



COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Item 2 of the Provisional Agenda

Twentieth Regular Session

Rome, 24–28 March 2025

DRAFT BASELINE REPORT ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE AND CLIMATE CHANGE

NOTE BY THE SECRETARIAT

1. The Commission on Genetic Resources for Food and Agriculture (Commission), at its Nineteenth Regular Session, reviewed and simplified the voluntary draft questionnaire on genetic resources for food and agriculture (GRFA) and climate change.¹ It requested the Secretariat to finalize the questionnaire by September 2023 and subsequently circulate it to all National Focal Points (NFPs) to the Commission to coordinate national consultations and subsequent submissions, with a view to establishing a baseline of national responses for all sectors. It further requested the Secretariat to prepare a summary of responses to the questionnaire for consideration by the Intergovernmental Technical Working Groups (Working Groups).²

2. In response to this request FAO finalized the questionnaire and circulated it to all NFPs of the Commission. This document contains the draft baseline report, which provides a summary and preliminary analysis of all responses received.

¹ CGRFA-19/23/Report, *Appendix B*.

² CGRFA-19/23/Report, paragraph 16.

DRAFT BASELINE REPORT ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE AND CLIMATE CHANGE

I. INTRODUCTION

Climate change is proceeding at an alarming rate with major ecological and genetic consequences for biodiversity. It poses a significant threat to our ability to ensure global food security, eradicate poverty, and achieve sustainable development. As the pace of climate change is increasing, it is more important than ever to conserve, characterize and sustainably use genetic resources for food and agriculture (GRFA) (FAO, 2022a).

The World Meteorological Organization (WMO) underscores the alarming trend of climate change indicators reaching unprecedented levels in 2023 (WMO, 2024). It states that 2023 was the warmest year on record at $1.45\text{ °C} \pm 0.12\text{ °C}$ above the pre-industrial average. Concentrations of greenhouse gases – carbon dioxide, methane and nitrous oxide – reached record-high observed levels in 2022 and real-time data indicates that these have continued to increase in 2023 (WMO, 2023). Global mean sea level reached a record high, with the rate doubling in the last decade (2014–2023) since the first decade of satellite record (1993–2002). It further highlights how extreme weather events are progressively affecting food security and agriculture, with wider socioeconomic implications.

Over millennia farmers, livestock keepers, fisherfolk and forest dwellers have adjusted their production systems to suit evolving environmental conditions, relying on GRFA. Despite their profound significance, these resources continue to be overlooked, lacking the recognition commensurate with their vital role.

Genetic resources and their diversity play an essential role in climate change adaptation and mitigation efforts. Addressing climate change is paramount for securing a sustainable future for the world's growing population. Climate change stands as a primary catalyst for biodiversity loss. The stressors and risks posed by climate change to the various sectors of GRFA (plants, animals, forests, aquatic resources, invertebrates and microorganisms) are various. Many agriculture, forestry, and other land-use options provide adaptation and mitigation benefits that could be upscaled across most regions (IPCC, 2023). Therefore, GRFA play a significant role in mitigation of and adaptation to the effects of climate change.

The Commission on Genetic Resources for Food and Agriculture's (Commission) study on *The role of genetic resources for food and agriculture in adaptation to and mitigation of climate change* (FAO, 2022a), highlighted that there continues to be many knowledge gaps about interactions at the genetic, species and production-system level. The study further showed that, in particular, further research is needed to fill data and information gaps regarding the genetic level and regarding climate change-related breeding programmes in the public and private sectors.

II. BACKGROUND

The Commission, at its Eighteenth Regular Session (FAO, 2021), noted the potential GRFA offer for climate change adaptation and mitigation. Coupled with the outcomes of the study on *The role of genetic resources for food and agriculture in adaptation to and mitigation of climate change*, it requested that a questionnaire be completed by the National Focal Points (NFPs) for the Commission with the aim of gathering information on activities at country level related to the impacts of climate change on GRFA and to the role of GRFA in climate change adaptation and mitigation.

The Commission, then, at its Nineteenth Regular Session, reviewed and simplified a draft questionnaire on GRFA and climate change (FAO, 2023a). It requested the Secretariat to finalize and subsequently circulate it only to National Focal Points to the Commission³ to coordinate national consultations and subsequent submissions, with a view to establishing a baseline of national responses

³ National Focal Points to the Commission on Genetic Resources for Food and Agriculture.

for all sectors. It further requested the Secretariat to prepare a summary of responses to the questionnaire (FAO, 2023a).

The results of the questionnaire are presented and analysed in this draft baseline report.

III. METHODOLOGY

The questionnaire was reviewed by the Commission's intergovernmental technical working groups (FAO, 2023b,c,d,e) and as requested by the Commission circulated to the 126 individual nominated by Member countries as NFPs for the Commission for completion,⁴ with a view to establishing a baseline of national responses for all sectors.

The questionnaire was launched in April 2024 through an online platform.

It addressed the following aspects:

- A. Assessments of climatic impacts on GRFA
- B. Integration of GRFA into the climate change planning processes
- C. Implementation of climate change policies, programmes and projects
- D. Impact of implementation on GRFA, adaptation and mitigation

Forty-four responses were received, covering the following regions: Africa 9; Asia 2; Europe 20; Latin America and the Caribbean 4; Near East 6; North America 2; and Southwest Pacific 1. However, as a general note the questionnaire numbering does not match the baseline as some countries did not answer all the questions. The analysis below tries to group and capture the essence of country submissions but might fall short of providing some details expressed in the questionnaire. There is no quality or preference judgement in the order of the replies.

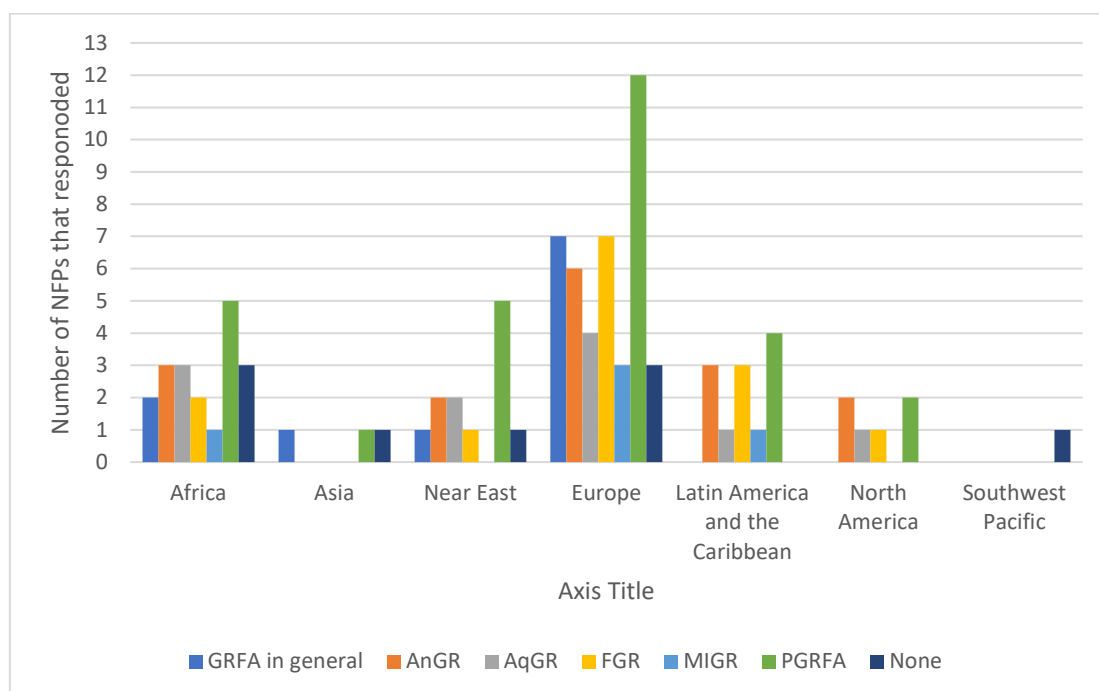
IV. RESULTS

1. Assessments undertaken regarding climate risk and vulnerability

The assessment of risk and vulnerability in the context of climate change is an important step, especially in adaptation planning, and helps inform policymakers on where to allocate resources. NFPs were therefore asked if any assessments had been undertaken regarding climate risk and vulnerability in their countries for GRFA in general and for the specific sectors. It was clear from the results that some countries in all regions, except the Southwest Pacific, had undertaken assessments with the highest rates being for Europe and the lowest in Asia. The highest levels of assessments were for the plant genetic resources for food and agriculture (PGRFA) sector.

⁴ <https://www.fao.org/cgrfa/overview/members/en>

Figure 1: Number of countries that have undertaken assessments regarding climate risk and vulnerability, by region



Notes: Total of 43 NFPs responded.

2. Integration of genetic resources for food and agriculture into the climate change planning process

Addressing GRFA as part of the climate change planning process is essential for ensuring a sustainable future, especially as the global population grows. GRFA are expected to play a significant role in mitigation of and adaptation to the consequences of climate change.

With the Cancun Adaptation Framework,⁵ the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) established a process for countries to formulate and implement National Adaptation Plans (NAPs) as a means of identifying medium- and long-term climate change adaptation needs and developing and implementing strategies and programmes to address those needs.

Thirty-six countries indicated that they have a NAP (or comparable(s)) already in place.⁶ Of those countries that responded positively, 32 indicated that the NAP (or comparable(s)) addresses other issues as well, whereas only one indicated that it addresses exclusively GRFA.

Nineteen NFPs indicated that their country's NAP (or comparable document(s)) addresses the sustainable use and conservation of GRFA,⁷ whereas ten indicated that this was not the case and three answered that they did not know.

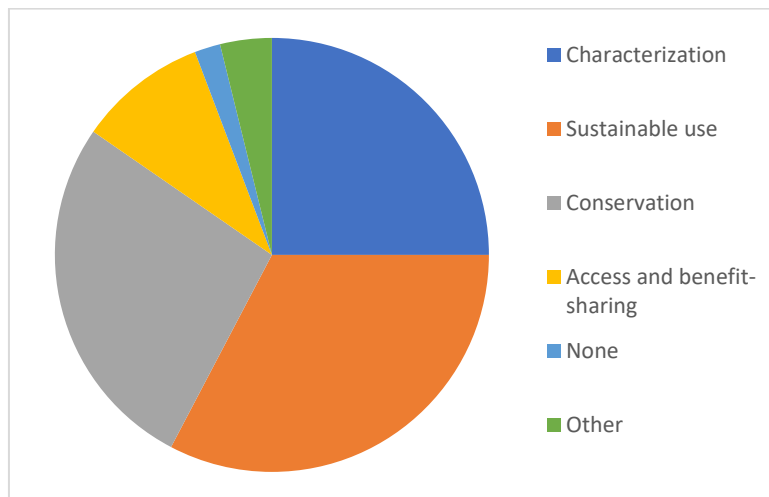
NFPs that indicated that their country's NAP addresses GRFA ranked the areas of GRFA management according to importance as shown in Figures 2.1 and 2.2.

⁵ <https://unfccc.int/process/conferences/pastconferences/cancun-climate-change-conference-november-2010/statements-and-resources/Agreements>

⁶ As of 27 June 2024, 57 countries have submitted their NAP to the UNFCCC. <https://napcentral.org/submitted-naps>

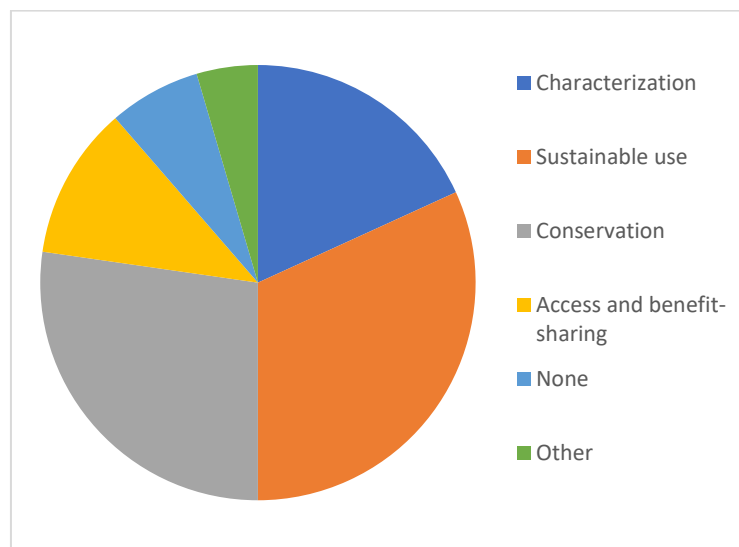
⁷ Argentina, Belarus, Cabo Verde, Central African Republic, Czechia, Ecuador, Finland, Germany, Italy, Jordan, Kyrgyzstan, Mali, Norway, Portugal, South Sudan, Switzerland, Uganda, United States of America, Yemen.

Figure 2.1: Areas of GRFA management that the NAP (or comparable document(s)) expressly considers as important for adaptation



Notes: Total of 19 NFPs responded.

Figure 2.2: Areas of GRFA management that the NAP (or comparable document(s)) expressly considers as important for mitigation

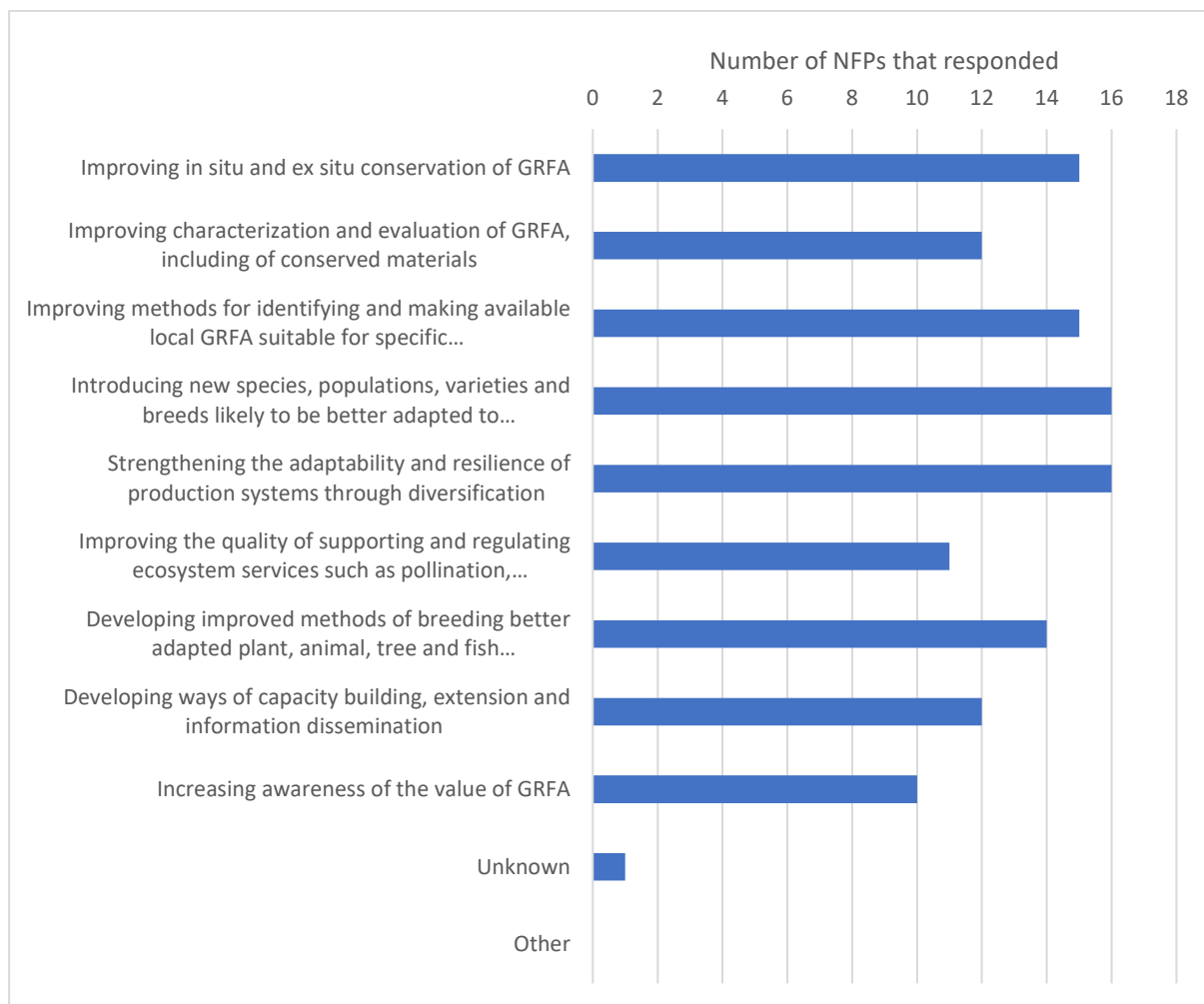


Notes: Total of 19 NFPs responded.

3. Specific measures on GRFA considered in NAP

NFPs that indicated they had NAP on GRFA were presented with a list of typical measures. Of all measures offered “introducing new species, populations, varieties and breeds likely to be better adapted to changed/changing conditions” and “strengthening the adaptability and resilience of production systems through diversification” were considered priorities (Figure 3).

Figure 3: Specific measures considered in the NAP (or comparable document(s))



Notes: Total of 18 NFPs responded.

4. GRFA as part of Nationally Determined Contributions

Nationally Determined Contributions (NDC) are a country's climate action plan to cut emissions and adapt to climate impacts. Parties to the Paris Agreement⁸ are required to establish an NDC and update it every five years.

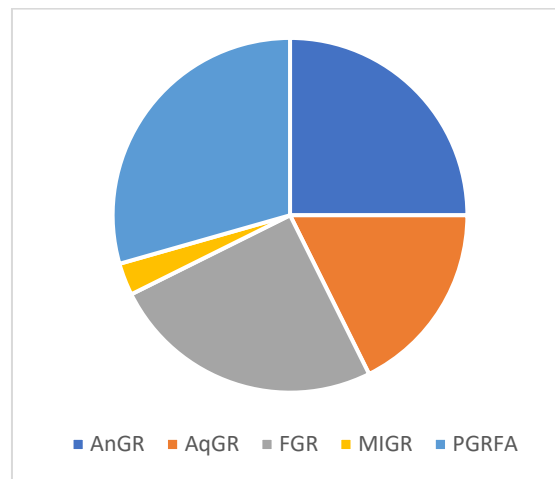
Twenty-five countries⁹ indicated that they have included sustainable use and/or conservation for one or more sectors of GRFA in their NDC or comparable document, 14 indicated they did not and five did not know.

NFPs that indicated that they have included sustainable use and/or conservation into their NDC or comparable document, indicated that PGRFA, followed by animal genetic resources for food and agriculture (AnGR) and forest genetic resources (FGR) are the sectors where most work for climate change for the adaptation and mitigation is undertaken (Figures 4.1 and 4.2).

⁸ <https://www.un.org/en/climatechange/paris-agreement>

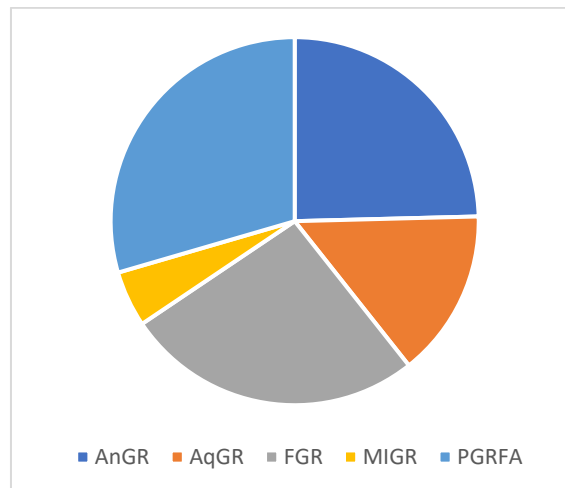
⁹ Argentina, Azerbaijan, Belarus, Cabo Verde, Central African Republic, Denmark, Ecuador, El Salvador, Estonia, Germany, Iran (Islamic Republic of), Ireland, Italy, Kyrgyzstan, Mali, Namibia, Norway, Peru, Poland, Portugal, Qatar, South Africa, South Sudan, Switzerland, Yemen.

Figure 4.1: Areas of GRFA management that the NDC (or comparable document(s)) expressly considers as important for adaptation



Notes: Total of 21 NFPs responded.

Figure 4.2: Areas of GRFA management that the NDC (or comparable document(s)) expressly considers as important for mitigation

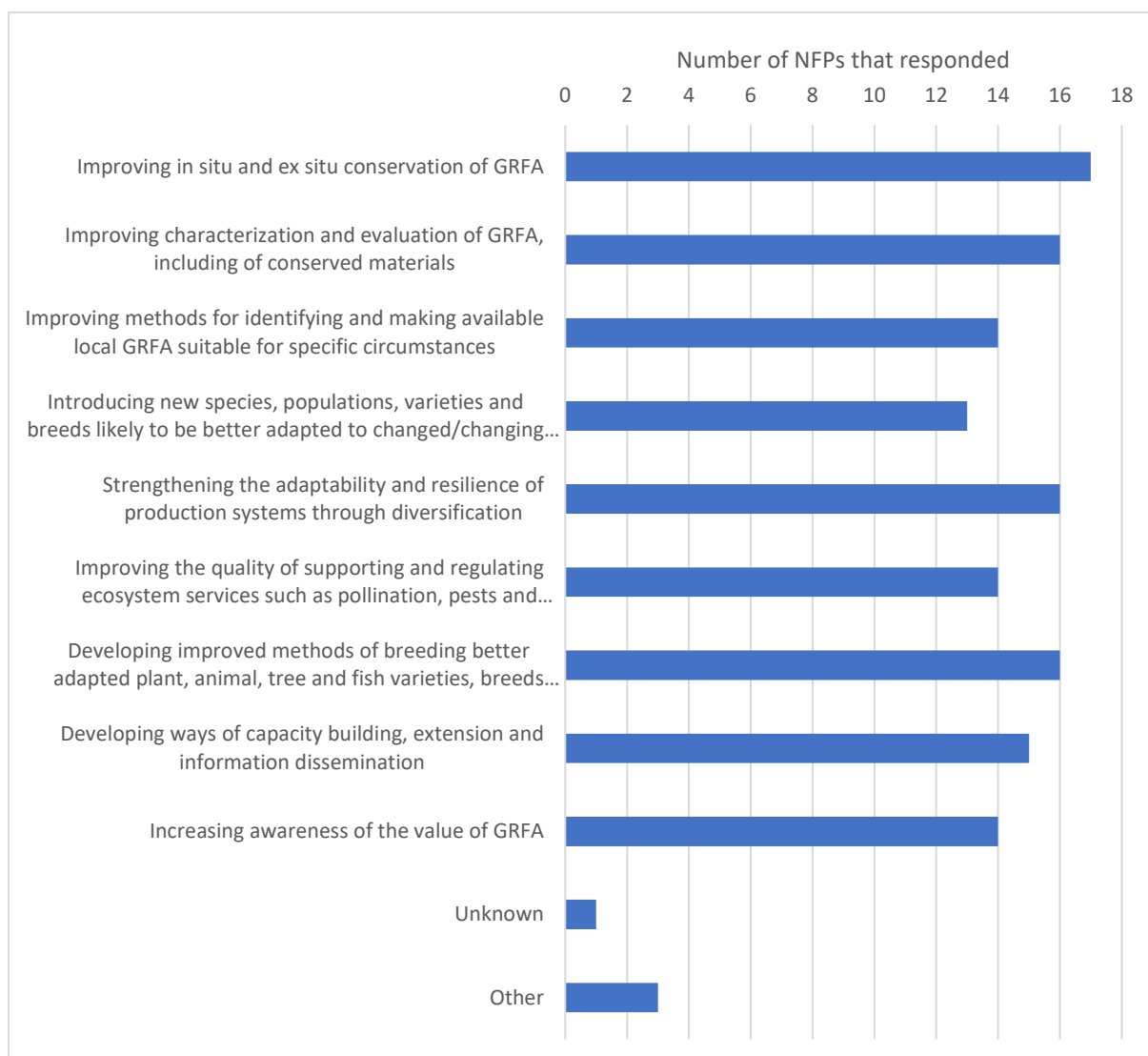


Notes: Total of 21 NFPs responded.

5. Specific measures on GRFA considered in NDC

Countries with NDC on GRFA were presented with a list of typical measures. Of all measures offered “improving *in situ* and *ex situ* conservation of GRFA” and “improving characterization and evaluation of GRFA, including of conserved materials” were considered priorities (Figure 5).

Figure 5: Specific measures considered in the NDC (or comparable document(s))



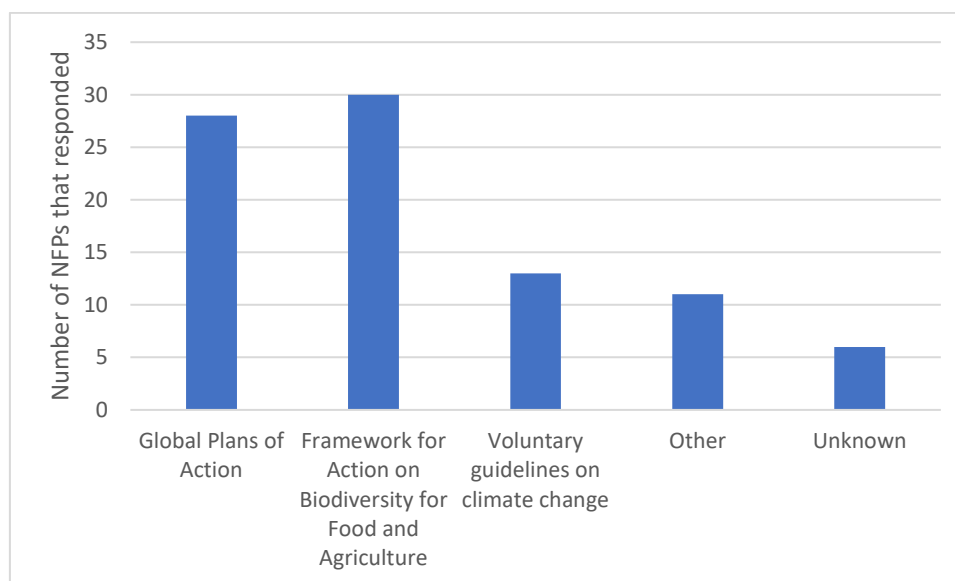
Notes: Total of 22 NFPs responded.

6. Commission instruments used in national planning related to climate change action

To date, the Commission has developed and published various tools and instruments to assist countries in managing genetic resources as a pivotal reservoir and tool at their disposal to adapt and mitigate agriculture and build resilience into agricultural and food production systems, including: the Global Plans of Action for animal (FAO, 2007), aquatic (FAO, 2022b), plant (FAO, 2011) and forest (FAO, 2014) genetic resources, the *Framework for Action on Biodiversity for Food and Agriculture* (FAO, 2022c) and the *Voluntary Guidelines to Support the Integration of Genetic Diversity into Climate Change Adaptation Planning* (FAO, 2015).

Most countries have used the *Framework for Action on Biodiversity for Food and Agriculture* and the various Global Plans of Action (Figure 6). However, the *Voluntary Guidelines to Support the Integration of Genetic Diversity into Climate Change Adaptation Planning* were only used by 13 countries. The objectives of the Voluntary Guidelines are: (i) to promote the use of GRFA in climate change adaptation and support their integration into national climate change adaptation planning; (ii) to support the genetic resources experts and those involved in climate change adaptation to identify and address the challenges and opportunities of GRFA in adaptation; and (iii) to promote the involvement of genetic resources stakeholders in the national climate change adaptation planning process. Furthermore, ten countries indicated the use of other instruments used in national planning.

Figure 6: Commission instruments used in national planning related to climate change action



Notes: Total of 44 NFPs responded.

7. Policy-related material to raise awareness on the value of GRFA

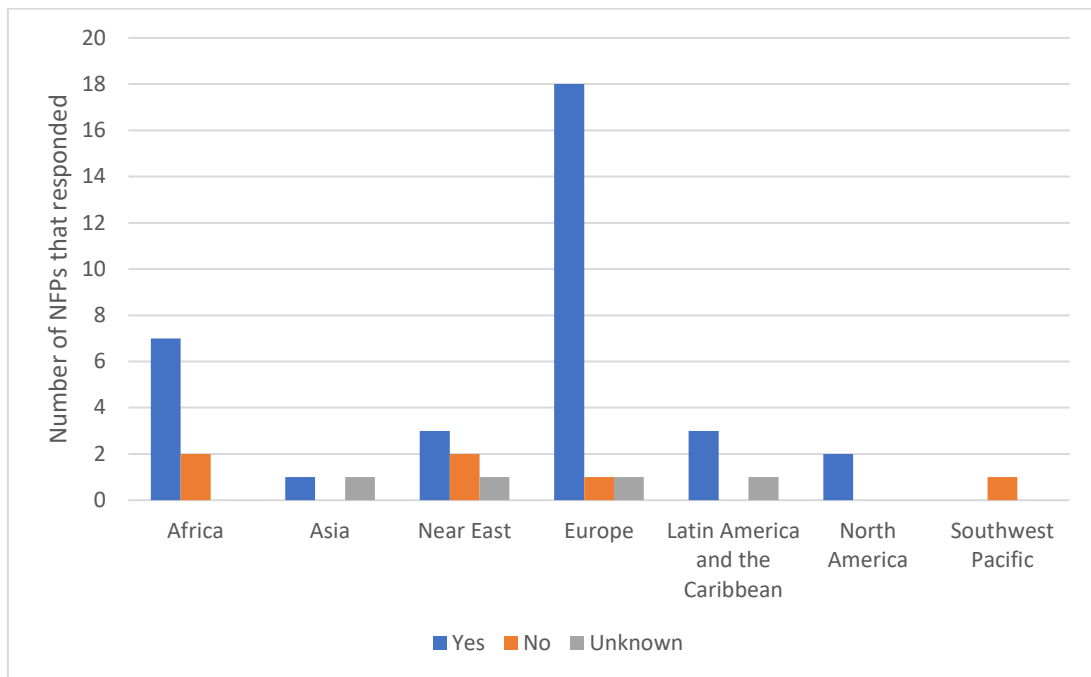
Across the different regions, 34 countries specified that their country has prepared policy-relevant materials intended to raise the awareness of policymakers of the value of GRFA (Figure 7), for example in the form of national plans, as in the case of Germany, Pakistan, South Africa and the United States of America¹⁰; projects, as in the case of Jordan; technical information, as in the case of Peru;¹¹ or country reports for the different sectors, as in the case of the Kingdom of the Netherlands.¹²

¹⁰ National Strategy on Genetic Resources for Food, Agriculture, Forestry and Fisheries (2024): https://www.ble.de/SharedDocs/Downloads/DE/Landwirtschaft/Biologische-Vielfalt/Strategie_Agrobiodiversitaet.pdf;jsessionid=0B26263100E22E1D6AF4182947267DF7.internet951?__blob=publicati%20onFile&v=8; Pakistan National Biodiversity Strategy and Action Plan for achieving Aichi Biodiversity Targets and Sustainable Development Goals (2017–2030): <https://www.cbd.int/doc/world/pk/pk-nbsap-v2-en.pdf>; Pakistan National Food Security Policy (2018): <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC184963/>; National Strategic Action Plan for conservation and sustainable use of crop wild relatives in South Africa National Plan for conservation and sustainable use of plant genetic resources for food and agriculture: dalrrd.gov.za/images/Branches/AgricProducHealthFoodSafety/genetic-resources/national-plan-for-conservation-and-sustainable-use-of-plant-genetic-resources-for-food-and-agricultur_p97467.pdf; National Plan for conservation and sustainable use of farm animal genetic resources (2016), South Africa: <https://old.dalrrd.gov.za/doiDev/sideMenu/geneticResources/docs/National%20Plan.pdf>; National Aquaculture Policy Framework (2013), South Africa: https://www.gov.za/sites/default/files/gcis_document/201409/36920gon763.pdf; The National Strategic Germplasm and Cultivar Collection Assessment and Utilization Plan (2023), United States of America: <https://www.ars-grin.gov/Pages/NPGS>

¹¹ Catálogo de Medidas de Mitigación: <https://sinia.minam.gob.pe/documentos/catalogo-medidas-mitigacion>; Catálogo de Medidas de Adaptación: <http://repositoriodigital.minam.gob.pe/xmlui/handle/123456789/686>

¹² <https://edepot.wur.nl/583694>; <https://edepot.wur.nl/323918>; <https://doi.org/10.18174/550632>; <https://edepot.wur.nl/428682>

Figure 7: Countries that have prepared policy-related material to raise awareness on the value of GRFA



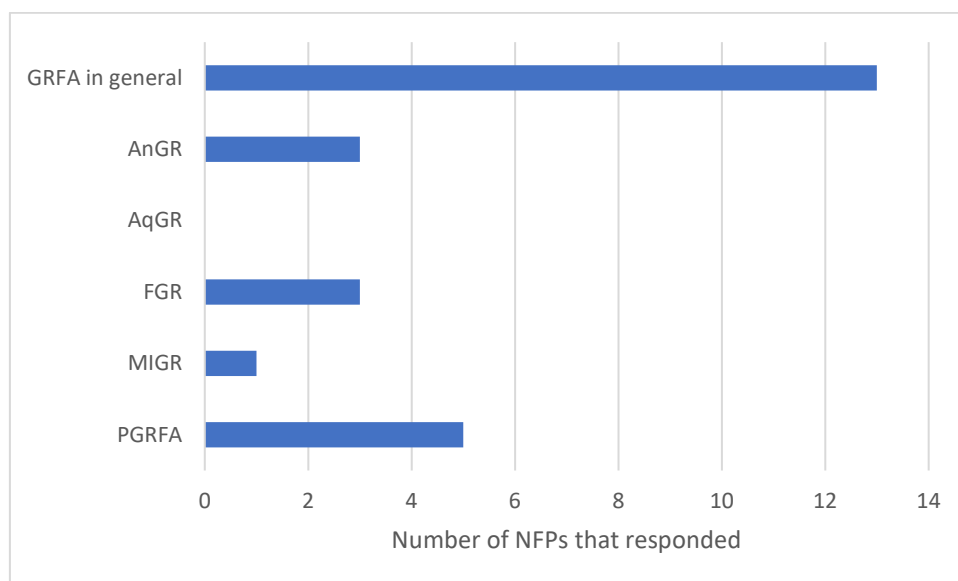
Notes: Total of 44 NFPs responded.

8. Implementation of climate change policies, programmes and projects

Countries were asked to indicate if they have established institutional arrangements, for example a country-level coordination mechanism, to strengthen the role of GRFA in national climate change adaptation planning and mitigation planning.

With regard to adaptation measures, a total of 21 countries indicated that they did have such arrangements in place, 18 indicated they did not and five did not know. Of those that responded that they did have such arrangements, these were predominantly related to GRFA in general, rather than to specific sectors of GRFA (Figure 8.1).

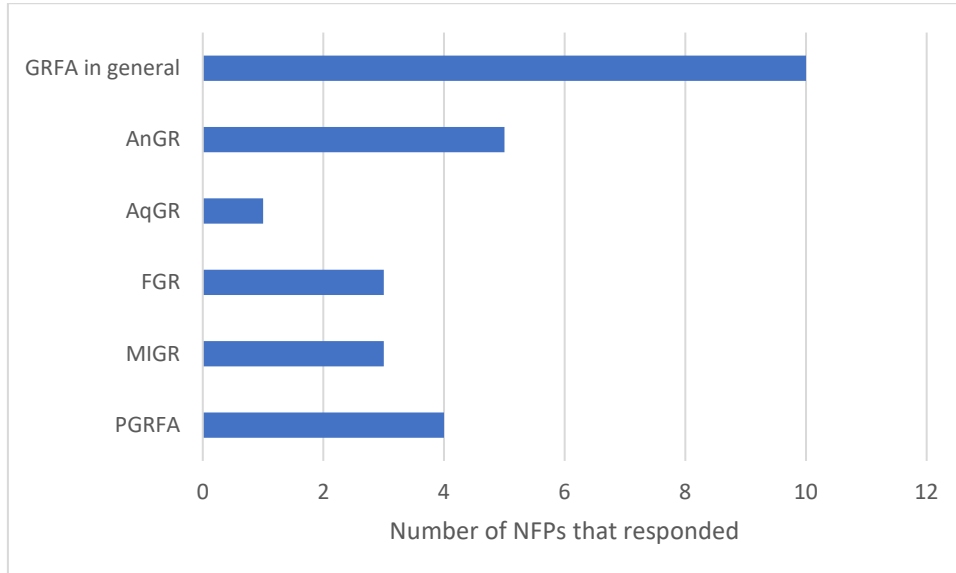
Figure 8.1: Institutional arrangements for strengthening the role of GRFA in national climate change adaptation planning



Notes: Total of 18 NFPs responded.

With regard to mitigation measures, 18 countries indicated that they did have arrangements in place, 20 indicated they did not and six did not know. Of those that responded that they did have such arrangements, these were again related to GRFA in general in most countries, rather than to specific sectors of GRFA (Figure 8.2).

Figure 8.2: Institutional arrangements for strengthening the role of GRFA in national climate change mitigation planning



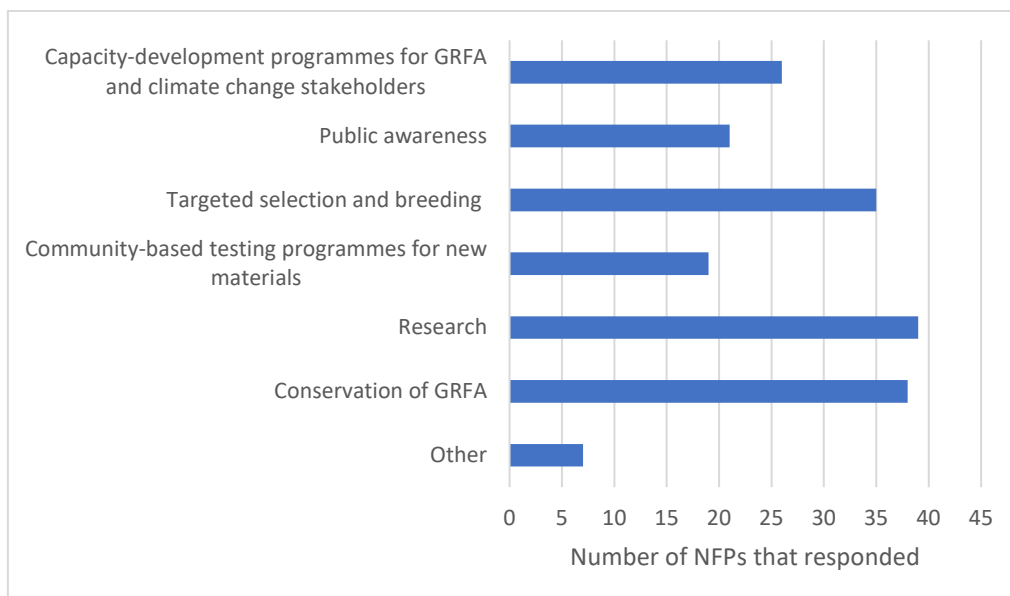
Notes: Total of 15 NFPs responded.

9. Types of activities related to GRFA implemented for climate change mitigation/adaptation

NFPs were presented with a list and asked to indicate which types of activities related to GRFA and climate change adaptation and mitigation have been implemented in their country (Figure 9).

The activity most frequently indicated by NFPs was “research”, followed by “conservation of GRFA” and “targeted selection and breeding”.

Figure 9: Types of activities related to GRFA and climate change adaptation and mitigation that have been implemented in a country

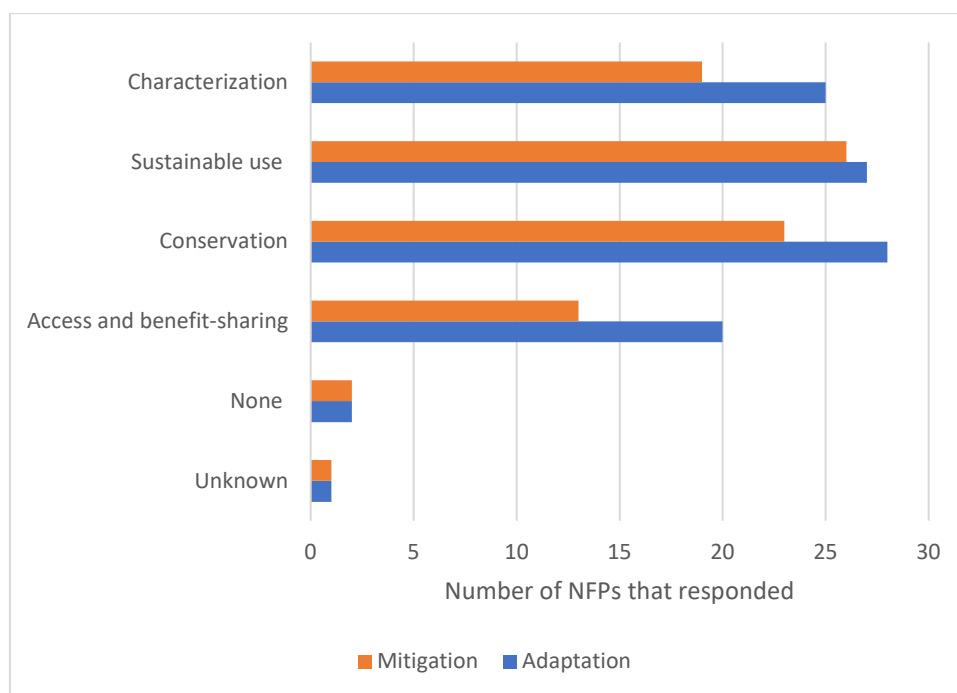


Notes: Total of 44 NFPs responded.

10. Areas considered important for adaptation and mitigation to climate change under countries climate change policy

Some countries then indicated which area(s) of management of GRFA are considered as important for adaptation to or mitigation of climate change under their country's climate change policy. As shown in Figure 10, conservation and sustainable use emerged as the top priorities for adaptation to climate change under the country's climate change policy, while sustainable use was the primary focus for mitigation to climate change under the country's climate change policy.

Figure 10: Areas of management of GRFA considered important for adaptation and mitigation to climate change under countries climate change policy



Notes: Total of 36 NFPs responded.

11. Capacity gaps or needs with relevance to the conservation and sustainable use of GRFA

Thirty of the 44 countries indicated institutional or technical capacity gaps or needs with relevance to the conservation and sustainable use of GRFA in the context of climate change adaptation/mitigation. Some countries further specified the nature of these gaps and needs, including:

- Technical gaps. For example, lack of professional capacities, lack of qualified personnel, lack of access to necessary equipment, lack of training, technology transfer, lack of national genebanks and comprehensive inventories.
- Institutional gaps. For example, strengthening of infrastructure, need for specialized interdepartmental commissions and not general climate change commissions, coordination difficulties, financial difficulties.
- Awareness raising regarding sustainable consumption patterns, as well as information sharing.
- Lack of policy, regulation or standardization.
- National coordination of genetic resource collection managers remains to be strengthened and optimized.

12. Impact of implementation on GRFA, adaptation and mitigation

The impact of climate change on the implementation on GRFA for adaptation and mitigation is vital to ensuring food security, promoting resilience and supporting ecosystems under changing climatic conditions. By using the genetic diversity within GRFA, crops and livestock may become more resilient to heat, drought and diseases, ensuring stable food production. Additionally, GRFA can play a crucial role in both adaptation and mitigation strategies, such as improving carbon sequestration through sustainable agricultural practices, thereby helping to combat climate change (FAO, 2019).

Twenty of the 44 countries NFPs specified that the impact of management practices on the conservation and sustainable use of GRFA and on the ecosystem services they deliver has been assessed in their country and that specific management practices have been identified and validated as being most conducive to climate change adaptation and mitigation.

13. Monitoring the impact of policies, projects or programmes related to climate change and GRFA

Sixteen NFPs indicated that the impact of policies, projects or programmes related to climate change and GRFA has been or is being monitored and assessed in their country. Other countries report that an accounting system for greenhouse gas emissions reduction is currently under development.

V. CONCLUSIONS

Although the analysis is based on insufficient data, it is evident that countries have recognized that GRFA play an important role in climate change adaptation and mitigation. Many countries have undertaken assessments regarding climate risk and vulnerability, not only for GRFA in general but for the specific sectors.

Based on the responses received it is evident that NAPs (or comparable documents) and NDC (or comparable(s)) increasingly acknowledge the role of the sustainable use and/or conservation of GRFA.

In addition, it is clear from the results that there are a number of gaps that still need to be addressed in order to help countries scale up their climate action. NFPs noted the need to strengthen technical knowledge at country level through training of personnel, strengthening infrastructures and better access to knowledge and equipment.

NFPs also noted the need for better coordination and collaboration within their respective countries among different departments/commissions so as to better address the sector-specific challenges. It is therefore essential to foster an enabling environment.

VI. REFERENCES

- FAO.** 2007. *Global Plan of Action for Animal Genetic Resources and the Interlaken Declaration*. Rome. <https://openknowledge.fao.org/handle/20.500.14283/a1404e>
- FAO.** 2011. *Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture*. Rome. <https://openknowledge.fao.org/handle/20.500.14283/i2624e>
- 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>
- FAO.** 2015. *Voluntary guidelines to support the integration of genetic diversity into national climate change adaptation planning*. Rome. <https://openknowledge.fao.org/handle/20.500.14283/i4940e>
- FAO.** 2019. *The State of the World's Biodiversity for Food and Agriculture*. J. Bélanger & D. Pilling eds. FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome. <https://doi.org/10.4060/CA3129EN>

- FAO.** 2021. *Report of the Eighteenth Regular Session of the Commission on Genetic Resources for Food and Agriculture*. CGRFA-18/21/Report, 27 September–1 October 2021. Rome. <http://www.fao.org/3/nh331en/nh331en.pdf>
- FAO.** 2022a. *The role of genetic resources for food and agriculture in adaptation to and mitigation of climate change*. FAO Commission on Genetic Resources for Food and Agriculture. Rome. <https://doi.org/10.4060/cb9570en>
- FAO.** 2022b. *Global Plan of Action for the Conservation, Sustainable Use and Development of Aquatic Genetic Resources for Food and Agriculture*. FAO Commission on Genetic Resources for Food and Agriculture. Rome. <https://doi.org/10.4060/cb9905en>
- FAO.** 2022c. *Framework for Action on Biodiversity for Food and Agriculture*. FAO Commission on Genetic Resources for Food and Agriculture. Rome. <https://doi.org/10.4060/cb8338en>
- FAO.** 2023a. *Report of the Nineteenth Regular Session of the Commission on Genetic Resources for Food and Agriculture*. CGRFA-19/23/Report, 17–21 July 2023. Rome. <http://www.fao.org/3/nh331en/nh331en.pdf>
- FAO.** 2023b. *Report of the Twelfth Session of the Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture*. CGRFA/WG-AnGR-12/23/Report, 18–20 January 2023. Rome. <https://www.fao.org/3/nl432en/nl432en.pdf>
- FAO.** 2023c. *Report of the Fourth Session of the Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture*. CGRFA/WG-AqGR-4/23/Report, 21–23 February 2023. Rome. <https://www.fao.org/3/nl911en/nl911en.pdf>
- FAO.** 2023d. *Report of the Seventh Session of the Intergovernmental Technical Working Group on Forest Genetic Resources*. CGRFA/WG-FGR-7/23/Report, 7–9 March 2023. Rome. <https://www.fao.org/3/nm012en/nm012en.pdf>
- FAO.** 2023e. *Report of the Eleventh Session of the Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture*. CGRFA/WG-PGR-11/23/REPORT, 18–20 April July 2023. Rome. <https://www.fao.org/3/nm279en/nm279en.pdf>
- IPCC.** 2023: *Summary for Policymakers*. In: *Climate Change 2023: Synthesis Report*, pp. 1–34. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Core Writing Team: H. Lee and J. Romero, eds., Geneva, Switzerland. doi: 10.59327/IPCC/AR6-9789291691647.001. https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf
- WMO.** 2023. *The state of greenhouse gases in the atmosphere based on global observations through 2022*. Greenhouse Gas Bulletin No. 19–15 November 2023. <https://library.wmo.int/records/item/68532-no-19-15-november-2023>
- WMO.** 2024. *State of the Global Climate 2023*. WMO-No. 1347. <https://library.wmo.int/idurl/4/68835>