



COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Item 3 of the Provisional Agenda

INTERGOVERNMENTAL TECHNICAL WORKING GROUP ON AQUATIC GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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STATUS OF THE IMPLEMENTATION OF THE GLOBAL PLAN OF ACTION FOR THE CONSERVATION, SUSTAINABLE USE AND DEVELOPMENT OF AQUATIC GENETIC RESOURCES

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ANNEX 1: List of significant FAO publications related to aquatic genetic resources for food and agriculture in 2021–2022

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I. INTRODUCTION

1. At the initiative of the Commission on Genetic Resources for Food and Agriculture (Commission)¹, the Council, at its 168th Session in December 2021, adopted the Global Plan of Action for the Conservation, Sustainable Use and Development of Aquatic Genetic Resources for Food and Agriculture (Global Plan of Action).²
2. The Committee on Fisheries Sub-Committee on Aquaculture (COFI:AQ), at its Eleventh Session, welcomed the adoption of the Global Plan of Action and highlighted the need for wider adoption of selective breeding for the genetic improvement of species in aquaculture.³ The Committee on Fisheries, at its Thirty-fifth Session appreciated FAO's work on the Global Plan of Action and supported the implementation of the associated global information system to ensure the effective and sustainable use of aquatic species.⁴
3. This document summarizes the activities undertaken by FAO since September 2021, in collaboration with its partners, in support of the implementation of the Global Plan of Action and seeks the Commission's guidance as to future activities.

II. RAISING AWARENESS ON AQUATIC GENETIC RESOURCES AND THE GLOBAL PLAN OF ACTION

4. At its Eighteenth Regular Session the Commission requested FAO to continue distributing *The State of the World's Aquatic Genetic Resources for Food and Agriculture* (SoW-AqGR) and communicating its key messages widely, including through regional and subregional workshops. The Global Plan of Action represents the critical response to the needs and challenges identified in the SoW-AqGR and thus represents a key component of FAO's communication on aquatic genetic resources for food and agriculture (AqGR).
5. The Global Plan of Action has been published in all UN languages and is available on the FAO's website and in printed form.⁵ Print copies are being distributed to key stakeholders including national focal points and regional FAO offices.
6. FAO presented the SoW-AqGR and the Global Plan of Action on various occasions, including at:
 - the International Symposium on Fisheries and Aquatic Sciences (keynote address), September 2021, Ismir, Türkiye;
 - the Global Conference on Aquaculture, September 2021, Shanghai, China;
 - Aquaculture Europe, September 2022, Rimini, Italy;
 - the International Symposium on Genetics in Aquaculture (keynote address), November 2022, Puerto Varas, Chile; and
 - regional fora in East Africa (October, 2022) and national fora in India (December 2021), Indonesia (June 2022) and Chile (December 2022).
7. FAO published multiple articles referring to the SoW AqGR and the Global Plan of Action, as listed in Annex 1. Furthermore, a number of communication activities have been conducted in the context of FAO's work in support of the implementation of specific strategic priorities of the Global Plan of Action as outlined in this document.

¹ CGRFA-18/21 Report, paragraph 58.

² CL 168/REP, paragraph 38a.

³ CGRFA/WG-AqGR-4/23/3/Inf.6, paragraph 8.

⁴ CGRFA/WG-AqGR-4/23/3/Inf.5, paragraph 17(i).

⁵ <https://www.fao.org/documents/card/en/c/cb9905en>

III. FAO'S ACTIONS FACILITATING THE IMPLEMENTATION OF THE GLOBAL PLAN OF ACTION

Terminology for the description of AqGR

8. At its Eighteenth Regular Session, the Commission requested FAO to make available the key terminology from the report (e.g. as a stand-alone glossary) and integrate relevant terms into FAO's Term Portal. In response to this request and in support of strategic priority 1.1 of the Global Plan of Action, FAO is coordinating a process of standardisation of AqGR-related terminology across a range of FAO hosted platforms.

9. FAO is currently finalizing an updated glossary of terms used in the SoW-AqGR and considered to be essential for the description of AqGR.⁶ The terminology will also be used for the description of farmed types in AquaGRIS.⁷ The glossary is being developed with reference to definitions already developed for AquaGRIS and definitions used in the scientific literature and in the current FAO Term Portal, which contains multiple collections of terms relevant to different sectors and disciplines. To the extent possible, terms used in the glossary will be harmonized with those used in FAO Term Portal and AGROVOC thesauri. AGROVOC is a multilingual and controlled vocabulary designed to cover concepts and terminology under FAO's areas of interest.

10. In preparing the glossary, FAO is developing a protocol for analysis of terminology used in scientific literature for descriptions of AqGR, utilizing the search engine functions of the Aquatic Sciences and Fisheries Abstracts (ASFA), which can be used as an indicator to monitor changes in terminology use over time, including the adoption of new FAO-introduced terms, such as those used in AquaGRIS, in the aquaculture literature.

AquaGRIS

11. With the support from the Government of Germany, FAO continued, during the reporting period, with the development of AquaGRIS, FAO's global information system for AqGR (in support of strategic priorities 1.2 and 1.3). A prototype of AquaGRIS,⁸ launched in May 2022, enables access to information entered by species' level experts covering 114 species with data from over 41 different countries.

12. The development of a fully functional version of AquaGRIS is underway and the full version will incorporate: (i) feedback received from experts who have been using the prototype system; (ii) data on wild stocks in addition to farmed types of cultured species; and (iii) additions and refinements of data collection to enable the generation of data related to indicators for the status of AqGR and the implementation of the Global Plan of Action.⁹ The data collection on wild relative genetic resources has been developed in response to and in line with recommendations provided by an expert workshop held by FAO in July 2022.¹⁰

13. The fully functional version of AquaGRIS will utilize a new bespoke web-based data entry interface, including an MS Excel-based version that can be used for offline data entry. It will also include an expanded data verification interface and an updated data query interface that will enable the generation of expanded reports and fact sheets enabling output of all data contained in the AquaGRIS database, including the generation of indicators of the status of AqGR at national, regional and global levels. The fully functional version of AquaGRIS will be released in 2023.

14. As part of the AquaGRIS development project, training in the use of AquaGRIS will be conducted in a series of virtual and, where feasible, in-person webinars/workshops in 2023. In

⁶ See list of terms reported in CGRFA/WG-AqGR-4/23/3/Inf.3.

⁷ FAO. 2020. What are "farmed types" in aquaculture and why do they matter? FAO Aquaculture News, 61: 40–42. Rome (<https://www.fao.org/3/ca8302en/ca8302en.pdf#page=40>)

⁸ <https://www.fao.org/fishery/aquagris/home>

⁹ See CGRFA/WG-AqGR-4/23/4.

¹⁰ CGRFA/WG-AqGR-4/23/3/Inf.4.

addition, FAO will identify at least one or two countries per region that will be supported in uploading data on their AqGR into AquaGRIS.

Guidelines facilitating the implementation of the Global Plan of Action

15. As requested by the Working Group¹¹ and in support of strategic priorities 2.1, 2.3, 2.4 and 2.5, FAO is developing guidelines on genetic management in stocking programmes identifying best practices and providing practical genetics-related advice to hatchery, fishery and resource managers on how to responsibly and sustainably use AqGR in stocking programmes for recreation, ecosystem rehabilitation and conservation. Stocking programmes, whereby hatchery-reared seed, juveniles or adults are introduced into the natural environment, are carried out in support of capture fisheries management and conservation, or to create or improve ecosystem services, and can have the objective of stock establishment, restocking, stock enhancement or ranching. The different rationales and objectives for these stocking practices have differing risks and benefits and thus somewhat differing implications for genetic management of the stocked genetic material. The draft guidelines will also include case studies and identify best practices to follow. They provide a decision support tool to inform the correct choice of genetic management strategy depending on the different stocking scenarios. An outline of the guidelines is provided in information document *Outline of guidelines on genetic management in stocking programmes*.¹²

16. In support of strategic priority 2.4, FAO is also in the process of developing guidelines for *ex situ in vitro* gene banking with a significant focus on cryopreservation of various life-cycle stages of a range of aquatic species. *Ex-situ, in vitro* gene banking is used far less extensively in aquaculture than in terrestrial agriculture and practical application of such techniques is mainly focused on cryopreservation of gametes (principally sperm) of fish and shellfish, for conservation or for supporting genetic management in aquaculture breeding, and gene banking of farmed types of macro- and microalgae. The guidelines will present the current state of the art and best practices for practical application of *ex situ, in vitro* gene banking in aquatic species. An outline of the guidelines is provided in information document *Outline of guidelines for ex situ in vitro gene banking of aquatic species*.¹³

17. Both guidelines are being further developed in consultation with experts in the respective fields. FAO intends to initiate broad consultations to allow Members and observers to provide inputs to and comments on the draft guidelines. A finalized draft of the guidelines will be made available to the Working Group at its Fifth Session, for its consideration.

Management of AqGR

18. In support of strategic priority 3.2, and as part of its awareness-raising efforts, FAO commissioned three case studies to illustrate critical issues in relation to the management of AqGR. These case studies (see other documents for summary version of each case study) were developed under the auspices of a regional aquaculture platform and covered:

- a. *Genetic management of Indian major carps* illustrating the pitfalls of not paying due attention to genetic management within important seed supply systems.
- b. *Lessons from two decades of tilapia genetic improvement in Africa* illustrating the challenges of developing breeding programmes in a developing country context.
- c. *Proactive approach proved key to survival for the Australasian Pacific oyster industry* illustrating the benefits of an industry-driven breeding programme.

19. Also in support of strategic priority 3.2 (capacity building), FAO, in partnership with the Norwegian Institute of Food, Fisheries and Aquaculture Research (Nofima), has developed an on-line training course on *Management and Development of Aquaculture Genetic Resources*. The content development for this course is complete and has been reviewed by relevant experts and stakeholder trainees and FAO is now identifying a platform to make this training widely available to a range of

¹¹ CGRFA/WG-AqGR-2/18/Report, paragraph 25.

¹² CGRFA/WG-AqGR-4/23/3/Inf.1.

¹³ CGRFA/WG-AqGR-4/23/3/Inf.2.

different stakeholders. More details on the 18 modules of this course, which includes lectures and supporting information material, are provided in Annex 2.

IV. FAO SUPPORT TO COUNTRY IMPLEMENTATION OF THE GLOBAL PLAN OF ACTION

20. FAO is providing technical support to two countries in the implementation of specific elements of the Global Plan of Action. FAO contributes to the Technical Cooperation Project *Technical assistance in developing a national strategy for sustainable management of aquatic genetic resources* in Indonesia and to the project *Development of a strategy to implement in Chile the Global Plan of Action for the conservation, sustainable use and development of aquatic genetic resources for food and agriculture in aquaculture and fisheries*, funded by the government of Chile and to which FAO is providing technical support to both projects.

21. Discussions have been initiated with a number of national and regional organizations in relation to the use of AquaGRIS for the development of national registries of AqGR that would facilitate the needs-based implementation of the Global Plan of Action based on national information on AqGR.

V. MONITORING OF THE IMPLEMENTATION OF THE GLOBAL PLAN OF ACTION

22. The improvement and harmonization of monitoring and reporting procedures is one of the Strategic Priorities of the Global Plan of Action. The document *Development of Indicators for Monitoring the Status of Aquatic Genetic Resources for Food and Agriculture (CGRFA/WG-AqGR-4/23/4)* outlines a strategy for monitoring the implementation of the Global Plan of Action by Members. Monitoring the implementation of the Global Plan of Action will involve approximately biennial updating of information in AquaGRIS and periodic supplementary surveys. Members will be encouraged to create national registries of their AqGR with a view to generate a benchmark for the status of AqGR and to complement and update the information they contributed to the preparation of SoW-AqGR. This process is also intended to act as a catalyst for Members, given the availability of detailed and accessible summaries of the status of AqGR in their countries that can be related to relevant indicators, to review the Global Plan of Action and identify key strategic priorities and associated actions related to that status.

23. To date there is no funding strategy for the implementation of the Global Plan of Action. The Working Group is encouraged to consider and propose mechanisms for funding for Member's implementation.

VI. GUIDANCE SOUGHT

24. The Working Group is invited to take note of the actions taken by FAO to facilitate and support the implementation of the Global Plan of Action and provide guidance to the Commission on further activities in this regard. The Working Group may wish to:

- welcome the release of the prototype of AquaGRIS and encourage FAO to finalize the full version of AquaGRIS;
- request FAO to finalize the glossary, including the process of standardization of AqGR-related definitions across FAO and related term directories and thesauri;
- review the document *Outline of guidelines on genetic management in stocking programmes* and the document *Outline of guidelines for ex situ in vitro gene banking of aquatic species*, and request FAO to finalize both, for review by the Working Group at its next session.

25. The Working Group may wish to recommend that the Commission:

- call upon countries to implement the Global Plan of Action, make use of AquaGRIS and develop national inventories of AqGR;
- recommend that FAO continue to coordinate and support the implementation of the Global Plan of Action, to complete the development of AquaGRIS and to continue to host and coordinate AquaGRIS;
- encourage donors to support the implementation of the Global Plan of Action; and
- recommend that FAO continue pursuing extra budgetary funds to support the implementation of the Global Plan of Action.

ANNEX 1
LIST OF SIGNIFICANT FAO PUBLICATIONS RELATED TO AQUATIC GENETIC RESOURCES FOR FOOD AND AGRICULTURE IN 2021–2022

Mair, G. & Lucente, D. 2022. FAO Resources for Strategic Planning. <i>Indian J. of Plant Genet. Resour.</i> , 35(3): 285–288. See other documents.
Mair, G.C. & Lucente, D. 2022. FAO Council adopts a Global Plan of Action for enhancing the management of aquatic biodiversity used for aquaculture. <i>FAO Aquaculture News</i> , 65 (Special Issue): 35–37. Rome, FAO. https://www.fao.org/3/cc0158en/cc0158en.pdf#page=35
FAO. 2022. <i>Global plan of action for the conservation, sustainable use and development of aquatic genetic resources for food and agriculture</i> . Commission on Genetic Resources for Food and Agriculture. Rome. https://doi.org/10.4060/cb9905en
FAO. 2021. Report of the African Regional Workshop on Development of a Global Information System for Farmed Types of Aquatic Genetic Resources (Incorporating a Review of Strategic Priorities for a Global Plan of Action), Addis Ababa, Ethiopia, 2–4 December 2019. FAO Fisheries and Aquaculture Report No. 1325. Rome. https://doi.org/10.4060/cb2343en
FAO. 2021. Report of the Regional Workshop for Asia and the Pacific Region on the Development of a Registry of Farmed Types of Aquatic Genetic Resources (Incorporating a review of strategic priorities for a Global Plan of Action), Virtual Workshop, 8–12 June 2020. FAO Fisheries and Aquaculture Report No. 1324. Rome. https://doi.org/10.4060/cb3412en
FAO. 2021. Report of the Regional Workshop for Europe and Central Asia on the Development of a Global Information System of Farmed Types of Aquatic Genetic Resources (Incorporating a Review of Strategic Priorities for a Global Plan of Action), Virtual Workshop, 5–8 October 2020. FAO Fisheries and Aquaculture Report No. 1329. Rome. https://doi.org/10.4060/cb2359en
FAO. 2021. Report of the Regional Workshop for Latin America and the Caribbean and for North America on the Development of a Registry of Farmed Types of Aquatic Genetic Resources (Incorporating a review of strategic priorities for a Global Plan of Action), Virtual Workshop, 21–24 September 2020. FAO Fisheries and Aquaculture Report No. 1328. Rome. https://doi.org/10.4060/cb3413en
FAO. 2021. Report of the Regional Workshop for the Near East on the Development of a Registry of Farmed Types of Aquatic Genetic Resources (Incorporating a review of strategic priorities for a Global Plan of Action), Virtual Workshop, 7–8 December 2020. FAO Fisheries and Aquaculture Report No. 1344, Rome. https://doi.org/10.4060/cb4763en
Lucente, D., Sims, S., Lei, G. & Mair, G. 2021. Conservation of farmed aquatic species: an opportunity we must not miss! <i>FAO Aquaculture News</i> , 63: 51–53. Rome, FAO. www.fao.org/3/cb4850en/cb4850en.pdf#page=51
Mair, G.C., Lucente, D., Viparthy, K. & Ellenbroek, A. 2021. FAO releases a prototype of a new global information system for aquatic diversity. <i>FAO Aquaculture News</i> , No. 64, pp. 47–49. www.fao.org/3/cb8047en/cb8047en.pdf#page=47

**ANNEX 2 MODULE TITLES FOR ON LINE COURSE CONTENT FOR THE
FAO/NOFIMA TRAINING RESOURCE ON MANAGEMENT AND DEVELOPMENT OF
AQUATIC GENETIC RESOURCES**

Module	Topic
1	Needs and challenges in genetic management in aquaculture
2	Status, benefits and scope of aquaculture selective breeding
3	Aquaculture species as breeding animals
4	Defining breeding objective/goals for aquaculture species
5	Recording of phenotypes and pedigrees, DNA sampling for genotyping
6	Mating designs for fish species
7	Design of simple and more advanced breeding programs
8	Estimation of breeding values and selection of breeding candidates
9	Inbreeding and control of the rate of inbreeding
10	Genotype by environment interactions in aquaculture
11	Dissemination and measuring of genetic gain
12	Introduction to the application of genomic information in selection (marker assisted selection and genomic selection)
13	Molecular genetic tools and chromosome manipulation as genetic improvement tools
14	Application and governance of gene editing
15	FAO framework of sustainable use and development
16	The Global Plan of Action for Conservation, Sustainable Use and Development of AqGR for Aquaculture
17	Terminology usage
18	AquaGRIS global information system for aquatic biodiversity