



# COMMITTEE ON FISHERIES

## SUB-COMMITTEE ON AQUACULTURE

### Tenth Session

Trondheim, Norway, 23–27 August 2019

## THE STATE OF THE WORLD'S AQUATIC GENETIC RESOURCES FOR FOOD AND AGRICULTURE AND POSSIBLE FOLLOW-UP

### Executive Summary

This working document provides background to the preparation of the first report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture*, gives an overview of its key findings and seeks the Sub-Committee's view on the development of a Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture.

### Suggested action by the Sub-Committee

The Sub-Committee is invited to:

- Welcome the report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture*;
- Provide advice on the proposed objectives, overall structure and potential strategic priorities for a Global Plan of Action on Aquatic Genetic Resources for Food and Agriculture, as provided in the Appendix to this document; and
- Request FAO to prepare a draft Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture, taking into account advice provided by the Regions and by the Committee on Fisheries and its relevant subsidiary bodies, for review by the Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture and the Commission on Genetic Resources for Food and Agriculture, at their next sessions.



## INTRODUCTION

1. Despite the crucial role of farmed aquatic species and their wild relatives in contributing to global food security and sustainable livelihoods, information available on farmed aquatic genetic resources for food and agriculture (AqGR) and their wild relatives tends to be scattered and is generally incomplete. There are still gaps in reporting aquaculture data at country level, and to FAO. Furthermore, characterization of aquatic genetic diversity at levels below that of the species is limited to a relatively small number of species and countries.
2. Lack of data and information, and inadequate standardization of terminology and nomenclature, result in poor understanding of the status and trends of AqGR. There is, however, growing recognition that improved information on the status, trends and drivers affecting AqGR will be increasingly important to support sustainable aquaculture and wild catch fisheries to improve food security and nutrition. There is a growing body of information on farmed AqGR, including aquatic plants, and on genetically distinct fish stocks, but there is an increasing need for more information to underpin sound management. At the same time, many countries lack the capacity and/or the resources to collect information on AqGR diversity.
3. Improvements in knowledge of the status and trends of the use and conservation of farmed aquatic species and their wild relatives will enable stronger and more comprehensive policy and planning, and overall management of these essential resources. The report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture* (the Report) aims to provide (i) a global assessment of the status and trends of farmed aquatic species and their wild relatives and (ii) a basis for action to enhance their conservation, sustainable use and development at country, regional and international levels.
4. This document provides background to the preparation of the Report, gives an overview of its contents and seeks the Sub-Committee's view on the development of a Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture.

## BACKGROUND

5. As reported to previous sessions of the Sub-Committee, the Commission on Genetic Resources for Food and Agriculture (Commission) agreed in 2007 that improving the collection and sharing of information on aquatic genetic resources is of high priority; it therefore included the preparation of the country-driven Report into its Multi-Year Programme of Work (MYPOW).
6. At its 14<sup>th</sup> Regular Session in 2013, the Commission decided "that the scope of the report would be farmed aquatic species and their wild relatives within national jurisdiction".<sup>1</sup> The Commission agreed on the structure of the report and invited countries to prepare country reports for the Report with the involvement of all relevant stakeholders.<sup>2</sup>
7. In 2016, the Commission's newly established Ad Hoc Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture (WG AqGR) as well as the Committee on Fisheries (COFI) Advisory Working Group on Aquatic Genetic Resources and Technologies (COFI

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<sup>1</sup> CGRFA-14/13/Report, paragraph 76.

<sup>2</sup> CGRFA-14/13/Report, Appendix H.

AWG–AqGRT) considered FAO's work on aquatic genetic resources and, within this context, the draft Report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture*.<sup>3</sup>

8. The WG AqGR provided detailed recommendations,<sup>4</sup> which the COFI AWG–AqGRT "appreciated and endorsed" at its second session held in October 2017, also providing some additional guidance on priority needs and areas of work for FAO on AqGR.<sup>5</sup> The Sub-Committee, at its 9th session in 2017 also welcomed the forthcoming report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture*.<sup>6</sup>

9. The Thirty-third Session of COFI held in Rome from 9 to 13 July 2018<sup>7</sup> welcomed the draft Report, and recommended its finalization by the Secretariat and wide distribution. COFI further recommended that FAO develop a global information system, including a registry of species, to monitor and assess the status of aquatic genetic resources relevant to aquaculture.

10. In 2019, FAO presented the "proofing version" of the Report to the Commission. The Commission acknowledged the progress made in the preparation of the Report, representing an important milestone, and appreciated the work undertaken towards this first global assessment of aquatic genetic resources. The Commission requested that FAO finalize, launch and widely distribute the report and its in-brief version in 2019.<sup>8</sup>

11. The Commission also reviewed options for follow up to the Report including proposed objectives, overall structure and a list of follow-up strategic priorities<sup>9</sup> that were presented to it. The Commission requested FAO to prepare a Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture for review by the WG AqGR and the Commission at their next sessions.<sup>10</sup> On the occasion of this session, the Commission also decided to establish the WG AqGR as a regular intergovernmental technical working group. The Commission also stressed the importance of continuing the valuable collaboration with COFI and its relevant subsidiary bodies.<sup>11</sup>

## **THE REPORT ON *THE STATE OF THE WORLD'S AQUATIC GENETIC RESOURCES FOR FOOD AND AGRICULTURE***

12. The Report<sup>12</sup> is the first ever global assessment of AqGR, with its scope being limited to cultured AqGR and their wild relatives, within national jurisdiction. The main sources of information for the preparation of this assessment were reports submitted by countries on the status of their AqGR and five specially commissioned Thematic Background Studies.<sup>13</sup> Overall, 92 countries contributed to this country-driven process, covering approximately 96 percent of global aquaculture production and over 80 percent of global capture fisheries production.

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<sup>3</sup> CGRFA/AqGR-1/16/Inf.2.

<sup>4</sup> COFI :AQ/X/2019/Inf.9, paragraphs 7–14.

<sup>5</sup> COFI:AQ/X/2019/Inf.10.

<sup>6</sup> COFI:AQ/X/2019/Inf.5, paragraph 46.

<sup>7</sup> FIAP/R1249, paragraphs 38–39.

<sup>8</sup> COFI:AQ/X/2019/Inf.11, paragraphs 53–54.

<sup>9</sup> CGRFA-17/19/8.3

<sup>10</sup> COFI:AQ/X/2019/Inf.11, paragraph 55.

<sup>11</sup> COFI:AQ/X/2019/Inf.11, paragraph 51.

<sup>12</sup> FAO. 2019. *The State of the World's Aquatic Genetic Resources for Food and Agriculture*. FAO Commission on Genetic Resources for Food and Agriculture assessments. Rome. Licence: CC BY-NC-SA 3.0 IGO, and FAO. 2019. *The State of the World's Aquatic Genetic Resources for Food and Agriculture - in brief*. FAO Commission on Genetic Resources for Food and Agriculture assessments. Rome. Licence: CC BY-NC-SA 3.0 IGO.

<sup>13</sup> <http://www.fao.org/aquatic-genetic-resources/background/sow/background-studies/en/>

13. The Report represents a snapshot of the present status of AqGR and forms a valuable technical reference document, particularly where it presents standardized key terminology and concepts. There is little doubt that the process of preparing the Report and the work done within countries to prepare Country Reports has improved the level of understanding and awareness of the vital importance of AqGR. The Report thus represents the first step in building a broad knowledge base on AqGR as a basis for future actions towards improved conservation, sustainable use and development of these valuable resources, at national, regional and global levels.

14. The Report is organized into ten chapters. The first chapter provides a summary of the current status of aquaculture and capture fisheries and the markets for their products, and summarizes the outlook for these sectors. The chapter also introduces some standard nomenclature used to describe AqGR throughout the Report and recommended for broader adoption. Chapters 2–9 deal primarily with the data from Country Reports on a range of issues. The second chapter reviews the use and exchange of AqGR, primarily in aquaculture, and the application of genetic technologies to AqGR. Chapter 3 explores the effects of different drivers of change on AqGR and their wild relatives. Chapters 4 and 5 cover, respectively, the status of *in situ* and *ex situ* conservation of AqGR. Chapter 6 identifies the stakeholders in AqGR and their roles in conservation, sustainable use and development. Chapter 7 reviews national policies and legislation governing AqGR. Chapter 8 reviews research, training and extension on AqGR, such as national coordination and networking. Chapter 9 deals with international collaboration on AqGR, including the roles of various mechanisms and instruments through which countries cooperate. The final chapter clarifies the needs and challenges, which arise from the key messages on AqGR identified in the preceding chapters.

15. The final chapter of the Report includes a summary of the key features and characteristics of AqGR, and specifically identifies areas where these differ from terrestrial genetic resources. Relative to plant and animal genetic resources for food and agriculture, farming of most AqGR is in its infancy and aquaculture is still evolving in the way it utilizes these resources. Few distinct farmed types have been developed and these tend to be poorly characterized and are described using inconsistent nomenclature. Most farmed AqGR retain levels of genetic variation similar to those of their wild relatives. Thus, compared to terrestrial genetic resources, AqGR are characterized by a large and growing diversity of species but relatively little development of distinct farmed types, contrasting with the focus on a few species but a vast diversity of breeds and varieties in terrestrial animals and plants.

16. There are proven genetic technologies that have generated significant production gains, particularly from well-managed selective breeding programmes, but adoption of these technologies is relatively slow, limiting their impact on global aquaculture production to date.

17. Wild relatives of all farmed AqGR still exist and are widespread, and there is a strong interaction between farmed AqGR and their wild relatives. Much of aquaculture production is reliant upon wild relatives as sources of broodstock and/or seed. Anthropogenic activities, including capture fisheries, threaten the viability of some of these wild relative stocks. Countries reported on both *in situ* and *ex situ* conservation programmes for AqGR.

18. Non-native species contribute very significantly to aquaculture production, and exchange of AqGR is commonplace. However, it is often inadequately regulated, and this can lead to negative consequences associated with invasive species. AqGR often occur in common property water resources, including transboundary resources. Partly as a result of this and the lack of regulation of germplasm exchange, breeders' rights and access and benefit-sharing arrangements are poorly developed for AqGR and will differ somewhat from those prevalent in other sectors.

19. Approximately 40 specific needs and challenges are identified from the key messages in each chapter of the report and these are summarized in this final chapter. There are some needs and challenges relating to responses to sector changes and environmental drivers. More specific needs and challenges are organised into four strategic priority areas: characterization, inventory and monitoring of AqGR;

development of AqGR for aquaculture; sustainable use and conservation of AqGR; and policies, institutions, capacity building and cooperation.

20. The information contained in the Report provides an excellent basis for identifying strategic priorities for action, establishing mechanisms to implement these actions, and identifying the required resources and institutional capacities for effective implementation.

## **RESPONDING TO THE FINDINGS OF THE REPORT ON *THE STATE OF THE WORLD'S AQUATIC GENETIC RESOURCES***

21. The Commission, at its 17<sup>th</sup> Regular Session, requested FAO to review the objectives, overall structure, principles and the list of potential strategic priorities for follow-up actions, as contained in the Appendix to this document, and to prepare a draft Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture.<sup>14</sup> The Commission agreed that the Global Plan of Action should be prepared upon consultation with the regions and in collaboration with COFI and its relevant subsidiary bodies.<sup>15</sup> It further noted that the Global Plan of Action should be voluntary and collaborative and be implemented in line with the needs and priorities of countries.<sup>16</sup>

22. The Sub-Committee, in reviewing the proposed objectives, overall structure and the list of follow-up actions, may also wish to take into account the priority areas identified by the COFI AWG–AqGRT at its second meeting. The COFI AWG–AqGRT identified priority areas for FAO activities on AqGR and made a series of recommendations.<sup>17</sup> These recommendations included: production of guidelines, including decision-support tools, on appropriate application of breeding programmes and genetic technologies; identification of conservation priorities, support to networking on AqGR between appropriate organizations and institutions; support to training and capacity building; development of impact assessments and case studies; risk–benefit analysis of non-native species in aquaculture; support to policy development including on access and benefit-sharing; and the development of information systems. Following input from the COFI AWG–AqGRT, a framework of essential criteria for development of AqGR was published by FAO in 2018.<sup>18</sup> The framework has been adopted and is being utilized by a southern African regional networking platform<sup>19</sup> to guide its national and regional work on AqGR.

## **GUIDANCE SOUGHT**

23. The Sub-Committee is invited to:

- Welcome the report on The State of the World's Aquatic Genetic Resources for Food and Agriculture;

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<sup>14</sup> CGRFA-17/19/Report, paragraph 55.

<sup>15</sup> CGRFA-17/19/Report, paragraph 51.

<sup>16</sup> CGRFA-17/19/Report, paragraph 56.

<sup>17</sup> COFI:AQ/X/2019/Inf.9, pages 3–4.

<sup>18</sup> FAO. 2018. *Aquaculture Development 9. Development of Aquatic Genetic Resources: A framework of essential criteria*, TG5, suppl. 9. Rome. 88 p (also available at <http://www.fao.org/3/CA2296EN/ca2296en.pdf>).

<sup>19</sup> The Southern African Development Community - East African Community, Worldfish-FAO Regional Genetics Platform.

- Provide advice on the proposed objectives, overall structure and potential strategic priorities for a Global Plan of Action on Aquatic Genetic Resources for Food and Agriculture, as provided in the Appendix to this document; and
- Request FAO to prepare a draft Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture, taking into account advice provided by the Regions and by the Committee on Fisheries and its relevant subsidiary bodies, for review by the Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture and the Commission on Genetic Resources for Food and Agriculture at their next sessions.

## APPENDIX

### **OBJECTIVES, PRINCIPLES, OVERALL STRUCTURE AND POTENTIAL STRATEGIC PRIORITIES OF THE GLOBAL PLAN OF ACTION FOR AQUATIC GENETIC RESOURCES FOR FOOD AND AGRICULTURE**

Follow-up actions on AqGR could include key measures to address the conservation, development and sustainable use of AqGR with a view to making a significant contribution to international efforts to promote food security and sustainable development and alleviate poverty, in line with the Sustainable Development Goals (SDGs), the FAO Code of Conduct for Responsible Fisheries (CCRF) and other international commitments, instruments or frameworks, such as the ecosystem approach to fisheries and to aquaculture.

#### *Possible objectives of follow-up actions*

Follow-up actions, which should be voluntary, collaborative, and based on national needs and priorities could pursue various objectives, including:

- Improving the identification, characterization and description of aquatic genetic resources, and their monitoring;
- Promoting access to, and sharing of, information on AqGR at regional and national levels;
- Ensuring the conservation of the important aquatic genetic resource diversity of both farmed types and wild relatives, for present and future generations;
- Promoting the sustainable use and development of aquatic genetic resources, for food security, sustainable agriculture and human well-being in all countries;
- Accelerating the appropriate application of genetic technologies for the improvement of farmed AqGR, including well-designed selective breeding programmes, to deliver genetic gains to support sustainable growth in aquaculture production;
- Addressing the need for the development of inclusive national programmes on AqGR that include relevant stakeholders, including resource managers, geneticists and development agencies;
- Stressing the important role women play in the use and conservation of AqGR and calling for special efforts be made to include women and women's cooperatives in programmes on AqGR management;
- Capacity-building in the development, use and conservation of AqGR and related information and of financial resources, training and education to enable more countries to benefit from and sustainably use AqGR;
- Protecting critical habitats for all development stages of AqGR and reversing the decline in many wild relatives of farmed aquatic species, including that caused by invasive species, and promoting ecosystem and ecoregional approaches as efficient means of promoting sustainable use and management of AqGR;
- Promoting access to and the fair and equitable sharing of benefits arising from the use of AqGR;
- Raising awareness and increasing knowledge and capacity of AqGR, including through the development of case studies that demonstrate how genetic technologies and associated knowledge can be used to increase food security, economic development and conservation of AqGR;
- Assisting countries and relevant institutions in the establishment, implementation and regular review of national priorities, strategies and priorities for the sustainable use, development and conservation of AqGR;
- Strengthening national programmes and enhancing institutional capacity – in particular, in developing countries and countries with economies in transition – and developing relevant regional and international programmes; such programmes should include education, research

and training to address the characterization, inventory, monitoring, conservation, development and sustainable use of AqGR;

- Reviewing relevant policies and national programmes and priorities with a view to create an enabling environment and mobilize the necessary human and financial resources for the sustainable use and exchange of AqGR and associated technologies, such as selective breeding.
- Calling for the development of voluntary guidelines and frameworks for:
  - International, regional and national networks on AqGR;
  - Gene banking;
  - Stock enhancement; and
  - Broodstock management and improvement.

### *Principles*

Follow-up actions on AqGR could also formulate key principles, aligned with existing instruments, in particular, the FAO Code of Conduct for Responsible Fisheries, the SDGs and the Convention on Biological Diversity. The strategic priorities should be based on the recognition that countries are fundamentally interdependent with respect to AqGR, and that substantial international cooperation is of mutual benefit. They would assist countries, as appropriate, to integrate AqGR conservation and management needs into wider national policies and programmes and frameworks of action at national, regional and global levels.

### *Overall structure*

Follow-up actions on AqGR could be structured along the following main themes or priority areas:

- Establish and strengthen national and global characterization, monitoring and information system for AqGR;
- Accelerate appropriate development of AqGR for aquaculture;
- Promote sustainable use and conservation of AqGR;
- Policies, institutions and capacity building.

For each of these priority areas, the Commission may wish to formulate specific actions that governments can agree to undertake at national, regional and/or international levels to meet the objectives. These actions would be based on the key findings, needs and challenges identified in the Report. A list of tentative strategic priorities for follow-up actions the Commission could consider, at its next session, under the above priority areas is given in the Appendix to this document.

### *Potential strategic priorities*

The following potential strategic priorities for follow-up action, listed under the proposed priority areas, are based on the needs and challenges identified in the report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture*.

### **Priority Area 1: Establish and strengthen national and global characterization, monitoring and information system for AqGR.**

Strategic Priority 1.1: Promote the globally standardized use of terminology, nomenclature and descriptions of AqGR.

Strategic Priority 1.2: Improve and harmonize reporting procedures and expand existing species-based information systems to cover unreported AqGR including ornamental species and micro-organisms.



Strategic Priority 1.3: Develop, promote and commercialize/institutionalize national, regional and global standardized information systems for the collection, validation, monitoring and reporting on AqGR below the level of species (i.e. farmed types and stocks).

#### **Priority Area 2: Accelerate appropriate development of AqGR for aquaculture.**

Strategic Priority 2.1: Raise awareness and improve understanding of the properties, roles and risks of genetic technologies and their application to AqGR including traditional selective breeding and emerging technologies.

Strategic Priority 2.2: Promote greater adoption of well-managed, long-term, selective breeding programmes as a core genetic improvement technology for all major aquaculture species.

Strategic Priority 2.3: Establish national species and breed development strategies and programmes to unlock the full potential of AqGR. Such strategies need to set an appropriate balance between the development of aquaculture of new species (both native and non-native), and development of farmed types of existing cultured species.

Strategic Priority 2.4: Conduct appropriate training and capacity building in genetic improvement, particularly in quantitative genetics.

#### **Priority Area 3: Promote sustainable use and conservation of AqGR.**

Strategic Priority 3.1: Develop risk-based policies and controls on introductions and transfers of AqGR and implement monitoring systems to understand the impacts of non-native species and reduce their negative impacts on both farmed and wild relative AqGR.

Strategic Priority 3.2: Identify wild relative AqGR most at risk to ensure that they are managed sustainably and appropriate conservation measures are implemented where necessary.

Strategic Priority 3.3: Monitor and anticipate the current and future impacts of environmental change on AqGR and respond accordingly, for example through conservation of threatened resources and the development of climate change adapted farmed types for aquaculture.

Strategic Priority 3.4: Promote *in situ* conservation, including habitat protection and aquatic protected areas, as the primary measure to protect threatened wild relatives AqGR.

Strategic Priority 3.5: Identify threatened wild relative AqGR that are critical to aquaculture development and to wild catch fisheries and to prioritize these for *in situ* conservation.

Strategic Priority 3.6: Actively incorporate conservation of AqGR in the development of fisheries management plans, particularly for threatened species.

Strategic Priority 3.7: Aquatic protected areas should be considered in the development of *in situ* conservation of key AqGR.

Strategic Priority 3.8: Identify the priority threatened and important AqGR as candidates for effective *ex situ* conservation.

Strategic Priority 3.9: Develop and promote guidelines and best practices for both *in vivo* and *in vitro ex situ* conservation.

Strategic Priority 3.10: Monitor the use and exchange of AqGR for non-food use, such as ornamental species, alongside that of food fish, and identify related risks and needs.

#### **Priority Area 4: Policies, institutions and capacity building.**

Strategic Priority 4.1: Support members to develop, monitor and enforce policies and good governance that adequately considers issues affecting conservation, sustainable use and development of AqGR, harmonized across sectors of government.

Strategic Priority 4.2: Develop national strategies for *in situ* and *ex situ* conservation of AqGR and their sustainable use.

Strategic Priority 4.3: Support improved national and regional communication on AqGR and raise awareness of the importance of AqGR among stakeholders from consumers to policy-makers.

Strategic Priority 4.4: Promote development of understanding of the roles of key stakeholders in AqGR, including indigenous communities and women, and their roles in the conservation, sustainable use and development of AqGR.

Strategic Priority 4.5: Support reviews of national legislation governing non-native AqGR including responsible use and exchange based on appropriate assessments of risks and access and benefit-sharing specific to properties of AqGR.

Strategic Priority 4.6: Promote awareness among member countries of the role that international agreements and instruments can play in the conservation, sustainable use and development of AqGR and improve their effective implementation for positive impact.

Strategic Priority 4.7: Establish or strengthen national institutions, including national focal points, for planning and implementing AqGR measures, for aquaculture and fishery sector development.

Strategic Priority 4.8: Establish or strengthen national institutions for education and research on AqGR and promote intersectoral collaboration on their conservation, sustainable use and development.

Strategic Priority 4.9: Strengthen national human capacity for characterization, inventory, and monitoring of trends and associated risks, for conservation, sustainable use and development of AqGR including economic valuation, characterization, and genetic improvement.

Strategic Priority 4.10: Encourage the establishment of network activities and support the development and reinforcement of international networking and information sharing on AqGR.

Strategic Priority 4.11: Strengthen efforts to mobilize resources, including financial resources for the conservation, sustainable use and development of AqGR.