Food and Agriculture Organization of the United Nations

NFIA/R1328 (En)

FAO
Fisheries and
Aquaculture Report

ISSN 2070-6987

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 NFIA/R1328 (En)

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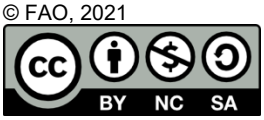
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 2021

Required citation:
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

ISSN 2070-6987 [Print]
ISSN 2707-546X [Online]

ISBN 978-92-5-133988-6



PREPARATION OF THIS DOCUMENT

This report describes the activities and outputs of the FAO virtual workshop for Latin America and the Caribbean and for North America on the "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)" and was held from 21–24 September 2020.

This document was prepared by Mr Graham Mair and Ms Daniela Lucente of FAO supported by Mr Joachim Carolsfeld and Mr Devin Bartley or the World Fisheries Trust (WFT) and Mr Dan Leskien and Ms Suzanne Redfern from the Commission on Genetic Resources for Food and Agriculture (Commission). The report was reviewed by participants in the workshop and their feedback incorporated prior to its finalization and adoption.

ABSTRACT

This report summarizes the proceedings and outcomes of the "Regional Workshop for Latin America and the Caribbean and for North America on the 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)" held from 21 to 24 September 2020 (with a final wrap-up session held on 1 October 2020).

The workshop was attended by National Focal Points for Aquatic Genetic Resources from Latin America and the Caribbean and for North America, officials from ministries and other governmental organizations, and also by representatives of three regional aquaculture organizations. The objectives of the workshop were to promote standardized use of nomenclature and terminology in the description and categorization of AqGR, especially below the level of species (i.e. farmed types), to identify priority regional stakeholders who would benefit from an information system, such as the Registry, to evaluate the key elements of the prototype Registry using regionally relevant species and their farmed type and, for each of the four Priority Areas of the GPA, to review the strategic priorities and propose concrete activities under each.

Participants identified government resource managers, academia and researchers, policy-makers, and intergovernmental organizations as the principal stakeholders and beneficiaries of the Registry. These same stakeholders would also be the main contributors of information to the system. Aquaculture producers were also identified as major contributors of information. It was thus noted that special consideration needs to be given to engaging private industry and demonstrating the value of the information system to the private sector. Participants made recommendations on the information sought for the Registry and, in particular, expressed concern over Members' capacity to record information on production of farmed types of aquatic genetic resources.

Through a series of working group sessions, participants identified regionally relevant long-term goals for the four Priority Areas of the GPA, revised the list of Strategic Priorities of the GPA, and identified specific regionally relevant actions that should be taken under the different Strategic Priorities, and identified some potential indicators that may be used to monitor progress in the implementation of the GPA.

CONTENTS

ABBREVIATIONS AND ACRONYMS

AqGR	Aquatic genetic resources for food and agriculture
COFI	FAO Committee on Fisheries
CBD	Convention on Biological Diversity
DIAS	FAO Database on Introductions of Aquatic Species
EAF	Ecosystem approach to fisheries
EBM	Ecosystem based management
FAO	Food and Agriculture Organization of the United Nations
GPA	Global Plan of Action
ITWG-AqGR	Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture
NFP	National focal point
Registry	Registry of Farmed Types of Aquatic Genetic Resources
SDG	Sustainable Development Goal
SoW-AqGR	*The State of the World's Aquatic Genetic Resources for Food and Agriculture*
UI	User Interface

OPENING OF THE WORKSHOP

1. The "Regional Workshop for Latin America and the Caribbean and for North America on the 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)" was held from 21 to 24 September 2020. A final wrap-up session was held on 1 October 2020. The agenda of the workshop is given in Annex 1.

2. The first session of the workshop (using the Zoom webinar platform) was attended by 76 participants, made of up of representatives from 14 Member Nations (including 11 national focal points) and three regional organizations. Attendance ranged from 49 to 65 over the remaining meeting sessions (using the Zoom meeting platform). The list of registered participants across the full workshop is provided in Annex 2.

3. Mr Graham Mair, Senior Aquaculture Officer of the Aquaculture Branch of the Fisheries Division, welcomed all participants and opened the meeting.

4. Mr Matthias Halwart, Head of the Aquaculture Branch, welcomed all participants. He noted that the recent publication of the first report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture* (SoW AqGR), launched by FAO in August 2019 (FAO 2019a and FAO 2019b), had been made possible by the 92 country reports. He mentioned that the SoW-AqGR was well received as it highlights important issues related to the conservation, sustainable use and management of genetic resources in aquaculture. He further noted that the current information available on AqGR is very limited and therefore the development of the Registry of Farmed Types of Aquatic Genetic Resources (Registry) is a key step forward in this regard and is fundamental to the development of the Global Plan of Action (GPA).

5. Ms Julie Bélanger, Technical Officer, Secretariat of the Commission on Genetic Resources for Food and Agriculture (hereafter known as "the Commission"), welcomed participants on behalf of Ms Irene Hoffmann, Secretary of the Commission, and provided some background on the work of the Commission and, more specifically, its activities related to aquatic genetic resources for food and agriculture (AqGR). She noted that the Commission, at its last session, had decided to establish the Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture (ITWG-AqGR) as a permanent working group of the Commission. She further recalled that the Commission had requested FAO to develop, in response to the SoW-AqGR, a GPA for AqGR. She further noted the importance of this and the other regional consultations as steps towards the draft GPA.

INTRODUCTION AND BACKGROUND

6. Mr Mair presented an outline of the structure of the consultation and the mechanisms for interaction with the participants. He then provided a brief overview of the scope of FAO's past work before introducing the key findings of the SoW-AqGR and the FAO responses to this report in the form of the development of the Registry and the GPA for AqGR. He then outlined the objectives and expected outputs of the workshop in relation to these two initiatives.

Workshop objectives

7. Mr Mair briefly explained that the workshop was being held to gather regional perspectives on the prototype Registry and on the priorities of the outline GPA. He noted that the specific objectives in relation to the Registry included:

- promoting standardized use of nomenclature and terminology in the description and categorization of AqGR, especially below the level of species (i.e. farmed types and stocks);
- identifying the priority stakeholders in the Registry; and
- identifying potential indicators for the effective monitoring of AqGR within a future GPA.

8. With regard to the GPA, Mr Mair noted that the review of the outline would address the following questions in the context of needs and challenges in AqGR management in North America and Latin America and the Caribbean:

- What should be the long-term goals for each Priority Area?
- Is the list of strategic priorities within each Priority Area appropriate and inclusive for the region?
- Are there goals and specific actions that could be taken within the strategic priorities?
- What indicators could be used to monitor progress on the key elements of the GPA and how could these be integrated into the Registry or the broader global information system on AqGR?
- Are there recommendations on implementation and financing of the GPA or any of its elements?

9. Mr Eric Hallerman, Professor at the Virginia Polytechnic Institute and State University (United States of America), presented an overview of AqGR in northern America (abstract in Annex 3). He noted that although the subregion accounts for only about 1 percent of global aquaculture production, genetic resources development has progressed well for certain species. Issues of conservation of wild stocks, fishery management and the interaction of wild relatives and farmed types were cited as important.

10. Mr Alexandre Wagner Silva Hilsdorf, Professor at the Universidade de Mogi das Cruzes (Brazil), presented an overview of AqGR in Latin America and the Caribbean (abstract in Annex 3). He mentioned that although the region has very high levels of aquatic biodiversity most of the aquaculture production comes from non-native species. Nonetheless there is potential to develop further native Latin American species for aquaculture, giving due regard to native biodiversity.

A registry of farmed types of Aquatic Genetic Resources as a key component of a Global Information System on Aquatic Genetic Resources for food and agriculture

11. Ms Daniela Lucente, Project Coordinator for the Aqauculture Branch, provided background information on the Registry. She noted that one of the major priorities identified in the SoW AqGR was to *establish and strengthen a national and global characterization, monitoring and information system for AqGR*. This priority includes:

a. promotion of a globally standardized use of terminology, nomenclature and descriptions of AqGR;
b. improvement and harmonization of reporting procedures and expanded existing species-based information systems to cover unreported AqGR including ornamental species and micro-organisms; and

c. development, promotion and commercialization/institutionalization of national, regional and global standardized information systems for the collection, validation, monitoring and reporting on AqGR[1] below the level of species (i.e. farmed types and stocks).

12. It was noted that examples of incorporating genetic diversity into national and global reporting and monitoring system do exist, but primarily in the terrestrial agriculture sector, where nomenclature for breeds and varieties has been standardized and used for centuries (see, for example, the Domestic Animal Diversity Information System (FAO, 2021a)). The aquatic sector has nothing similar at a global level.

13. It was recalled that the ITWG-AqGR, at its Second Session, had highlighted the critical need to *assess, explore and develop mechanisms to monitor the status and trends of AqGR through the establishment of a global information system and a Registry of farmed types of AqGR as well as stock of wild relatives, subject to the availability of the necessary funds* (FAO, 2018a).

14. The Government of Germany had responded by providing financial support to the development of the Registry. The outputs of the project funded by the German Government are:

- a functional prototype Registry populated with farmed types for a number of selected species;
- a website interface for the Registry for data entry and query;
- a series of regional workshops to build capacity and awareness and to validate the Registry; and
- a proposal for further development, institutionalization/commercialization and expansion of the Registry.

15. It was pointed out that a user interface (UI) of the Registry developed to date was built with the support of the Statistics and Information Branch of the Fisheries Department. It was made clear that the UI is still a work in progress and where necessary is currently populated with dummy data but that FAO will soon start to populate it with real data on farmed types of key aquaculture species at global, regional and national scales. A link to the UI that enables querying of data in the Registry was shared with participants ahead of the workshop.

A Global Plan of Action for Aquatic Genetic Resources for food and agriculture

16. It was recalled that the Commission, at its Seventeenth Regular Session held in February 2019, in response to The SoW-AqGR, had requested that FAO prepare a draft GPA for AqGR for consideration by the ITWG-AqGR and the Commission at their next sessions. It had also been agreed that the GPA should be prepared in consultation with the regions and in collaboration with the FAO Committee on Fisheries (COFI) and its relevant subsidiary bodies. The Commission had requested FAO to review the proposed objectives, overall structure and list of follow-up strategic priorities of the proposed GPA, as presented to the Commission (FAO, 2018b). A full draft GPA, reflecting all comments and inputs received, will be presented to the next sessions of the ITWG-AqGR and the Commission, for their consideration. Subsequently, the FAO Conference is expected to consider the GPA for adoption. The planned timeline for the development of a GPA is outlined in Annex 4.

17. Ms Suzanne Redfern, Technical Officer, Secretariat of the Commission, presented a brief history of the Commission as the only permanent intergovernmental body that specifically discusses and negotiates matters relevant to all components of biological diversity for food and agriculture. She highlighted the special features and themes of the GPAs and noted that previous GPAs in other agricultural sectors have helped governments to make policies, establish national actions and priorities,

[1] It should be noted here that AqGR includes wild relatives of species that are cultured

direct research and secure funding for work on genetic resources for food and agriculture in these sectors.

18. It was noted that the aquatic sector has no global information nor a GPA and therefore is in a position to learn from the experiences of the other sectors. Mr Mair provided further background on the AqGR GPA, explaining in detail the four Priority Areas that had been developed from the broad needs and challenges identified in the SoW-AqGR. He noted that one of the Priority Areas is specific to AqGR, namely the focus on development of AqGR for Aquaculture, which is in contrast to the GPAs in other sectors in which development of genetic resources has already happened over millennia. Mr Mair identified draft strategic priorities that have been indicated within each of the Priority Areas in response to specific needs and challenges in the SoW-AqGR.

19. It was further noted that the regional workshops are being used to provide feedback on both the Registry and the outline of the GPA as, in future, a functional and well-populated information system, of which the Registry will be a core component, will be an essential tool for the effective monitoring of the implementation of the GPA and other related instruments.

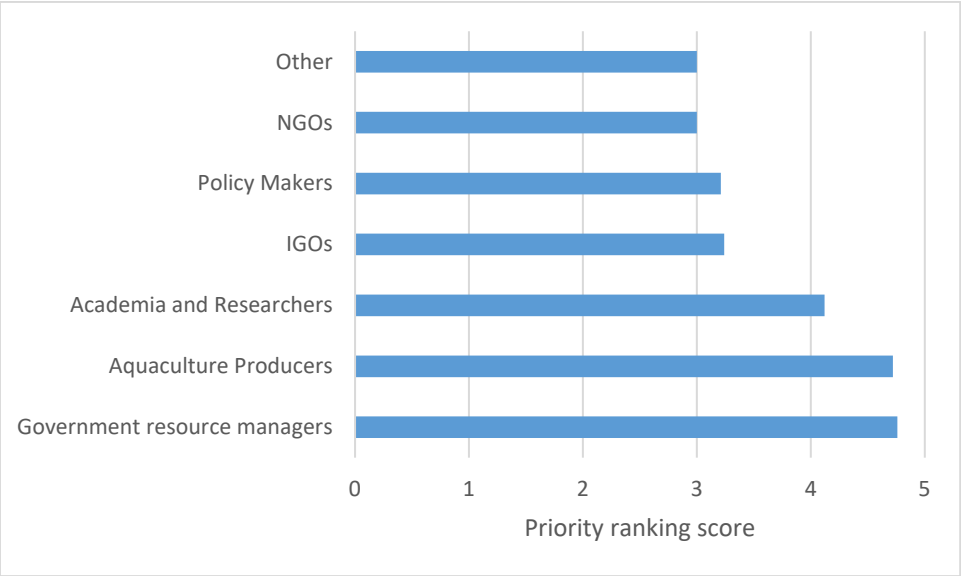
REGISTRY OF FARMED TYPES OF AQUATIC GENETIC RESOURCES

Stakeholders in the Information System of Aquatic Genetic Resources

20. Participants considered the role of primary stakeholders in the Registry, as identified during an expert workshop on the development of the Registry, that would be most interested in contributing to and/or using the Registry's information. Participants indicated that government resource managers and aquaculture producers would be the groups that would be the top two users of the Registry. This conclusion was supported by the results of an online survey that asked participants to score the relative importance of the different stakeholders in both contributing information to the Registry (Figure 1) and also in accessing and utilizing information from the Registry (Figure 2).

21. Participants stated that some stakeholders along the aquaculture supply chain, such as feed and pharmaceutical suppliers and aquaculture supply companies, had not been identified as secondary stakeholders by the expert workshop. In light of the fact that aquaculture producers were identified as main contributors to and users of the Registry, participants recommended that FAO reach out specifically to engage these stakeholders to discuss, *inter alia,* terminology and use of proprietary information. In light of the fact that aquaculture producers were identified as important stakeholders (Figures 1 and 2), it was agreed that efforts should be made to demonstrate the value of the Registry to the aquaculture industry and that confidentiality of information held in the Registry will be respected.

Figure 1: Summary of the scoring of participants of the relative value of the Registry with regard to providing information to the Registry by primary stakeholders (participants were allowed to pick more than one stakeholder group as a main provider of information to the Registry)



Source: Online survey conducted with workshop participants, 2020.

Figure 2: Summary of the scoring of participants of the relative value of the Registry with regard to accessing and utilizing the system by primary stakeholders (participants were allowed to pick more than one stakeholder group as a main user of the Registry)

Source: Online survey conducted with workshop participants, 2020.

22. Further clarification was requested on how the NFPs will receive information for uploading into the Registry, on the frequency of updating the information in the Registry and on how the Registry might potentially be linked to existing international databases, e.g. FishStatJ (FAO, 2021b), the SoW-AqGR database, the FAO Database on Introductions of Aquatic Species (DIAS) (FAO, 2021c) and national databases (USDA, 2021).

23. Special concern was raised on the issue of non-native species in aquaculture and the role that the Registry would play in evaluating risks to local stocks and wild relatives. It was noted that DIAS maintains records of international introductions and could serve as a general source of information on distribution (by country) and impacts of non-native species. It may be possible in the future to link the Registry with DIAS at the level of species. The participants were informed that at present the structure of the Registry does not allow for the identification of specific waterbodies where non-native species exist or may pose a risk. However, it was noted that the current version of the Registry does not accommodate information specific to individual waterbodies but, in response to Member's requests, this can be considered in a future version which will more proactively consider wild relative resources.

Classification of farmed types of Aquatic Genetic Resources

24. Participants considered the classification system for farmed types that was developed by FAO (Mair and Lucente, 2020) in consultation with an expert group and adopted in the Registry. The classification is based on two different categorizations. The primary categorization refers to the level of domestication from the original wild-sourced farmed type. The secondary categorization refers to any value-added categories of genetic manipulation applied to primary farmed types. There was a discussion of the merits of applying the definition of strain to include farmed types modified by domestication selection being categorized separately to those developed through deliberate directional selection. It was noted that the questions in the Registry would identify his distinction but that both could still be classed as strains if they were clearly differentiated from other farmed types of the same species. It was noted that the classification of farmed types prepared by FAO would differ from those commonly applied in many of the Member Countries but would aid in standardizing the understanding of terminology.

25. Participants enquired about how to apply the concept of farmed types to micro-organisms and about what other data-collection tools were available. Farmed type classification can and should be used on micro-organisms although there may not be many secondary farmed types in use. FAO indicated that micro-organisms are included among the target species of the prototype Registry and that the upcoming data-collection phase will include information on Artemia. FAO further indicated that the first step is to get the Registry working and then explore other data collection tools such as a spreadsheet based questionnaire.

26. Participants welcomed the information on the proposed Registry and noted that terminology suggested for it should be sent to editors of scientific journals to be included in their guidelines for publication.

Clarifications and suggestions

27. Participants reviewed and discussed the utility of an information system and the elements and content of the proposed Registry including the questions on species and farmed types as listed in the guidelines provided to the participants as background reading, and summarized in a presentation from Ms Lucente. It was emphasized that, in the first instance entries to the Registry may be limited to farmed types representing at least 10 percent of the national aquaculture production of the species in question (especially for captive propagated farmed types) and that farmed types used exclusively in research facilities and not in commercial production will not be included in the Registry. It was noted that these limitations are intended to control the size of the task of identifying farmed types where many exist. However, it was noted that countries with low aquaculture production might have only few farmed types meeting the requirement of 10 percent of the overall national production of a certain species. In these cases, countries can be more inclined to report also those farmed types not meeting the requirement but that are commercially produced and have been the target of significant efforts in terms of national AqGR development. The decision to endorse or sign off on entries into the Registry would ultimately be at the discretion of the NFP.

28. FAO informed the participants that the Registry would be a searchable database based on standardized terminology and accessible to national and international stakeholders. The Registry and the future information system would provide improved capacity to guide informed exchange and development of AqGR and could be used by countries to develop national registries of AqGR. The Registry could also be useful in reporting for the various production databases and for monitoring the implementation of Sustainable Development Goal (SDG) target 2.5 (maintaining genetic diversity and providing fair and equitable access), once appropriate indicators for the AqGR have been developed. The Registry and the future global information system can also be used by FAO Members as useful information sources for implementing their aquaculture practices in line with the principles of the Code of Conduct for Responsible Fisheries, particularly concerning the recommendations related to aquatic genetic resources (Article 9 – Aquaculture development).

29. A poll conducted among participants indicated that 78 percent of respondents thought that some of the information being sought for the Registry would be difficult to obtain. However, some participants noted that some national information systems on aquatic species do exist and that their utility in providing information to the Registry could be examined. Some countries indicated that they did think it feasible that most information for the Registry (with the possible exception of commercially sensitive information) would be accessible. FAO pointed out that whilst the questionnaires contained a large number of questions, many of them would not be applicable to many farmed types and that the number of farmed types that can be entered is limited for most species if the 10 percent contribution is applied. It was noted that it was found possible to collect relevant information for all farmed types in the Philippines, a large aquaculture producing nations, over a two week period

30. It was noted that the species list preloaded in the Registry is based on the list of species of the FAO Aquatic Sciences and Fisheries Information System (FAO, 2021d) and includes the scientific name and a global common name used as the basis for identifying species to be entered into the system. Species common names in local languages will not be included in the species preloaded list.

31. It was further noted that the Registry only allows for species and farmed type names and cannot be based on species items that are not individual species. In this regard, the Registry may differ from data kept in other information systems (e.g. FishStatJ or national databases). It is hoped that the Registry will start to provide more refined information to a variety of stakeholders on what is being farmed at the species level and below.

32. Participants stressed the value of training on terminology and on the database for NFPs and others who may assist with collecting information on farmed types. It was noted that FAO had conducted a successful field-testing of the Registry and the farmed type classification in the Philippines. The field-testing resulted in the collection of a significant amount of farmed type data, which will be used to populate the prototype Registry. A similar exercise could be repeated elsewhere where human and financial resources are available (e.g. through the FAO Technical Cooperation Programme) and FAO noted that it would be interested to work with one or more countries in the region in the near future to attempt to enter national farmed types. It was noted that contributions from countries are voluntary and that initial entries to the Registry can focus on the major aquaculture species.

REVIEW OF THE OUTLINE GLOBAL PLAN OF ACTION FOR AQUATIC GENETIC RESOURCES

33. The second part of the workshop focused on the draft outline of the GPA for AqGR. Participants reviewed the four Priority Areas of the draft GPA for AqGR, namely:

1. Establish and strengthen national and global characterization, monitoring and information systems for AqGR.
2. Accelerate appropriate development of AqGR for aquaculture.
3. Promote sustainable use and conservation of AqGR.
4. Policies, institutions and capacity building.

34. FAO thanked those countries that responded to a Circular State Letter requesting input on the GPA and assured participants that information contained in the response would be incorporated into the final synthesis on the GPA. FAO also confirmed that the version of the GPA sent out with the Circular State Letter was that same as that discussed during the regional workshops.

35. In preparation for the break-out groups, FAO instructed the participants to i) address whether the list of strategic priorities within each Priority Area is appropriate and inclusive for the region; ii) identify goals and specific actions that could be taken in the region within the strategic priorities; iii) identify what indicators could be used to monitor progress on the key elements of the GPA and how they could be integrated into the information system; and iv) formulate recommendations on implementation of the GPA. Due to audiovisual delays, some break-out groups were not able to complete the analysis of all strategic priorities. Annex 5 summarizes the outputs from these break-out group discussions for the four Priority Areas.

CLOSING REMARKS

36. Mr Mair thanked all the participants for their attendance and active participation in the workshop, and gave a short review of the workshop outcomes.

37. Mr Marc Taconet, Chief Statistics and Information Branch of the Fisheries Division, then gave a presentation on the already existing information systems and their importance. He noted that the Registry is part of the big ecosystem of FI databases, which provides strong potential for contribution.

38. Ms Irene Hoffmann, Secretary of the Commission, noted that the workshop had been very interesting and participants had engaged a lot in the discussion. She mentioned that though this new virtual format is challenging and dependant on inputs of all participants, it is still important to create a network within the region to move forward with this important global agenda. She further noted that the Commission is looking forward to the results of the workshop and the development of the GPA.

39. Mr Mair again thanked all participants, organizers, interpreters, and closed the meeting.

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Annex 1 - Agenda for Latin America and the Caribbean and for North America Workshop

Session	Title	Objective	Key messages	Format
Day 1: Monday 21 September 16.30-18.00 CET	Introduction to the Registry	Raise awareness of key findings of the SoW-AqGR and rationale for the Registry	• The SoW-AqGR identified many needs and challenges • Lack of information on AqGR beyond species is a critical challenge • The value of the Registry to countries and the types of information it will contain	• Welcome remarks (*M. Halwart, J. Bélanger*) • Introduction to the workshop (*G.C. Mair*) • The SoW-AqGR: needs and challenges summary (*G.C. Mair*) • Discussion • Why do we need a Registry? (*D. Lucente*) • Discussion
Day 2: Tuesday 22 September 16.30-18.30 CET	Stakeholders and farmed types. Information content for the Registry.	• Facilitate understanding of Members' stakeholders that will use the information system and explain concept of farmed types • Seek feedback on the information content of the Registry	• Who will use the information system? • The concept of farmed types and the relationship between species, primary and secondary farmed types • Are we collecting the correct information on species and farmed types? • Is there anything missing in the Registry?	• Stakeholders in the Registry (*D. Bartley*) • Discussion • What are farmed types? (*G.C. Mair*) • Discussion • Health break • Discussion • Data queries from the system (*G. C. Mair*) • Species level and farmed type data collection (*D. Lucente)* • Discussion
Day 3: Wednesday 23 September 16.30-18.30 CET	Introduction to the GPA-AqGR and first working group session	Understand the role of GPAs and the draft priorities for a GPA-AqGR	• What is the value of a GPA? • What GPAs achieved in other sectors • What is the structure of the GPA-AqGR?	• Discussion on data collection (continued…) • What is a GPA? *(S. Redfern)* • Discussion • The outline of the GPA-AqGR and introduction to working groups *(G. C. Mair)* • Discussion • Health break • Introduction to working group session • Working group session 1

Session	Title	Objective	Key messages	Format
Day 4: Thursday 24 September 16.30-18.20 CET	Feedback on the GPA-AqGR and second and third working group session	Seek feedback from participants on regional priorities, actions and indicators for the GPA-AqGR	• Suggested changes to priority areas and strategic priorities • Possible actions on strategic priorities • Possible indicators	• Working group session 2 • Health break • Working group session 3
Day 5: Thursday 01 October CET	Wrap-up session with discussion on the final report	Present key outcomes of the workshop	• Key feedback on Registry • Key suggested changes to Registry structure. • Summary of key changes to GPA-AqGR	• Presentation on Registry feedback (*G. C. Mair)* • Discussion • Presentation on GPA-AqGR development *(G. C. Mair)* • Discussion • Report adoption • Closing remarks *(G. C. Mair, I. Hoffmann, M. Halwart)*

Annex 2 - List of participants

NATIONAL FOCAL POINTS

Ms Maria Ines TRUCCO,
Jefa del Gabinete de Genética Molecular y Microbiología INIDEP
Argentina

Mr Miguel Manuel SOSA.
Departamento de Agricultursa Ministerio de Tierras y Agricultura,
Coordinator de Acuicultura
Belize

Mr Eric Arthur BASTOS ROUTLEDGE,
Director de Investigación y Desarrollo en Embrapa Pesca y Acuicultura
Brazil

Mr Alistair STRUTHERS
Director, Aquaculture Policy and Regulatory Affairs
Canada

Mr Alejandro BARRIENTOS,
Coordinador Unidad de Asuntos Sanitarios y Plagas, División de Acuicultura, Subsecretaría de Pesca y Acuiculturas
Chile

Mr Javier PLATA
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Annex 3 - Summary of Regional Presentations

Aquatic Genetic Resources in Northern America; Three Indicative Case Studies

Eric M. Hallerman, Virginia Polytechnic Institute and State University

North America's contribution to global aquaculture – 659 000 tonnes of finfish, crustaceans, and mollusks (FAO 2018) – corresponds to ~1 percent of world aquaculture production. Some of the key species include channel catfish *Ictalurus punctatus*, rainbow trout *Oncorhynchus mykiss*, Atlantic salmon *Salmo salar*, tilapias *Oreochromis* sp., and oysters, *Crassostrea virginica* and *C. gigas*. To set the context for consideration of aquatic genetic resources, we must recognize contrasts with terrestrial genetic resources. We do not have "breeds" in the sense of terrestrial livestock, as we have no breed books or associations. Populations of wild relatives still exist, and we exploit wild genetic resources to bring valued traits into cultured stocks. This review will focus on three case studies that demonstrate important issues regarding aquatic genetic resources: channel catfish, rainbow trout and Atlantic salmon). Domestication is recent (channel catfish, rainbow trout) or ongoing (Atlantic salmon). Selective breeding is in relatively early stages, with large generation-by-generation improvements in selected traits. I consider North American AqGR on a species-by-species basis, noting some key strains and AqGR issues.

For channel catfish, strain registries (Auburn University, 1983; Kincaid *et al*, 2000) exist, but are dated.

Key strains have been developed by Auburn University, large companies (e.g., GoldKist, Harvest Select, SouthFresh Fingerlings LLC) and the U.S. Department of Agriculture – Agricultural Research Service (USDA-ARS) Warmwater Aquaculture Research Unit. Among AqGR issues for channel catfish, we are early in the genetic improvement process and must continue selective breeding to realize genetic gains. We need to identify and conserve key wild resource stocks. The broadening culture of channel x blue hybrid catfish may pose an introgression hazard to populations of wild relatives.

For rainbow trout, a strain registry (Kincaid et al., 2000) exists, but is dated. Key strains were developed by the University of Washington (Donaldson), fisheries agencies (e.g., Kamloops), the USDA-ARS National Center for Cool and Cold Water Aquaculture, large eyed-egg producers such as TroutLodge and Mt. Lassen, and vertically integrated companies such as Clear Springs. Key AqGR issues for rainbow trout regard untapped wild genetic resources of possible aquaculture value. Wild populations being highly valued, interest in conservation of wild stocks has led to the requirement of physical and reproductive confinement, including use of all-female stocks, for aquaculture operations in some jurisdictions.

Atlantic salmon has been produced in North America since the 1970s, at first using selectively bred European strains. However, to conserve imperiled wild stocks, culture of non-North American strains was banned by a 2003 court decision, creating an impetus to develop North American strains. In response, development of selectively bred strains has been undertaken by the USDA-ARS National Cold Water Marine Aquaculture Center and by several vertically integrated companies. Among AqGR issues for Atlantic salmon, we are early in the domestication and selective breeding process for cultured strains and must conserve imperiled populations of wild relatives.

Conservation of AqGR differs from that for terrestrial genetic resources in its relatively strong emphasis on fisheries and conservation management, including managing interaction of farmed types with wild relatives. There is a wide range of stakeholders, not only including aquaculturists, but also fisheries and conservation managers, commercial and recreational fishers, environmentalists, and the general public. Strategic priorities, then, include holistic assessment of AqGR, establishment or updating of registries of farmed types, and engagement of stakeholders. The sector must establish goals for conservation of AqGR, identify possible actions, and implement selected actions within a context of limited resources.

Aquatic Genetic Resources in Latin America and Caribbean

Alexandre W.S. Hilsdorf, University of Mogi das Cruzes, Brazil

Latin America and the Caribbean play an important role in global aquaculture production, not only because of the contribution in terms of total production but also for the range of species cultivated. Production in South America, Latin America and the Caribbean countries amount to 3 139.70 thousand tonnes, i.e. 3.82 percent of the world aquaculture production (FAO, 2020). Apart from salmonids produced mostly in Chile, tilapia dominate fish farming in Central and South America. Different tilapias species and farmed types have been introduced and farmed over the last decades in different countries in this region. At present, some of them have formed feral populations of wild relatives resulting from escapees. Many tilapia culture operations in countries across Latin America are based on Genetic Improvement of Farmed Tilapia (GIFT) farmed types, derived from different introductions of the GIFT strain produced by WorldFish. However, the context of aquatic genetic resources (AqGR) in Latin America and the Caribbean is broader than farming a few alien species (FAO, 2019). Most of Latin America and Caribbean countries are located in the Neotropical region. This region comprises massive biodiversity in general and notably of freshwater fishes. Just in the Amazon region alone a recent database describes 2 406 validated freshwater native fish species (Jézéquel et al. 2020). At least 100 species are economically important for local fisheries, and some are also farmed in the region such as *Colossoma macropomum, Arapaima gigas, Brycon amazonicus, Piaractus brachypomus*, among others. This is not to mention the myriad of ornamental fish species being caught by local dwellers and commercialized through middleman traders. All these species are valuable AqGR for local fishers and wide range of stakeholders (Hilsdorf and Hallerman, 2017).

Despite the long domestication of some native species in aquaculture operations, all of them can still considered as relatively undeveloped primary farmed types and will be defined in the Registry as captive propagated farmed types. As far as we are concerned, no regular and recorded selective breeding programs have developed domesticated farmed types to the extent that they can be referred to as strains, even at the regional level. Different studies of native farmed species using molecular markers have shown a reduction in the genetic diversity among broodstock of *C. macropomum* and *A. gigas* in aquaculture. On the other hand wild relative populations have been imperiled because of dam construction and habitat degradation. Thus, to assess the still unknown genetic variability of wild relative stocks is pivotal for the long-term conservation of AqGR because these are the raw material for breeding programs to create more productive farmed types adapted to environmental and economic changes. At this point, the production of secondary farmed types such as hybrid production using different species and even genera of native freshwater fishes has been a strategy established in some countries to enhance productivity. Studies have shown many of these hybrids to be fertile resulting in potential introgression beyond F_1 generation in captivity and in the wild. This process may contribute to genetic erosion of wild relatives. This, in addition to the continuous search for new alien species for Latin American and Caribbean aquaculture operations poses new threats to the native AqGR.

In conclusion, the development of native species aquaculture beyond the alien ones already established is also essential at a regional level. To get knowledge of the wild relative and cultured farmed type genetic variability is a crucial step to protect and use this AqGR. The development of a sustainable and economically feasible aquaculture production depends on creating new, more productive strains to be the base for seed production, which will also protect the wild relatives, and the long-term food security to support the local economic development.

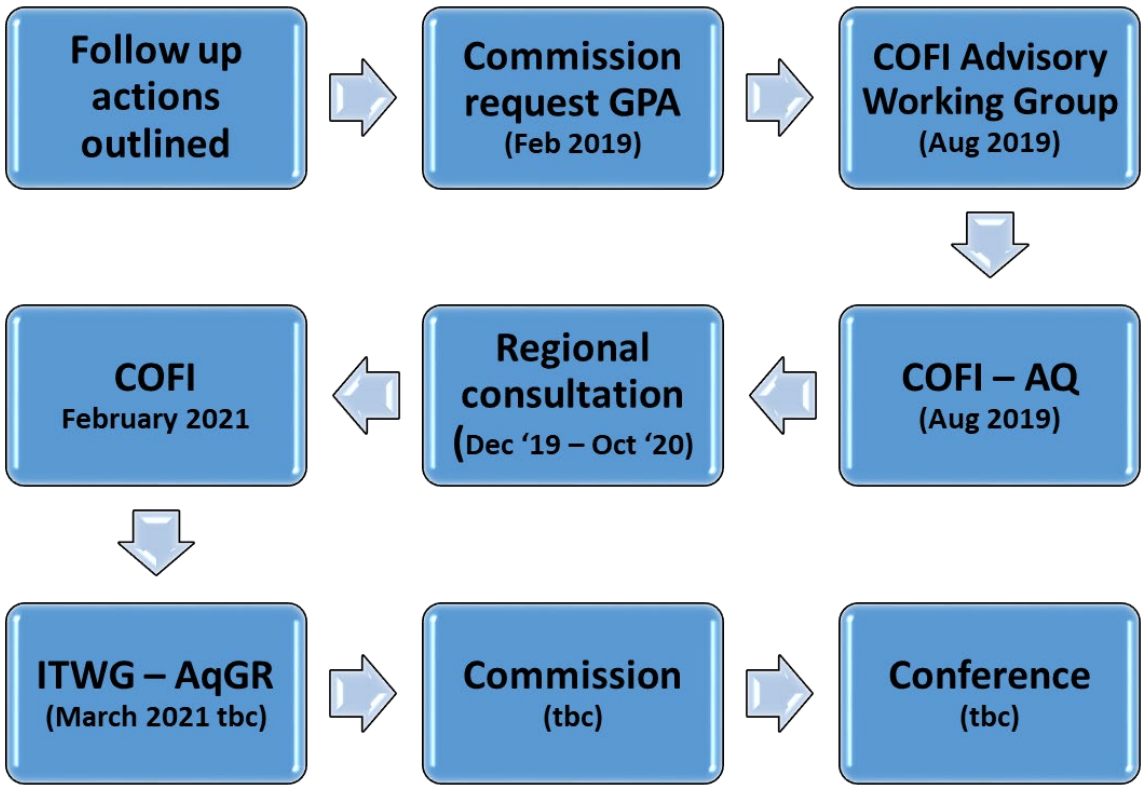
FAO. 2019. *The State of the World's Aquatic Genetic Resources for Food and Agriculture*. FAO Commission on Genetic Resources for Food and Agriculture assessments. Rome.

FAO. 2020. *The State of World Fisheries and Aquaculture 2020*. *Sustainability in action*. Rome.

Hilsdorf, A.W.S, Hallerman, E.M., (2017). *Genetic resources of neotropical fishes*. Cham: Springer International Publishing.

Annex 4 - Tentative timeline for development and approval of a Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture

(Note: all dates after June 2020 are considered tentative due to the disruption to schedules resulting from the COVID-19 pandemic.



Annex 5 - Priority Areas of the draft Global Plan of Action for aquatic genetic resources: long-term goals, strategic priorities, actions and indicators

Working Group Sessions
The discussion focused, *inter alia*, on the following questions:

- What should be the long-term goals for the region for each Priority Area?
- Is the list of strategic priorities within each Priority Area appropriate and inclusive for the region?
- Can you identify goals and Specific Actions that could be taken in the region within the Strategic Priorities?
- What indicators can we use to monitor progress on the key elements of the Global Plan of Action and how can these be integrated into the Registry or the broader information system on AqGR?
- Do you have recommendations on implementation and financing of the GPA or any of its elements?

The following tables summarize the outputs under each of the priority areas in the outline GPA.

Priority Area 1: ESTABLISH AND STRENGTHEN NATIONAL AND GLOBAL CHARACTERIZATION, MONITORING AND INFORMATION SYSTEM FOR AQGR

Long-term goal: Effective generation and management of information on AqGR.

Strategic priority	Actions
Strategic Priority 1.1: Promote the globally standardized use of terminology, nomenclature and descriptions of AqGR *Indicator: Adoption of standardized terminology in national policies and/or programmes*	• Development and communication of a standard terminology harmonizing different existing sources • Consider and develop multilingual definitions of key terms • Organize national and subnational workshops to promote and agree on standardized terminology published by FAO (national focal points to promote the organization of these workshops) • Promote standardized terminology through key influencers in academia, industry and governments (including national focal points) • Work with academic journals to adopt standardized AqGR terminology in the scientific literature
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	• Develop mechanisms to standardize species and common names across regions • Develop standardized forms for data entry of existing AqGR in a country • Include pictures in the FAO information system on farmed types of AqGR

Strategic priority	**Actions**
Note for FAO: include alien invasive species where they are used in aquaculture *Indicator: Adoption of standardized reporting procedure across regions*	• Make information systems available only in digital form (i.e. printed form not required)
Strategic Priority 1.3: Develop and/or maintain, 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) Note for FAO: harmonize with relevant existing systems Maintain = keep updated *Indicator: None provided*	• Communicate and disseminate key messaging on the value and benefits of the FAO information system for farmed types of AqGR to federal governments and through relevant technical experts • FAO Members to support the adoption of the FAO information system through the Commission and COFI • Develop technical cooperation projects to work with countries on the data collection of their AqGR using the FAO information system

Priority Area 2: ACCELERATE APPROPRIATE DEVELOPMENT OF AQGR FOR AQUACULTURE

Long-term goal: Enhanced appropriate application of genetic improvement technologies to increase the sustainable aquaculture production and deliver benefits to consumers (users)

Strategic priority	Actions
Strategic Priority 2.1: Raise awareness, through communication and education, to improve understanding of the properties, benefits and potential risks of genetic technologies and their application to AqGR *Indicator: Regional campaign strategy/strategies developed*	• Preparation and publication of documentation, including brochures and guidelines, on the risks and benefits of these technologies • Develop messages for communication programs for consumers *(potentially consider this action for Priority Area 3, in relation to traceability)* • Organize national and regional stakeholder workshops • Develop national communication plans to raise awareness • Continue with online events as part of the communication strategy, aim to encourage participation of hidden stakeholders and capture new users of the Registry. • Develop a plan to collaborate with indigenous communities and traditional owners to integrate their knowledge into the Registry.
Strategic Priority 2.2: Develop and promote well-managed, long-term selective breeding programmes as a core genetic improvement technology for all major aquaculture species leading to greater adoption *Indicator: Five breeding programmes per region*	• Identify well-managed national and/or regional breeding programmes as case studies and/or best practice examples • Raise awareness of the costs and benefits among key stakeholders such as producer associations and government • Promote public and public–private investments for selective breeding programmes • Support scientific research for effective integration of molecular technologies, such as genomic selection, in selective breeding programmes • Seek and promote long term commitment, politically and economically, to breeding programs regionally and internationally.
Strategic Priority 2.3: Establish priority species and farmed type development strategies and programmes (backed up with the appropriate policies and funding mechanisms) to unlock the full potential of AqGR	• Develop national and subnational farmed type development strategies *Note for FAO: such strategies need to set an appropriate balance between the development of new species (both native and non-native) and the development of farmed types of existing cultured species*

Strategic priority	**Actions**
Indicator: None provided	• Review legal frameworks, underpinning species selection and farmed type development, in line with relevant international instruments such as the Convention on Biological Diversity (CBD), Cartagena Protocol on Biosafety and the Nagoya Protocol on Access and Benefit-Sharing
Strategic Priority 2.4: Conduct appropriate training and capacity building in genetic improvement, particularly in quantitative genetics (N.B. Consider to merge with 2.1) *Indicator:* None provided	• Collaborate with terrestrial animal and plant geneticists and combine different expertise • Develop a plan to build capacity in quantitative genetics, for example through universities and research centres

Priority Area 3: PROMOTE SUSTAINABLE USE AND CONSERVATION OF AQGR

Long-term goal: Promote sustainable use and conservation of aquaculture species and wild relatives, to include native and non-native species

Strategic priority	Actions
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 *Goal: Reduce and prevent adverse impacts from introductions and transfers with better identification and risk assessment tools* *Indicator: Number of escapes; loss of natural biodiversity in wild populations among and within populations*	• Control and monitor escapes from aquaculture and other vectors for species introductions • Develop introduction and transfer protocols • Improve control of introduction of exotic species for aquaculture also in the ornamental fish sector • Genetically identify sources of exotic species • Monitor introductions and impact of non-native species in aquaculture and conduct risk analysis of impacts on natural populations • Mark aquaculture farmed types so they can be traced • Conduct risk analysis of hybrid production on natural populations • Apply risk and benefit analysis of introductions • Link private and public sector • Link actions and policies with articles of international instruments, especially the Convention on Biological Diversity and give special attention to articles on invasive alien species, the Cartagena Protocol on Biosafety and the Nagoya Protocol on Access and Benefit-Sharing • Make policy actions compatible with Strategic Priority 4 • Development of national and regional restoration and emergency plans or guidelines
Strategic Priority 3.2: Identify wild relative AqGR most at risk or important to ensure that they are managed sustainably and appropriate conservation measures are implemented where necessary *Goal: Conservation of wild relatives*	• Conduct workshops (including NGO, IGO) to identify wild relatives most at risk and identify specific actions needed • Include other important species but not most at risk so that they do not become at risk • Monitor genetic diversity of wild relatives to understand local adaptation, stock structure, new genotypes for breeding programs

Strategic priority	**Actions**
Indicator: Number of action plans for long-term conservation of wild relatives, number of wild relatives being monitored; population trends in terms of genetic diversity/numbers	• Set up appropriate policies and/or guidelines to protect wild relatives • Define protected areas (broad definition of protected areas needed) for wild relatives and set priorities for key habitats including areas for sustainable use • Provide general environmental protection for aquatic habitats • Increase capacity of public sector to deal with policies and participate in their development • Implement zoning for aquatic habitats on where anthropogenic activities are allowed or prohibited. • Educate the public and decision makers • Capacity building in risk assessment • Establish working groups to establish *in situ* protection and identify genetic characteristics (include indigenous and traditional owner groups in the working groups)
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.~~ *Goal: Climate smart aquaculture practiced throughout region* *Indicator: number of reports or studies (publications) on climate change impacts on AqGR; number of climate smart aquaculture facilities/innovations*	• Conduct studies on climate solution based aquaculture technology and systems • Conduct studies on competition and predation and other interactions, and trophic interaction analyses • Define climate smart aquaculture and link with sustainable aquaculture and disseminate • Develop climate change scenarios for key habitats and species including acidification • Improve research on climate change impacts, e.g. Acidification • Adapt aquaculture to climate change, e.g. climate smart aquaculture • Ensure aquaculture development is aligned with the recommendations of IPCC • Focus also on local and small scale implications of external factors such as climate change
~~**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	**Actions**
COMBINED WITH 3.2 ABOVE Also covered under 4.2 *Indicator: None provided*	
~~**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~~. COMBINE WITH 3.2 *Indicator: None provided*	
Strategic Priority 3.6: Actively incorporate conservation of AqGR in the development of fisheries management and ecosystem based management plans, particularly for threatened species *Indicator: % of fishery management plans that incorporate AqGR conservation* Note for FAO: This could be ambitious unless a compilation of fishery management plans for each country in the region is available	• Follow ecosystem approach to fisheries (EAF) and ecosystem based management (EBM) to address also non-target species • Promote and develop EAF and EBM programs and management of AqGR relevant to aquaculture and wild relatives • Promote collaboration between fishery managers and aquaculture managers • Actively incorporate *ex situ* conservation into fishery management • Protect and conserve wild relatives through appropriate fisheries management
~~**Strategic Priority 3.7**: Aquatic protected areas should be considered in the development of in situ conservation of key AqGR~~. COMBINE WITH 3.2 *Indicator: None provided*	
Strategic Priority 3.8: Identify the priority threatened and important AqGR as candidates for effective *ex situ* conservation *Indicator: None provided*	• Expand or develop *ex situ* gene banks for all major species • Clarify the variety of gene banks available for *ex situ* conservation and the advantages of each type • Produce guidelines on best practices for *in vitro* and *in vivo ex situ* conservation • Link *ex situ* and *in situ* conservation in regards to threatened and important species

Strategic priority	**Actions**
	• Harmonize and standardize protocols (technologies, inventory, reporting) for *ex situ* conservation
~~**Strategic Priority 3.9**: Develop and promote guidelines and best practices for both in vivo and in vitro ex situ conservation~~. PUT AS ACTION UNDER 3.8 OR COMBINE *Indicator: None provided*	
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 *Indicator: Number of inventories of non-food AqGR important or threatened*	• Identify resources for non-food AqGR that are most important, most problematic or most threatened • Increase collaboration between groups responsible for AqGR for food and non-food uses

Priority Area 4: POLICIES, INSTITUTIONS AND CAPACITY BUILDING

Long-term goals:

Networks that facilitate the collaboration among different stakeholders established.

Awareness increased on the importance of AqGR among different stakeholder.

Acknowledgement of the timeframe for, and constraints involved in, the maintenance of AqGR.

Strategic priority*	**Actions**
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 *Indicator: Number of national policies implemented.*	• Increase the sharing of good practices on AqGR among stakeholders • Support capacity building and training for policy development on AqGR • Establish a network for AqGR • Establish national policies or plans for AqGR, including strategies for adaptation to climate change • Prepare guidelines for the preparation of national policies or plans for AqGR
Strategic Priority 4.2: Develop national strategies for the conservation of AqGR and their sustainable use *Indicator: Number of accessions in gene banks;* *Indicator: Number of species conserved in situ*; *Indicator: Number of protected areas established.*	• Establish and manage protected areas for AqGR • Strengthen *ex situ* conservation for AqGR • Develop national genebanks (sequences, live, gametes and stem cells) for AqGR • Develop collaboration between existing genebanks and promote engagement with national focal points • Implement national strategies for the conservation of AqGR
Strategic Priority 4.3: Support national and regional communication on AqGR and raise awareness of the importance of AqGR among stakeholders from consumers to policy-makers *Indicator: Number of campaigns established;* *Indicator: Number of promotional materials produced (including on the SDGs).*	• Build capacity on Sustainable Development Goals 2 (Zero Hunger) and 14 (Conserve and sustainably use the oceans, seas and marine resources) • Establish campaigns and communication material to raise awareness on the role of the conservation, sustainable use and development of AqGR
Strategic Priority 4.4: Promote development of understanding of the roles of key stakeholders in AqGR, including communities that hold traditional knowledge associated with genetic resources, indigenous communities and	• Establish campaigns and communication material to raise understanding among specific target groups of their roles in the conservation, sustainable use and development of AqGR

Strategic priority*	**Actions**
women, and their roles in the conservation, sustainable use and development of AqGR *Indicator: Number of campaigns established;* *Indicator: Number of promotional materials produced.*	• Increase the involvement of specific target groups in the conservation, sustainable use and development of AqGR
Strategic Priority 4.5: Support reviews, development and implementation 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 *Indicator: Development and revision of legislation on AqGR*	• Promote the development and implementation of national and regional legal frameworks for the responsible use and exchange 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 *Indicator: International committees established*	• Establish international or regional committees for discussion and awareness raising
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 *Indicator:Training programmes established*	• Establish a baseline for planning and implementing AqGR measures • Diagnose and determine the AqGR measures in each country • Increase the capacity of NFPs on AqGR measures
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 *Indicator: None provided*	• Establish public forums on AqGR • Create training programmes on AqGR • Strengthen the inclusion of programmes at different education levels
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	• Analyse and learn lessons from previous case studies in AqGR management

Strategic priority*	**Actions**
valuation, characterization, and genetic improvement *Indicator: None provided*	• Strengthen and promote training, including online training, on AqGR at all levels • Create a registry of private and public aquaculture hatcheries in each country, with a focus on their related capacities • Promote collaboration between countries worldwide to improve knowledge sharing on AqGR • FAO to provide guidelines and manuals for monitoring of AqGR
Strategic Priority 4.10: Encourage the establishment of network activities and support the development and reinforcement of international networking and information sharing on AqGR *Indicator: Number of networks established*	• Create specific training programmes and workshops on AqGR • Disseminate a newsletter/bulletin on AqGR • Hold regular meetings for regional groups to share information on the implementation of the Global Plan of Action • Hold annual or biannual meetings involving stakeholders to discuss the implementation of the Global Plan of Action
Strategic Priority 4.11: Strengthen efforts to mobilize resources, including financial resources for the conservation, sustainable use and development of AqGR *Indicator: None provided*	• Develop fund-raising mechanisms for the implementation of the AqGR strategies

***** Consider to integrate of the following strategic priorities:

a) 4.1 + 4.2 + 4.7
b) 4.3 + 4.4
c) 4.8 + 4.9
d) 4.6 + 4.10

The suggestion is based on the fact that there are multiple strategic priorities and indicators and a few actions proposed.

In September 2020, the Food and Agriculture Organization of the United Nations (FAO) held a virtual regional workshop for Latin America and the Caribbean and for North America on the *"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)"*. The workshop aimed at promoting a standardized use of nomenclature and terminology in the descriptions and categorization of farmed types of aquatic genetic resources (AqGR), and seeking feedback from Members of the Americas on the development of an FAO-hosted information system on farmed types and on the outline of a Global Plan of Action for AqGR.

ISBN 978-92-5-133988-6 ISSN 2070-6987

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CB3413EN/1/02.21