



Food and Agriculture
Organization of the
United Nations

NFIA/R1344 (En)

FAO
Fisheries and
Aquaculture Report

ISSN 2070-6987

Report of the

**REGIONAL WORKSHOP FOR THE NEAR EAST ON THE
DEVELOPMENT OF A REGISTRY OF FARMED TYPES OF
AQUATIC GENETIC RESOURCES
(INCORPORATING A REVIEW OF STRATEGIC PRIORITIES FOR A
GLOBAL PLAN OF ACTION)**

Virtual Workshop, 7–8 December 2020

Report of the

Regional Workshop for the Near East on the Development of a Registry of Farmed Types of Aquatic Genetic Resources (Incorporating a review of strategic priorities for a Global Plan of Action)

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Required citation:

FAO. 2021. *Report of the Regional Workshop for the Near East on the Development of a Registry of Farmed Types of Aquatic Genetic Resources (Incorporating a review of strategic priorities for a Global Plan of Action), Virtual Workshop, 7–8 December 2020*. FAO Fisheries and Aquaculture Report No. 1344, Rome. <https://doi.org/10.4060/cb4763en>

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

ISBN 978-92-5-134434-7
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PREPARATION OF THIS DOCUMENT

This report describes the activities and outputs of the FAO virtual workshop for the Near East on “Development of a Global Information System of Farmed Types of Aquatic Genetic Resources (Incorporating a review of strategic priorities for a Global Plan of Action)” held from 7–8 December 2020.

This document was prepared by Mr Graham Mair, Mr Sebastian Sims and Ms Daniela Lucente with the support of Mr Lionel Dabbadie and Ms Suzanne Redfern. The report was reviewed by participants in the workshop and their feedback incorporated prior to its finalization.

ABSTRACT

This report summarizes the proceedings and outcomes of the Regional Workshop for the Near East on the “Development of a Global Information System of Farmed Types of Aquatic Genetic Resources (Incorporating a review of strategic priorities for a Global Plan of Action)” held from 7 to 8 December 2020.

This workshop, organized thanks to the support of the FAO Subregional Office for the Gulf Cooperation Council States and Yemen, was the fifth in a series of regional workshops held to generate feedback on the Registry of Farmed Types of Aquatic Genetic Resources (Registry) being developed by FAO in response to the findings of the first report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture (SoW-AqGR)* prepared under the guidance of the Commission on Genetic Resources for Food and Agriculture (Commission) and launched by FAO in 2019. As requested by the Commission, the workshop also sought feedback on an outline of a Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture (GPA). The workshop was held online over a period of two days, with sessions lasting between 160 and 180 minutes.

The objectives of the workshop were to promote standardized use of nomenclature and terminology in the description and categorization of aquatic genetic resources (AqGR), especially below the level of species (i.e. farmed types), to identify priority regional stakeholders who would benefit from and could contribute to an information system, such as the Registry, to evaluate the key elements of the prototype Registry using regionally relevant species and their farmed types, and to review the strategic priorities and propose concrete activities under each of the four Priority Areas of the GPA.

The workshop sessions were attended by between 33 and 42 participants, including three National Focal Points for Aquatic Genetic Resources from the Near East, officials from ministries and research institutions. Participants identified government resource managers, academia and researchers as the principal stakeholders and beneficiaries of the Registry. It was noted that regional fisheries management organizations should also be considered as important stakeholders. Some participants expressed concern over availability of part of the information asked in the questionnaire developed by FAO to collect farmed type information. Some participants also expressed support to the development of the Registry and interest in possible collaboration to populate the system with national farmed type data.

Participants were provided with a draft outline of the GPA and were asked to provide written feedback, particularly by: identifying regionally relevant long-term goals for the four Priority Areas of the GPA; revising the list of Strategic Priorities of the GPA; identifying specific regionally relevant actions that should be taken under the different Strategic Priorities; and identifying potential indicators that may be used to monitor progress in the implementation of the GPA. This input will be considered in the preparation of the draft GPA.

CONTENTS

Preparation of this document.....	iii
Abstract	iv
Abbreviations and acronyms	vi
Opening of the workshop	1
Introduction and background.....	2
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	3
A Global Plan of Action for Aquatic Genetic Resources for food and agriculture.....	4
Registry of farmed types of aquatic genetic resources	5
Stakeholders in the Information System of Aquatic Genetic Resources.....	5
Classification of Farmed Types of Aquatic Genetic Resources	5
Clarifications and Suggestions	6
Review of the outline global plan of action for aquatic genetic resources for food and agriculture.....	6
Closing remarks.....	7
References	7
Annex 1 – Agenda for the Near East Workshop.....	8
Annex 2 – List of participants	9
Annex 3 – 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.).....	12
Annex 4 – Feedback from Participants on Priority Areas of the Draft Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture: Long-term Goals, Strategic Priorities, Actions and Indicators.....	13

ABBREVIATIONS AND ACRONYMS

AqGR	Aquatic genetic resources for food and agriculture
COFI	FAO Committee on Fisheries
Commission	FAO Commission on Genetic Resources for Food and Agriculture
CBD	Convention on Biological Diversity
DIAS	FAO Database on Introductions of Aquatic Species
FAO	Food and Agriculture Organization of the United Nations
GPA	Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture
ITWG-AqGR	Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture
NFIA	FAO Fisheries Division – Aquaculture Branch
NFIS	Statistics and Information Branch
NFP	National Focal Point
OCBC	Secretariat of the Commission on Genetic Resources for Food and Agriculture
Registry	Registry of Farmed Types of Aquatic Genetic Resources
SDG	Sustainable Development Goal
SNG	Subregional Office for the Gulf Cooperation Council States and Yemen
SoW-AqGR	<i>The State of the World's Aquatic Genetic Resources for Food and Agriculture</i>

OPENING OF THE WORKSHOP

1. The Regional Workshop for the Near East on the “Development of a Global Information System of Farmed Types of Aquatic Genetic Resources (Incorporating a review of strategic priorities for a Global Plan of Action)” was held from 7 to 8 December 2020. The agenda of the workshop is given in Annex 1.
2. The first session of the workshop (using a virtual webinar platform) was attended by 43 participants, made of up of representatives from 8 Member Nations (including three national focal points [NFPs]) and officials from ministries. The list of participants is provided in Annex 2.
3. Mr Dino Francescutti, Subregional Coordinator of the FAO Subregional Office for the Gulf Cooperation Council States and Yemen (SNG) opened the meeting and welcomed all participants. He noted that the Development of a Global Information System for Farmed Types of Aquatic Genetic Resources was a very important topic, affecting the future of aquatic ecosystems and food security. He outlined that aquaculture was key to meeting increased demand for fish. He further noted that aquaculture is a relatively young field, and that most aquatic genetic resources for food and agriculture (AqGR) of cultured species were highly similar to their wild relatives and had not yet lost the genetic variation in the wild that has occurred for terrestrial species. He mentioned that conserving this biodiversity was essential to adapt aquaculture between environments or responding to natural or human-induced impacts such as climate change or new diseases. He further noted that it was important to engage in sustainable selective breeding to produce more with less resources, acknowledging that a well designed improvement programme could increase production by 10 percent per generation without changes to feed or space. He noted that the challenge was combining conservation of wild resources while enhancing cultured resources. He acknowledged participating FAO Members, and the support of Mr Ahmed AlMazrouai, from FAO Regional Office for the Near East, in opening up the workshop to a larger number of countries.
4. Mr Matthias Halwart, Chief of the Aquaculture Branch (NFIA) of the Fisheries Division, welcomed 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, 2019b, 2019c), 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 management of genetic resources in aquaculture. He further noted that the current information available on AqGR is incomplete and therefore the development of the Registry of Farmed Types of Aquatic Genetic Resources (Registry) is a key step forward in addressing this limitation and is fundamental to the development of the Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture (GPA). He acknowledged the Government of Germany for the support of the development of the Registry and the GPA.
5. Ms Irene Hoffmann, Secretary of the Commission on Genetic Resources for Food and Agriculture (Commission), welcomed participants and provided some background on the work of the Commission and, more specifically, its activities related to 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 regular working group of the Commission. She further recalled that the Commission had requested FAO to develop the GPA, in response to the SoW-AqGR. She noted the importance of this and the other regional workshops as steps towards the draft GPA and expressed her gratitude to all participants for contributing to this process.

INTRODUCTION AND BACKGROUND

6. Mr Graham Mair, Senior Aquaculture Officer (NFIA), presented an outline of the structure of the workshop and the mechanisms for interaction among 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 FAO's initiatives to develop the Registry and prepare the GPA, as requested by the Commission. He then outlined the objectives and expected outputs of the workshop in relation to these two initiatives.

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 GPA outline. 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 the Near East:

- 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 on any of its elements?

9. Mr Lionel Dabbadie, Senior Fishery and Aquaculture Officer (SNG), presented the status of development of AqGR in the Gulf Cooperation Council States and Yemen. He outlined that the region does not have much freshwater biodiversity as it is largely desert, but that the Red Sea, Gulf of Aden and Arabian Gulf have very large biodiversity. He then compared the coastlines of countries. He outlined aquaculture production statistics for the region from FishStatJ. Since the 1950s, production of 39 species has been reported, including 23 marine fish, 10 freshwater fish, four shrimps, one oyster and one sea cucumber. In 2018, production of 15 species were recorded. He observed that the key species farmed in the region look very different depending on whether Saudi Arabia is included or not in the statistics. When Saudi Arabia is included, *Litopenaeus vannamei* had the largest production, followed by *Oreochromis niloticus*, *Lates calcarifer* and *Sparus aurata*. Excluding Saudi Arabia, the key species were *Sparus aurata*, *Fenneropenaeus indicus* and *Oreochromis niloticus*. Species such as *Acipenser baerii* are also cultured, in this case for caviar production. He then outlined that aquaculture in the region has changed significantly since 2018, particularly with respect to native species such as Hamour grouper, rabbit fish and *Seriola* spp. and non-native species such as *Fenneropenaeus indicus*, *Sparus aurata*, and other species including the European sturgeon. He then outlined recent developments in the region, such as growing interest in the conservation of native AqGR, and the efforts to preserve wild stocks. There have been recent successes including a Kingfish fishing ban. There is a great deal of interest in the culture of species for which capture fisheries cannot meet demand, and some

hatcheries have opened to target this part of production. To this end, the presenter launched a poll asking which native species has the greatest potential to expand its production over the next decade. Hamour grouper was the most popular answer.

10. Ms Wahida Nasser Almary, a biotechnologist from the Ministry of Agricultural Wealth, Fisheries and Water Resources of Oman, presented her experience of molecular genetics with respect to AqGR and the improvement of capture fisheries and aquaculture. Her research projects include DNA barcoding for the identification of marine species and fillets. She used molecular analysis for example to: determine whether there were two distinct Kingfish stocks in Oman; carry out stock assessments for seven demersal species; analyse the genetic structure of the Frigate tuna; analyse the genetic diversity of spiny lobster in Oman; sample and classify 44 shellfish species in Omani coastal waters; identify the species of fish fillets; understand the effects of hypoxia and temperature. She noted that some of the species she had researched, such as the spiny lobster, were not aquaculture species.

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, NFIA, 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
- a. development, promotion and commercialization/institutionalization of national, regional and global standardized information systems for the collection, validation, monitoring and reporting on AqGR¹ 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 systems 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 [DAD-IS]) (FAO, 2021) It was noted that nothing similar exists for AqGR at global level.

13. It was recalled that the ITWG-AqGR, at its Second Session, 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, 2019d).

14. The Government of Germany has responded by providing financial support to the development of the Registry. The projected 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

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

- a proposal for further development, institutionalization/commercialization and expansion of the Registry.

15. Through another poll, it was noted that most of the participants had often experienced confusing usage of terminology describing farmed type111.

16. Some participants expressed support to the development of the Registry and interest in a possible collaboration to populate the system with national farmed type data.

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

17. Ms Suzanne Redfern, Technical Officer, Secretariat of the Commission (OCBC), 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 agriculture sectors have helped governments to make policies, establish national strategies and priorities, direct research and secure funding for work on genetic resources for food and agriculture in these sectors.

18. 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, 2018). 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 tentative timeline for the development of a GPA is outlined in Annex 3.

19. It was noted that the aquatic sector has no global information system 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 preparation of the GPA for AqGR, 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 Priority Area 2 with a 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.

20. 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. Mr Mair noted that AqGR are often ignored in the consideration of genetic diversity in food and agriculture, for example in assessing indicators related to targets in Sustainable Development Goal 2.5 (maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species), in part due to the lack of indicators to quantify genetic diversity of AqGR.

REGISTRY OF FARMED TYPES OF AQUATIC GENETIC RESOURCES

Stakeholders in the Information System of Aquatic Genetic Resources

21. Ms Lucente presented an overview of the primary stakeholders that could be users of and provide information to a Registry. Participants considered the role of the 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 through a poll that government resource managers and academia and researchers would be respectively the first and second top users of the Registry.

22. Participants suggested that regional fisheries management organizations should also be included as stakeholders.

Classification of farmed types of Aquatic Genetic Resources

23. Mr Mair presented an overview of the classification system FAO has proposed for AqGR in the Registry. Participants considered the classification system for farmed types that was developed by FAO (FAO, 2020) in consultation with an expert group and adopted in the Registry. The classification is based on two different categorizations; the "Primary" farmed types categorization refers to the level of domestication from the original wild-sourced farmed type. The "Secondary" farmed type categorization refers to any of seven genetic improvement methodologies that can add value when applied to primary farmed types. Mr Mair noted that each species in an aquaculture facility will have one and only one primary farmed type, but it could have several or no secondary farmed types. He further noted that there should be a national focus on characterizing farmed types with these being categorized relative to other farmed types within the country (for example a strain can be defined as such if it is distinct from other farmed types of the same species, within the country).

24. Following the presentation on farmed types, a poll was launched to test participants' understanding and knowledge on primary farmed types. Only 31 percent correctly classified a hypothetical primary farmed type, with the rest of respondents providing very different answers and consequently confirming the need for promotion and broad adoption of a standard terminology for farmed types. In a second poll, 56 percent of respondents was able to correctly classify secondary farmed types from a worked example.

25. Participants noted that there can be problems in the translation into Arabic of farmed type terms, especially with regard to the term "gene edited". FAO explained that in English language this is a well-established term and that the difference between "gene edited" and "transgenic" is clear but countries can adopt different approaches and regulations on the use and management of these resources.

26. Mr Mair gave a short demonstration of the utility of the user interface that enables data within the Registry to be queried (FAO, 2021b). He demonstrated the capacity to display, on the opening page, a summary of the global data entered into the system with the capacity to filter data by different geographic scales (global, regional, national), taxonomic category, species, and primary and secondary farmed types. He showed how the data can also be summarized through pages specific to: development of AqGR; conservation and sustainable use; and policies, institutions and capacity. Finally, he demonstrated the capability to generate species and country fact sheets.

27. Ms Lucente gave an in-depth presentation on the user interface of the questionnaire that data providers will need to fill in to enter farmed type data in the Registry. It was mentioned that FAO has preloaded the interface with over 600 species from the Aquatic Sciences and Fisheries Information System and the database of the SoW-AqGR. She explained that the questionnaire and the classification of farmed types have been field-tested in the Philippines and provided examples of information entered in the Registry during the field-testing and the current work with species experts.

28. Some participants highlighted that most countries in the region do not have aquatic plant production. FAO is aware that there will be differences in farmed species and in the representation of taxonomic groups between countries and regions. However, the questionnaire was developed to reflect the different realities in the different countries and, for this reason, it also covers aquatic plants.

29. In relation to the question in the questionnaire “*What is the strain accession code?*” participants noted that this question was specific to countries that have national registry which is not the case for most countries in the region.

30. Some participants asked clarification with regard to the acronym TBD (to be determined) which is among the possible answers to some of the questions in the questionnaire. FAO is already considering to remove this option which is a relic from an earlier version of the questionnaire.

Clarifications and suggestions

31. 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 Ms Lucente’s presentation.

32. Participants noted that many countries do not have detailed information to respond to many questions asked in the questionnaire, especially those related to genetic characteristics, qualitative phenotypes and quantitative performance of farmed types. Whilst this relates in part to the relatively few developed farmed types in the region there is nevertheless a need to conduct studies to generate this information and this will take time. In addition, there is no or very limited work on the secondary farmed types. At the same time, it was noted that the questionnaire is comprehensive and properly organized.

33. FAO explained that there is awareness on the fact that there are differences between countries in the availability and ease of access to AqGR information, especially at farmed type level, and that the fields in the questionnaire for which information is unavailable can be left blank.

34. FAO clarified that AqGR still under research and development should not be entered into the Registry. The Registry and the future Global Information System focus on those AqGR already having some production at national level.

35. Participants recommended that for financing the implementation of the GPA, FAO might provide technical support to one of the most economically developed countries of the region to establish a research station and gene bank for conserving and improving aquaculture that will serve the region.

REVIEW OF THE OUTLINE GLOBAL PLAN OF ACTION FOR AQUATIC GENETIC RESOURCES FOR FOOD AND AGRICULTURE

36. FAO provided participants with the draft outline of the GPA (Annex 4) and invited them to provide written feedback, by email (ITWG-AqGR@fao.org), to the following questions:

- 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 your region within the Strategic Priorities?
- What indicators can we use to monitor progress on the key elements of the GPA that can be integrated into the Registry?
- Do you have recommendations on implementation of elements of the GPA?

Following completion of the workshop two countries, Kuwait and Oman, provided extensive written feedback to the draft outline of the GPA, using the template provided by FAO. This feedback will be considered, together with the comments from the other countries and regions, in the preparation of the GPA.

CLOSING REMARKS

37. Mr Mair thanked all the participants for their attendance and active participation in the workshop, and gave a short review of the workshop outcomes. Mr Mair outlined the next actions that FAO will take with regard to the Registry and the GPA and encouraged delegates to approach FAO if they wished to cooperate, in the near term, or longer term, with regard to entering data on species and farmed types for their country. Members who have not nominated NFPs or who wished to provide new NFPs, were encouraged to contact FAO, through formal channels, to provide their nominees.

38. Mr Dabaddie thanked participants and highlighted support from colleagues in the region. He stated that these workshops help resource managers in the region to contribute to the global agenda, and enable FAO to remain well connected to countries in the region.

39. Mr AlMazrouai encouraged participants to continue their engagement with FAO on issues related to AqGR and again thanked all participants, organizers, interpreters, and closed the meeting.

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Annex 1 – Agenda for the Near East Workshop

Session	Title	Objective	Key messages	Format	Advance reading
Day 1 (Dec 7) 09:00-10:30 CET	Introduction to the Registry	Raise awareness of key findings of the SoW-AqGR and rationale for the Registry	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Welcome remarks (<i>D. Francescutti, M. Halwart, I. Hoffmann</i>) • Introduction to the workshop (<i>G.C. Mair</i>) • The SoW-AqGR: needs and challenges summary (<i>G.C. Mair</i>) • AqGR in the Near East (<i>Wahida Bint Nassir Al Aamirya</i>) • Why do we need a Registry? (<i>D. Lucente</i>) • Stakeholders in the Registry (<i>D. Lucente</i>) • Panel discussion 	<ul style="list-style-type: none"> • In Brief of the SoW-AqGR
Day 2 (Dec 8) 09.00-10.50 CET	Stakeholders and farmed types Information content for the Registry	<ul style="list-style-type: none"> • Facilitate understanding of member stakeholders that will use the information system and explain concept of farmed types • Seek feedback on the information content of the Registry 	<ul style="list-style-type: none"> • 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? 	<ul style="list-style-type: none"> • What are farmed types? (<i>G.C. Mair</i>) • Discussion • Data queries from the system (<i>G.C. Mair</i>) • Data collected at species and farmed type level (<i>D. Lucente</i>) • Discussion • Health break • What is a GPA? (<i>S. Redfern</i>) • The outline of the GPA-AqGR (<i>G.C. Mair</i>) • Discussion • Wrap-up and closure 	<ul style="list-style-type: none"> • Article: What are Farmed Types and why do they matter? • GPA document (attachment)

Annex 2 – List of participants

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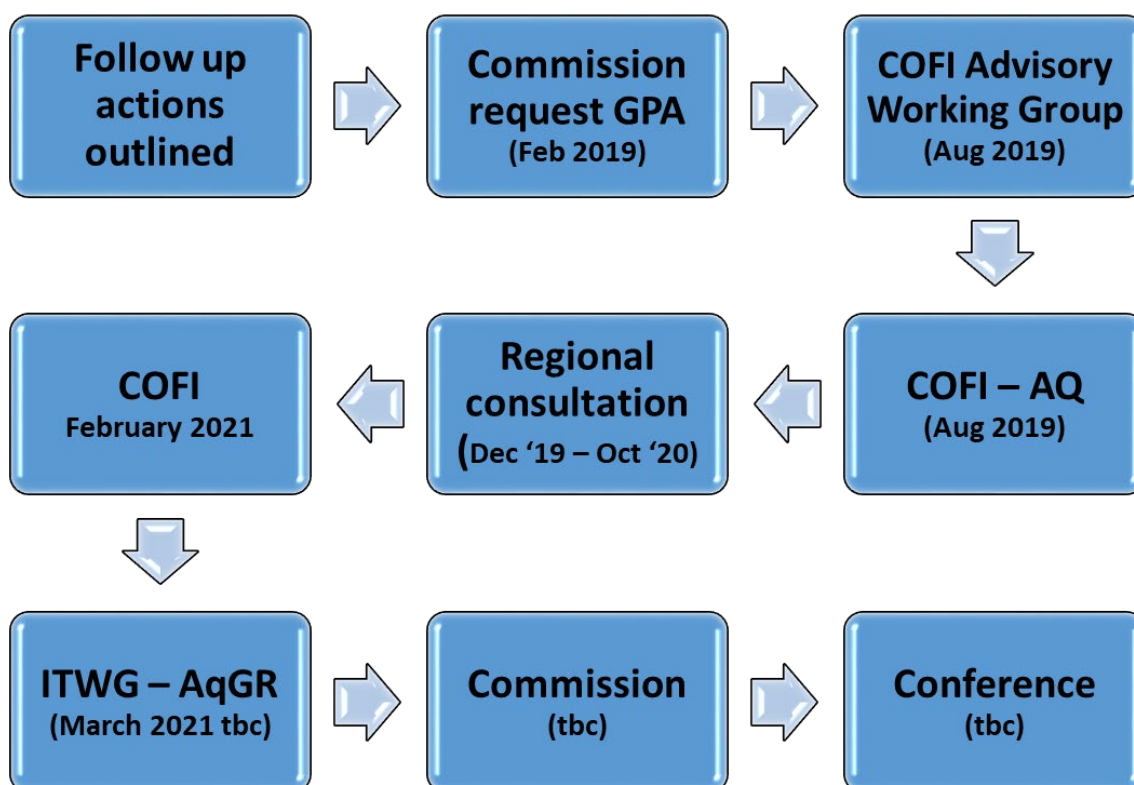
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Annex 3 – Tentative Timeline for Development and Approval of a Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture (Note: all dates after June 2020 are considered tentative due to the disruption to schedules resulting from the COVID-19 pandemic.)



Annex 4 – Feedback from Participants on Priority Areas of the Draft Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture: Long-term Goals, Strategic Priorities, Actions and Indicators

Feedback provided by Kuwait

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

Long-term goal: Establishment and monitoring of standardized information system for AqGR below the level of species including ornamental species and micro-organisms.

Strategic priority	Actions
<p>Strategic Priority 1.1: Promote the globally standardized use of terminology, nomenclature and descriptions of AqGR (high priority)</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • Develop a guideline book for standardized terminology, nomenclature and descriptions of AqGR (prepare by FAO) • The guideline book would be agreed on by all focal points
<p>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. (high priority)</p> <p><i>Indicator:</i> Percentage of number of reported species</p>	<ul style="list-style-type: none"> • Develop an annex to the information system to cover unreported AqGR including ornamental species and micro-organisms
<p>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). (high priority)</p> <p><i>Indicator:</i> Percentage of number developed information system to the number of countries in the region</p>	<ul style="list-style-type: none"> • FAO prepare guidelines and assist countries to develop information system • Focal points to formulate a committee and organize meetings with stakeholders to develop information system with the help of FAO

Priority Area 2: Accelerate appropriate development of AqGR for aquaculture

Long-term goal: Establish awareness program among stakeholders to develop programs for selective breeding for major aquaculture species.

Strategic priority	Actions
<p>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. (high priority)</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • Develop awareness program for national fisheries and aquaculture stakeholders
<p>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. (high priority)</p> <p><i>Indicator:</i> Number of species selective breeding.</p>	<ul style="list-style-type: none"> • Develop national programs for selective breeding for major aquaculture species
<p>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. (Low priority)</p> <p><i>Indicator:</i> Number of breeds developed</p>	<ul style="list-style-type: none"> • Establish national breed development program to include new species by research institutions in the region
<p>Strategic Priority 2.4: Conduct appropriate training and capacity building in genetic improvement, particularly in quantitative genetics. (Low priority)</p> <p><i>Indicator:</i></p>	

Priority Area 3: Promote sustainable use and conservation of AqGR

Long-term goal: Development sustainable policies and measures for conservation of native AqGR.

Strategic Priority	Actions
<p>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. (high priority)</p> <p><i>Indicator:</i> Policy book for controls for introduction of non-native species.</p>	<ul style="list-style-type: none"> • Development of risk-based policies by the agriculture and fisheries authorities in collaboration with the environment protection agencies • Development of monitoring system by the agriculture and fisheries authorities for data collection and assessment of the impacts of non-native species on both farmed and wild relative AqGR
<p>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. (high priority)</p> <p><i>Indicator:</i> Change in trends and level of effective population size for wild relatives.</p>	<ul style="list-style-type: none"> • Develop a list of IUCN list (Threatened, Endangered, and Protected Species) for wild relative of AqGR • List national and regional management and conservation measures
<p>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. (Low priority)</p> <p><i>Indicator:</i> Number of threatened farmed type species</p>	<ul style="list-style-type: none"> • Inclusion of environmental parameters in the monitoring system to assess impact of environmental change such as climates change • Determine the most species vulnerable to the future impacts of environmental change
<p>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. (high priority)</p> <p><i>Indicator:</i> Percentage of protected areas to the total marine area.</p>	<ul style="list-style-type: none"> • Establish and monitor national marine protected areas (MPA) • Implement fishing measures to protect spawning and recruitment areas for the threatened wild relatives AqGR
<p>Strategic Priority 3.5: Identify threatened wild relative AqGR that are critical to aquaculture development and to wild catch fisheries and to</p>	<ul style="list-style-type: none"> • Develop a list of threatened wild relative AqGR that are critical to aquaculture development and to wild catch fisheries

<p>prioritize these for in situ conservation. (high priority)</p> <p><i>Indicator:</i> Change in trends and level of effective population size for species.</p>	<ul style="list-style-type: none"> • Develop stock management and conservation measures for these species
<p>Strategic Priority 3.6: Actively incorporate conservation of AqGR in the development of fisheries management plans, particularly for threatened species. (high priority)</p> <p><i>Indicator:</i> Number of management plans for protected species.</p>	<ul style="list-style-type: none"> • Development of fisheries management plans for threatened species from overfishing • Incorporate of conservation of AqGR in the fisheries management plans
<p>Strategic Priority 3.7: Aquatic protected areas should be considered in the development of in situ conservation of key AqGR. (low priority)</p> <p><i>Indicator:</i></p>	
<p>Strategic Priority 3.8: Identify the priority threatened and important AqGR as candidates for effective ex situ conservation. (low priority)</p> <p><i>Indicator:</i></p>	
<p>Strategic Priority 3.9: Develop and promote guidelines and best practices for both in vivo and in vitro ex situ conservation. (low priority)</p> <p><i>Indicator:</i></p>	
<p>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. (low priority)</p> <p><i>Indicator:</i></p>	

Priority Area 4: Policies, institutions and capacity building

Long-term goal: Development of national policies for enforcement and governance to address the sustainable use 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. (high priority)	<ul style="list-style-type: none"> • FAO to encourage and support countries to develop, monitor and enforce policies and good governance
Strategic Priority 4.2: Develop national strategies for in situ and ex situ conservation of AqGR and their sustainable use. (high priority)	<ul style="list-style-type: none"> • FAO to assist in development of 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. (low priority)	
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. (high priority)	
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. (low priority)	
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. (low priority)	
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. (low priority)	
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. (low priority)	
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. (high priority)	<ul style="list-style-type: none"> • Conduct training courses 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. (low priority)	
Strategic Priority 4.11: Strengthen efforts to mobilize resources, including financial resources for the conservation, sustainable use and development of AqGR. (high priority)	<ul style="list-style-type: none"> • Encourage national funding agents to support financially the main stakeholders for development of information system, policies, and all activities related to use of AqGR

Feedback provided by Oman

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

Long-term goal: AqGR management and sustainable development

Strategic priority	Actions
<p>Strategic Priority 1.1: Promote the globally standardized use of terminology, nomenclature and descriptions of AqGR</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • Aquatic Genetic resource and Technologies • Aquatic genetic resource management and sustainable development
<p>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.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • Provide suitable investment opportunities in aquaculture • Encourage the establishment of sustainable and competitive aquaculture industry that is in harmony with the environment, social, economic and historic values
<p>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).</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • The Sultanate of Oman contains world-class infrastructure, such as a modern road network, airports, and ports, with the introduction of technologies. A number of licenses were granted to establish commercial farming projects. • Commercial aquaculture projects vary in systems and species. Where there are 8 projects for shrimp culture and 7 projects for aquaculture with a water recycling system for species such as salmon, Omani sandalwood, and some finfish. There are five projects for the cultivation of the floating cage system for Sparidae seabream and tuna fattening. Production reached 557 tonnes from commercial farming as of the end of September 2019.

Priority Area 2: Accelerate appropriate development of AqGR for aquaculture

Long-term goal: Accelerate the aquaculture growth technologies

Strategic priority	Actions
<p>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.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • We have not yet actions in Oman regarding the genetic technologies on the applications of AqGR of selective breeding and emerging technologies. • However, it will be under strict policy roles to be clear from any diseases, restrict to any diseases (SPT) and should have as in Project of the 3 types of Shrimp Culture (<i>Penaeus indicus</i>, <i>P.monodon</i> and <i>Litopenaeus vannamei</i>). This project is under the establishment in Sharqia region. The aim is to reach production 4000 tons next year 2021, Unocal species and should have to start with 100-200 mothers for the growth development. •
<p>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.</p> <p><i>Indicator:</i></p>	<p>Scientific & Experimental Researches:</p> <ul style="list-style-type: none"> • Shrimp and shellfish farming • Finfish cage culture project • Hatchery and production of Omani abalone seeds • Hatchery of local seabream and Grouper
<p>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.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • Development of Integrated freshwater fish aquaculture • Spatial planning and development of aquaculture in Musandam Governorate- A GIS approach • Establishment of hatcheries & fish feed factories • Accelerate the aquaculture growth • Allocate suitable sites for aquaculture projects • Hatcheries of Tilapia project in Abatinah and Sharqia region. This project aimed to use small hatcheries (male yy) because they are fast in growth. They used the hatcheries from Thailand for the genetic improve farmed Tilapia
<p>Strategic Priority 2.4: Conduct appropriate training and capacity building in genetic improvement, particularly in quantitative genetics.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • No action was undertaken regarding training and capacity building in genetic improvement or quantitative genetics.

Priority Area 3: Promote sustainable use and conservation of AqGR

Long-term goal: Promote and monitoring of the AqGR conservation

Strategic Priority	Actions
<p>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.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • Still, there are no policies and controls
<p>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.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • Shrimp and shellfish • Finfish • Omani abalone seeds • Local seabream and Grouper
<p>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.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • The monitoring of current and future impacts on the preservation of genetic resources is the presence of overfishing that leads to depletion • Climate change with the occurrence of annual hurricanes • The occurrence of red tides that cause the death or mortality of genetic resources or even the AqGR
<p>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.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • Establishment of hatcheries and fish feed factories • Accelerate the aquaculture growth • Allocate suitable sites for aquaculture projects • Attract national & Foreign investments • Increase the production • Increase the contribution of the fisheries sector in the GDP
<p>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.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • Pelagic fish species, kingfish, tuna, sharks • Demersal fish species, Sparidae seabream, and Groupers • Shrimps • Lobsters • Abalone and Mollusks • Sea cucumber

<p>Strategic Priority 3.6: Actively incorporate conservation of AqGR in the development of fisheries management plans, particularly for threatened species.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • Currently there are no plans to integrate AqGR conservation effectively • Only fisheries management and sustainability plans exist, especially for endangered and cultured species
<p>Strategic Priority 3.7: Aquatic protected areas should be considered in the development of in situ conservation of key AqGR.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • Yes, there are many protected aquatic areas in Oman, which are well-known and strategic sites when developing either aquaculture or AqGR • Musandam, Batinah, Sharqiah, Alwusta, and Salalah
<p>Strategic Priority 3.8: Identify the priority threatened and important AqGR as candidates for effective ex situ conservation.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • Shrimps • Lobsters • Abalone • Seabream • Tuna
<p>Strategic Priority 3.9: Develop and promote guidelines and best practices for both in vivo and in vitro ex situ conservation.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • NA
<p>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.</p> <p><i>Indicator:</i></p>	<ul style="list-style-type: none"> • NA

Priority Area 4: Policies, institutions and capacity building

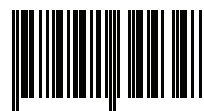
Long-term goal: Improve roles and policies of the conservation and sustainable use of the AqGR.

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.	<ul style="list-style-type: none"> • Investment incentives • One-stop Shop for aquaculture • Required information for Business & EIA studies • Soft loans from funders • Technical support during the phases of the project
Strategic Priority 4.2: Develop national strategies for in situ and ex situ conservation of AqGR and their sustainable use.	<ul style="list-style-type: none"> • Training of technical people on Aquaculture
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.	<ul style="list-style-type: none"> • The government encourages young people to start small investment projects in aquaculture • Technical and financial support • Provide appropriate technical assistance • Provide job opportunities for Omani people • Commitment of Social responsibilities
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.	<ul style="list-style-type: none"> • Spreading awareness among people about the importance of preserving genetic resources and how to preserve and sustain them for future generations through the media, other technological methods, schools and other events in simplified ways • Scientific publishing among people in the government and private sector
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.	NA
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.	<ul style="list-style-type: none"> • Investment commitment • Quality commitment
Strategic Priority 4.7: Establish or strengthen national institutions, including national focal points, for planning and implementing AqGR	<ul style="list-style-type: none"> • Exchange of experiences, visits and training among member states • Cooperation in the work of joint projects between member states

measures, for aquaculture and fishery sector development.	<ul style="list-style-type: none"> • Planning for the work of a center that includes all business between member states
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.	<ul style="list-style-type: none"> • Work in establishing a Gene bank to collect all data • Entering information on genetic resources and their importance in the educational sector • Scientific publication
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.	NA
Strategic Priority 4.10: Encourage the establishment of network activities and support the development and reinforcement of international networking and information sharing on AqGR.	<ul style="list-style-type: none"> • Create educational and informative platforms or applications through social media
Strategic Priority 4.11: Strengthen efforts to mobilize resources, including financial resources for the conservation, sustainable use and development of AqGR.	<ul style="list-style-type: none"> • Providing young technicians and volunteers in and encouraging them in their exerted efforts

In December 2020, the Food and Agriculture Organization of the United Nations (FAO) held a virtual regional workshop for the Near East on the “*Development of a Global Information System of Farmed Types of Aquatic Genetic Resources (Incorporating a review of strategic priorities for a Global Plan of Action)*”. 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 Near East 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 978-92-5-134434-7 ISSN 2070-6987



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CB4763EN/1/05.21