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SUB-COMMITTEE ON AQUACULTURE

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**REPORT OF THE SECOND SESSION OF THE COMMITTEE ON
FISHERIES ADVISORY WORKING GROUP ON AQUATIC GENETIC
RESOURCES AND TECHNOLOGIES,
ROME, ITALY, 19–20 OCTOBER 2017**





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RESOURCES AND TECHNOLOGIES**

Rome, Italy, 19–20 October 2017

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PREPARATION OF THIS DOCUMENT

This document was prepared by the FAO Secretariat with inputs and agreement from the Committee on Fisheries (COFI) Advisory Working Group on Aquatic Genetic Resources and Technologies. The contribution from the Government of Germany for supporting much of the work of the COFI Advisory Working Group on Aquatic Genetic Resources and Technologies is gratefully acknowledged.

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ABSTRACT

The establishment of the Advisory Working Group on Aquatic Genetic Resources and Technologies (Working Group) and its terms of reference were approved at the 31st session of the FAO Committee on Fisheries (COFI) in 2014, based on a request from the 7th Session of the FAO COFI Sub-Committee on Aquaculture, and in recognition of the tremendous opportunities to increase food production and improve livelihoods from the responsible use, management and conservation of aquatic genetic resources and technologies. Since its first session in 2015, the Working Group has assisted and provided advice to FAO on matters concerning aquatic genetic resources and technologies and in producing the first draft report on the State of the World's Aquatic Genetic Resources for Food and Agriculture. This report contains the main discussion points and general conclusions and recommendations from the second session of the Working Group convened from 19–20 October, 2017 in FAO headquarters, Rome, Italy.

The Working Group made excellent progress on implementing its work plan for 2015–2017 with all activities completed or nearly completed. The Working Group developed a new work plan for 2017–2019 which includes the revision of definitions related to genetic resources in FAO glossaries. The Working Group oversaw and contributed to the development of a comprehensive framework of minimum requirements for sustainable management, development, conservation and use of aquatic genetic resources, which was recommended for implementation.

Regarding the guidance on the preparation of the draft report on the State of the World's Aquatic Genetic Resources for Food and Agriculture (SoW AqGR), the Working Group endorsed the recommendations from the Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture (ITWG) and provided related recommendations.

The Working Group reviewed relevant documents on aquatic genetic resources for food and agriculture (AqGR) and derived the following six as high priority areas for FAO:

- Implementation of genetic improvement programmes, including selective breeding, hybridization and polyploidization;
- Risk/benefit analysis, such as FAO's Precautionary Approach, especially considering the use and introduction of non-native species and strains;
- Biosecure and equitable exchange of species and germplasm with policy frameworks such as Material Transfer Agreements and Access and Benefit Sharing protocols;
- National policy analysis, with explicit consideration of policy to enable the private sector;
- Establishment of an information system to document and monitor and assess the status of AqGR, including a registry of farmed types (e.g. strains, hybrids, triploids) as well as stocks of wild relatives.

The SoW AqGR and supporting thematic background papers were reviewed and advice provided on harmonizing definitions and producing a full glossary of key terms and concepts to accompany the SoW AqGR.

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ABBREVIATIONS AND ACRONYMS

AqGR	Aquatic genetic resources
ASFIS	Aquatic Sciences and Fisheries Information System
AWG	Advisory Working Group on Aquatic Genetic Resources and Technologies
CBD	Convention on Biological Diversity
CCRF	FAO Code of Conduct for Responsible Fisheries
CGRFA	Commission on Genetic Resources for Food and Agriculture
COFI	FAO Committee on Fisheries
COFI:AQ	FAO Committee on Fisheries' Sub-Committee on Aquaculture
DAD-IS	Domestic Animal Information System
FAO	Food and Agriculture Organization of the United Nations
FI	FAO Fisheries and Aquaculture Department
GMO	Genetically modified organism
ICAR	Indian Council of Agricultural Research
IGO	Inter-Governmental Organization
INGA	International Network for Genetics in Aquaculture
ITWG	Intergovernmental Technical Working Group
IUCN	International Union for the Conservation of Nature
NACA	Network of Aquaculture Centres in Asia-Pacific
NGO	Non-Governmental Organization
PPP	Private Public Partnership
SNPs	Single Nucleotide Polymorphisms
SoW AqGR	State of the World's Aquatic Genetic Resources for Food and Agriculture
WFT	World Fisheries Trust

BACKGROUND

In recognition of the tremendous opportunities to increase food production and improve livelihoods from the responsible use of aquatic genetic resources and technologies, the 7th Session of the FAO Committee on Fisheries' Sub-Committee on Aquaculture (COFI:AQ) recommended in 2013 the establishment of a body to advise FAO on matters concerning aquatic genetic resources and technologies, and to enhance international cooperation on aquatic genetic resource management.

The creation of the Advisory Working Group on Aquatic Genetic Resources and Technologies (Working Group) and the draft terms of reference were approved at the 31st Session of the FAO Committee on Fisheries (COFI) in 2014. Following FAO standard procedures, ten experts were endorsed, taking into consideration technical expertise, gender and geographical balance. These members have served a two year term on the Working Group with the possibility of renewal.

The first meeting of the COFI Advisory Working Group on Aquatic Genetic Resources and Technologies was convened from 1–2 October, 2015 in Brasilia, Brazil, in conjunction with the 8th Session of COFI:AQ. This second meeting was convened just prior to the 9th Session of the COFI:AQ in order to provide advice to the 9th session.

The agenda is included as Annex 1; the list of participants is included as Annex 2.

OBJECTIVES OF THE MEETING

The objectives of the meeting were to:

1. Provide guidance on the process leading to the SoW AqGR Report;
2. Provide comments on the Thematic Background Studies prepared for the SoW AqGR Report;¹
3. Provide guidance on a glossary of terms and concepts relevant to Aquatic Genetic Resources (AqGR);
4. Review and refine the draft Framework of Minimum Requirements for Sustainable Management, Development, Conservation and Use of Aquatic Genetic Resources (Framework);
5. Inform the Working Group on current activities and needs of FAO in regards to AqGR; and
6. Review and refine the Terms of Reference and general work plan for the Working Group (Annex 3).

DELIBERATIONS OF THE WORKING GROUP

The Working Group reviewed documents (Annex 4) and summaries of activities from FAO's regular and field programme in fisheries and aquaculture and the relevant documents of the 9th Session of COFI:AQ in order to become more familiar with the mandate and needs of FAO's Fisheries and Aquaculture Department (FI) and of the FAO Commission on Genetic Resources for Food and Agriculture (Commission).²

Guidance on the process leading to the SoW AqGR Report

The Working Group appreciated and endorsed the recommendations from the Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture (ITWG)³ and provided the following related recommendations:

1. The FAO secretariat reviews the regional analysis used in the first SoW AqGR and **considers adopting a smaller number of regions, consistent with FAO regions and existing analyses of fisheries and aquaculture statistics** (Annex 5), in the analysis used in the second draft.
2. The FAO secretariat includes **an analysis of data by major aquaculture producing countries (12 countries representing >90 percent of global production) and minor producing countries**, and to make the analysis available to the authors of the State of World's Aquatic genetic resources.
3. The Working Group specifically **endorsed the ITWG recommendation to develop case studies** and discussed **some specific subjects (e.g. good policy, successful breeding programmes, *in situ* and *ex situ* conservation) that could be summarized in the SoW AqGR**. Some of these case studies

¹ www.fao.org/aquatic-genetic-resources/background/sow/background-studies/en/

² www.fao.org/nr/cgrfa/cgrfa-meetings/cgrfa-comm/en/

³ www.fao.org/3/a-mr406e.pdf

would also be appended to the Framework of Minimal Requirements for Sustainable Management Conservation and Use of Aquatic genetic resources (see below). Potential case studies have been identified with good coverage across regions and economic status (Annex 6).

4. The Working Group recognized that **there may currently be a need for a regional/international network specifically focused on AqGR** and recommended that the SoW AqGR acts as a catalyst for the identification of the gaps, needs and challenges for establishment and longevity of such networks. Such a process could guide the development of a new network.
5. The Working Group recommended that, after publication of the SoW AqGR, **the database developed from the country reports be refined and developed to make the entire dataset available and searchable and that country data be made available in a more accessible and usable form than the original questionnaire.**
6. The Working Group **recommended the use of standardized terms** within the SoW AqGR and FAO documents and glossaries, and the promotion of the further use of these terms. The Working Group supported the glossary development process and agreed to **provide boxes for inclusion in the SoW AqGR on key terms and concepts related to AqGR.**
7. The Working Group **commended the overall high technical quality of the thematic background studies.** However, the **thematic background paper on farmed freshwater macrophytes is less complete than the other studies and would benefit from a broader geographic coverage.** The existing thematic background papers will provide valuable additional information to support the next draft of the SoW AqGR.

Guidance on definitions and concepts related to AqGR in the SoW AqGR and to be included in FAO glossaries

The SoW AqGR exists in a first draft and will be updated following analysis of all the country reports received. The report is drafted by multiple authors and will also include five thematic papers, commissioned and prepared by external authors. Throughout the SoW AqGR there is a need to harmonize the terminology used by all the various authors and also to compile specialist terminology relating to AqGR.

FAO hosts a searchable glossary portal containing terms related to fisheries and aquaculture and has a separate glossary relating to biotechnology for food and agriculture. An initial glossary of 66 terms was prepared to support the Asia-Pacific Regional Workshop on Reporting the Status of Aquatic Genetic Resources for Food and Agriculture organized by FAO and NACA in March 2015. The terms in these various glossaries are not consistent nor harmonized.

There are a number of other relevant glossaries including one prepared as part of the guidelines for management of fish genetic resources in India by the Indian National Bureau of Fish Genetic Resources,⁴ a glossary linked to the Genetic Guidelines for Fisheries Management⁵ and another within the Environmental risk assessment of genetically modified organisms.⁶ There are other relevant glossaries of terms available and collectively these are likely to provide pre-existing definitions for the majority of terms within the SoW AqGR.

The SoW AqGR and Thematic Background papers have been reviewed with the objectives of harmonizing definitions and producing a full glossary of key terms and concepts to accompany the SoW AqGR. The Working Group will provide feedback on the list of terms and concepts within the glossary. The current review proposed to add over 230 terms to the existing glossary.⁷

In reviewing the SoW AqGR documents there were three significant areas of harmonization that need to be addressed:

1. The use of terminology to describe different genotypes/phenotypes. The thematic review on “incorporating genetic diversity and indicators into statistics and monitoring of farmed aquatic species and their wild relatives” proposed “species”, “strain” and “farmed type” be the nomenclature used to describe AqGR in aquaculture with “stock” to be used in place of ‘strain’ in the wild. The thematic review includes proposed definitions for these terms which have been added to the glossary. Other

⁴ ICAR-NBFGR (2016). Guidelines for Management of Fish Genetic Resources in India. ICAR National Bureau of Fish Genetic Resources, Lucknow, India, 64 + xxiii p.

⁵ Kapuscinski, A.R. and Miller, L.M. 2007. Genetic guidelines for fisheries management (2nd Edition) Duluth, Minnesota: Minnesota Sea Grant, University of Minnesota Sea Grant Program.

⁶ Kapuscinski, A.R., 2007. Environmental risk assessment of genetically modified organisms (Vol. 3). CABI.

⁷ www.fao.org/faoterm/collection/aquaculture/en

terms such as cultivar and variety should not be used to describe AqGR. It is proposed that these definitions be adopted consistently within the SoW AqGR report and the thematic papers (with the possible exception of macrophytes) and all authors be requested to harmonize to these terms.

2. Terms about transgenesis vary throughout the document being referred to also as ‘gene transfer’ and ‘transformation’, the latter being applied to macrophytes and microorganisms. There is a need to standardize this terminology throughout the documents. Alternatively, terminology for microorganisms and aquatic plants could be different given the differences in methodology and standard usage amongst plant and microbial geneticists.
3. Terms about hybridization, crossbreeding and introgression are most useful if they are distinct (hybrids = between species, crossbreds = within species) and a distinction is made between F1 and F2 crosses, where traits are predictable to some degree, and any further introgression when essentially a pure species/strain is no longer discussed but some degree of species/strain mixing. It would be useful to agree and standardize the use of these terms with reference to farmed types throughout the documents. The use of the term “hybrid” in the macro algae thematic background paper⁸ is particularly unclear. It is proposed to include a box in the SoW AqGR report explaining the interpretation of these terms. There was also a discussion concerning the interpretation of the term “wild relatives” used in the SoW AqGR questionnaire. It was recognized that some ambiguity remains over this term with different interpretations being used in the SoW AqGR and thus that the use of the term needs to be clarified in the report.

Guidance on current activities and priority needs of FAO in regards to AqGR

The Working Group reviewed [COFI/AQ/IX/2017/6/Rev.1](#)⁹ and derived the following six high priority areas for FAO. These areas consider FAO’s comparative advantage and will promote responsible use of AqGR and impact positively on both aquaculture and fisheries resources and the people that depend on them. These areas are applicable primarily at national and regional level although some specific activities can be influential at a global level. These six areas are:

- Implementation of genetic improvement programmes, including selective breeding, hybridization and polyploidization;
- Risk/benefit analysis, such as FAO’s Precautionary Approach, especially considering the use and introduction of non-native species and strains;
- Biosecure and equitable exchange of species and germplasm with policy frameworks such as Material Transfer Agreements and Access and Benefit Sharing protocols;
- National policy analysis, with explicit consideration of policy to enable the private sector; and
- Establishment of an information system to document and monitor and assess the status of Aquatic genetic resources, including a registry of farmed types (e.g. strains, hybrids, triploids) as well as stocks of wild relatives.

The Working Group formulated more detailed recommendations for specific activities under these high priority areas (Table 1).

Table 1. Suggested priority areas of work on AqGR for FAO (H = high; M = medium; L = low) with indicative activities for high priority areas.

Level	Area of work (revised) ¹⁰	Indicative activities
H	Genetic improvement programmes, including selective breeding, hybridization, polyploidization	Promote the development of national programmes of genetic improvement, especially selective breeding Produce guidelines, including decision support tools, on appropriate application of breeding programmes and genetic technologies

⁸ www.fao.org/cofi/46056-0e272e19f4b0051d1e1c3b679e5ca8ada.pdf

⁹ www.fao.org/cofi/46114-0abf09938c7ff7729df7f7a87763fb61f.pdf

¹⁰ Potential areas of work as listed in COFI/IX/2017/6/Rev.1 were revised, and separate areas were combined where appropriate. Four priorities were combined as follows:

- In situ and ex situ were combined because of the complementarity of the two approaches
- The registry of farm types was combined with the information management system
- The development of new strains was combined with genetic improvement practices
- Risk/benefit was combined with introductions of non-native species/strains

Level	Area of work (revised) ¹⁰	Indicative activities
		<p>Support networking between appropriate organizations, institutions, etc.</p> <p>Support training (e.g. online training course, workshops) and capacity building in all components (information, infrastructure, breeding programmes, governance, and enabling private sector). Specific topics may include genetic characterization</p> <p>Conduct impact studies, with specific relevance to the socio-economic effects, of genetic improvement programmes</p> <p>Explore (through case studies) examples of policies related to genetic improvement and its impact</p>
H	Risk/benefit analysis, such as FAO's Precautionary approach, especially considering the use and introduction of non-native species and strains	<p>Develop tools to assess risk/benefit related to AqGR, with specific reference to socioeconomic impacts</p> <p>Explicitly consider the use of risk/benefit of non-native species introduction when analysing national policy</p> <p>Identify conservation activities to conserve at-risk genetic resources (e.g. IUCN red list)</p>
H	Exchange of species and germplasm; with policy frameworks such as Material Transfer Agreements and Access and Benefit Sharing protocols	Advise on appropriate policy on access and benefit sharing protocols and towards regulations on implementing CBD, Nagoya, or other related instruments. Include provision of case studies or examples
H	National policy analysis, with explicit consideration of policy to enable the private sector	<p>Development of processes to conduct policy analyses, for implementation by FAO or by Members</p> <p>Identify examples of effective policy with effective implementation (case studies)</p>
H	Establishment of an information system to document and monitor and assess the status of AqGR, including a registry of farmed types (e.g. strains, hybrids, triploids) as well as populations/stocks of wild relatives	Development of a global information management system (analogue of DAD-IS) as a central tool to identify knowledge gaps and needs for action to sustainably use, develop, manage and conserve AqGR
H	Implementation and promotion of the Framework of Minimum Requirements for Sustainable Use, Management and Conservation of Aquatic Genetic Resources	Pilot test implementation of the framework in a selected country and further promote its use
M	AqGR incorporation in traceability and marketing; for example FishPopTrace	
M	AqGR incorporation into climate change adaptation and mitigation	
M	<i>In situ</i> and <i>ex situ</i> conservation strategies for both aquaculture and fisheries, highlighting the complementarity of the two approaches, including gene banking	
L	Genetic characterization; through tools such as gene sequencing, SNPs and micro-satellites	
L	Genetic analysis of wild populations; such as Genetic stock identification of Atlantic cod, Pacific salmon and Atlantic salmon	
L	Genetic analysis of farmed populations; for example Genetically categorize farmed populations for traceability	

Guidance on the Framework of Minimum Requirements for Sustainable Use, Management and Conservation of Aquatic Genetic Resources

The Working Group noted with appreciation that the Framework was developed and refined in a regional evaluation workshop in Zambia¹¹ and by international experts on AqGR including several members of the Working Group. The Working Group further revised the Framework (Annex 7).

The Working Group endorsed the following principles of the Framework:

1. Sustainable use of AqGR – the priority for the development of AqGR is food security and improved livelihoods;
2. Conservation of AqGR to facilitate achieving food security and improved livelihoods in the long-term;
3. Fair and equitable sharing of benefits derived from the development of AqGR;
4. Science-based – the minimum criteria are based on updated information, good science and internationally agreed principles, and are not based on a country's ability to implement them; it is recognized that countries may have problems implementing some of the minimum criteria, but none-the-less should strive to do so;
5. Private sector participation will, in the long-term, be the main engine for the development and use of AqGR;
6. Transparency – adopting a science-based approach and an open information sharing platform will promote trust and facilitate uptake by private sector and civil society;
7. Long-term view – it is further recognized that the Framework may initially slow down the development of the private sector, e.g. by applying environmental safeguards and access and benefit sharing regimes, however the inclusion of these elements will facilitate long term success and the cooperation of other sectors and the international community; and
8. Complement international activities, e.g. the collection of aquaculture statistics by FAO.

The Working Group clarified the users of the Framework to be:

- National policy and decision makers;
- Fishing cooperatives;
- Aquaculture associations;
- Larger private aquaculture companies;
- Resource managers;
- Training and extension agents;
- Universities and Knowledge centers; and
- Other development IGOs and NGOs.

Users can employ the framework to lobby government or private industry for action.

The Framework may be adapted for use at a regional level, especially where AqGR are shared across common boundaries and shared watersheds. The framework may be extended for application across regions sharing common interests and having similar aquaculture and AqGR management priorities. The entire Framework could be applied on a regional basis under oversight from a regional organization, or components of national frameworks could be applied on the basis of regional collaboration. Examples could include the establishment of regional networks, regional reference centres, regional breeding programmes, collaborative work on characterization of common genetic resources, coordination on development of key infrastructure, regional training and education programs and coordination of compatible policy development. The benefits of effective cooperation include cost sharing, avoidance of duplication of effort and may also enhance the capacity to secure support from international donors.

¹¹ Report of the SADC-Worldfish Platform for Genetics in Aquaculture and Validation of the FAO *Framework on Sustainable Use, Management and Conservation of Aquatic Genetic Resources for Aquaculture: the framework*. 25 – 29 September 2017, Lusaka, Zambia. In preparation, FAO, Rome.

The workshop recommended that:

- implementation of the Framework should move beyond minimum criteria and include consideration of other items, e.g. gene banking, PPP;
- a national programme based on the Framework be developed that includes all 5 of its components. There may be phases of development, e.g. now focus on aquaculture and later the scope may be broader to include capture fisheries and biodiversity;
- government should consider support for private industry in the short and minimum term to facilitate uptake of genetic improvement programmes;
- infrastructure may also be accessed outside of a given country, i.e. the infrastructure or facility may not be in the country;
- the Zambia validation workshop be repeated in different regions; and
- additional annexes be added (Annex 6).

Members of the Working Group proposed case studies to be included in an annex to demonstrate successful development/management of AqGR (Table 2).

Table 2. Case studies to complement the Framework of Minimum Requirements for Sustainable Use, Management and Conservation of Aquatic Genetic Resources

Component of Framework	Case study and region	Potential author/facilitator
Information and databases	AqGR information management in Germany	Clemens Fieseler
	<i>Ex situ</i> gene bank of microalgae repositories in US and/or Australia	Graham Mair
Governance and policy	Office of genetic resource management and policy in Iran	Mohammad Pourkazemi
Infrastructure	Genetic improvement of tilapia in the Volta Basin	Devin Bartley
Enabling the private sector	Fundacion Chile, Development of PPP in Chile	Marcela Astorga
Capacity building	The International Network for Genetics in Aquaculture (INGA)	Devin Bartley/Ingrid Olesen

The Working Group recommended that the revised Framework, together with proposed case studies and annexes, be finalized, distributed and promoted as a policy document, and implemented.

Review of the Terms of Reference and work plan

The Working Group reviewed and reaffirmed its Terms of Reference (Annex 3). The Working Group has made excellent progress in implementing its work plan for 2015–2017 with 12 of the 18 planned activities completed and all others nearing completion (Annex 8). The Working Group, in consultation with FAO, further identified four new activities for 2017–2019 related to the responsible use of AqGR: further advising on and promoting the first draft Report on the SoW AqGR,¹² the promotion of genetic improvement programmes in aquaculture, risk/benefit analysis on the use and introduction of new species and strains (native and non-native), and the development of an information system on AqGR (Table 3). The work plan will be reviewed at the next session of COFI to include any additional tasks.

Table 3. 2017–2019 Work Plan. New activities highlighted in blue

Activity	Continuing activity from 2015–2017 work plan	New or continuing working activities 2017–2019
1. Shared directory established	Update with new link and information	Further updates and addition of new material planned
2. List of relevant links and publications submitted	Ongoing, with members drawing attention to relevant publications	Continued submission of relevant information planned
3. Advice on the analysis of country reports provided	Ongoing	To be finalized. AWG members to advise on analysis when reviewing the first or second draft of the SoW AqGR

¹² The experts assigned themselves specific chapters to review in the SoW AqGR as follows: Chapter 2: Mr Mair and Ms Nguyen; Chapter 3: Mr Jamu; Chapter 4: Ms Astorga; Chapter 5: Mr Lehoczky; Chapter 6: Mr Benzie; Chapter 7: Mr Fieseler and Ms Kapuscinski; Chapter 8: Ms Olesen; Chapter 9: Mr Pourkazemi.

Activity	Continuing activity from 2015–2017 work plan	New or continuing working activities 2017–2019
4. Definitions on AqGR in FAO glossaries reviewed and improvements proposed	Ongoing	Specific members will prepare an extensively updated glossary which will be circulated to the AWG prior to being finalized
5. Draft SoW AqGR reviewed	Ongoing	Members are welcome to comment on the first draft but specific feedback is requested on the second draft of the report which will be circulated to the members as soon as it is available. See Annex 1 for list of reviewing tasks for AWG members
6. Framework refined	Ongoing	Finalized framework to be circulated to group members
7. Promotion of <i>SoW AqGR</i> enhanced	Ongoing	To be continued. AWG to provide advice for the intersessional period as requested by the second period of the working group activity
8. Second meeting (October 2017) Work plan to be revised following the second meeting	Completed – Meeting was held 19–20 October. Notes to be distributed shortly	Updated workplan to be distributed by November 30 including any new tasks requested by the Secretariat
9. Supporting genetic improvement programmes in aquaculture		New activities – details to be advised
10. Supporting conservation AqGR in the wild		New activities – details to be advised
11. Supporting the establishment of an information system to document and monitor and assess the status of AqGR		New activities – details to be advised
12. Risk/benefit analysis on the use and introduction of new species and strains (native or non-native)		New activities – details to be advised
13. Supporting the establishment of network for AqGR		New activities – details to be advised

CLOSING

Election of officers and confirmation of participation

The Working Group elected Ms Ingrid Olesen (former Vice-Chair) as Chair for the next two years and Mr Graham Mair as Vice-Chair and Rapporteur. The Working Group gratefully acknowledged the leadership of Mr Mohammad Pourkazemi and thanked him for his work as the past Chair of the Working Group.

All members of the Working Group confirmed their availability to serve for the next two years.

Arrangements for next session

The next meeting of the Working Group is planned to be held in conjunction with the 10th session of COFI:AQ in 2019. Intersessional meetings, either face to face or through video conference will be organized on an as needed basis.

The Working Group thanked FAO for the opportunity to contribute to the responsible use of AqGR. The FAO Secretariat thanked the Working Group and resource persons for contributing their valuable time to assist FAO in the responsible development and management of AqGR.

The meeting was adjourned on 20 October, 2017 at 17:00 hours.

AGENDA

19 October 2017, Thursday		
08.30 – 09.00	Registration	
09.00 – 09.15	Welcome	Manuel Barange, Director Fisheries and Aquaculture Department (FAO)
09.15 – 09.30	Introduction and objectives of the meeting	Secretariat (FAO)
09.30 – 10.15	Preparation of <i>The First State of the World's Aquatic Genetic Resources for Food and Agriculture – for discussion</i> Background documents: (i) First draft of the State of the World's Aquatic Genetic Resources (ii) COFI:AQ/IX/2017/6/Rev.1 Aquatic Genetic Resources for Aquaculture Development and (iii) COFI:AQ/IX/2017/Inf.8 Status of preparation of The State of the World's Aquatic Genetic Resources for Food and Agriculture	Matthias Halwart, Secretary (FAO)
10.15 – 10.30	<i>Health break</i>	
10.30 – 12.30	Preparation of <i>The First State of the World's Aquatic Genetic Resources for Food and Agriculture – for discussion</i> (cont'd) Background documents: 5 Thematic Background Studies ¹³	FAO
12.30 – 13.00	Summarize conclusions for Report and advice for statement to COFI Sub-Committee on Aquaculture	Rapporteur and Devin Bartley (WFT)
13.00 – 14.00	<i>Lunch</i>	
14.00 – 14.30	Definitions on AqGR in FAO glossaries reviewed and improvements proposed Background documents: (i) <i>Preparation of a glossary and the harmonization of terms within the State of the World Report on Aquatic Genetic Resources</i> and (ii) <i>Draft glossary to accompany the State of the World report on Aquatic Genetic Resources</i>	Anne Kapuscinski and Graham Mair (AWG)
14.30 – 15.30	FAO priorities for AqGR – <i>for input</i> Background document: COFI:AQ/IX/2017/6/Rev.1 Aquatic genetic resources for aquaculture development	Austin Stankus (FAO) + Ingrid Olesen (NOFIMA)
15.30 – 16.00	<i>Health break</i>	
16.00 – 16.30	Cont'd	FAO
16.30 – 17.00	Summarize conclusions for Report and advice for statement to COFI Sub-Committee on Aquaculture	Rapporteur and Devin Bartley (WFT)
17.00	<i>Close for the day</i>	

¹³SBD.3 Thematic Background Study No 1: [Incorporating genetic diversity and indicators into statistics and monitoring of farmed aquatic species and their wild relatives](#)

SBD.4 Thematic Background Study No 2: [Genetic resources for microorganisms of current and potential use in aquaculture](#)

SBD.5 Thematic Background Study No 3: [Genome-based Biotechnologies in Aquaculture](#)

SBD.6 Thematic Background Study No 4: [Genetic resources for farmed seaweeds](#)

SBD.7 Thematic Background Study No. 5: [Genetic resources for farmed freshwater macrophytes: a review](#)

20 October 2017, Friday		
09.00 – 10.30	Preparation of the <i>Framework of minimum requirements for sustainable management, development, conservation and use of AqGR – for input</i> <u>Background document:</u> Responsible Development and Management of Aquatic Genetic Resources for Food and Agriculture: towards a Framework of Minimum Criteria (Draft Report of the SADC/WorldFish/FAO Workshop)	Daniela Lucente (FAO)
10.30 – 11.00	<i>Health break</i>	
11.00 – 12.00	Preparation of <i>Framework</i> (cont'd)	FAO
12.00 – 12.30	Review of ToRs and workplan	All
12.30 – 14.00	<i>Lunch</i>	
14.00 – 15.30	Summarize conclusions for Report and advice for statement to COFI Sub-Committee on Aquaculture	Rapporteur and Devin Bartley (WFT)
15.30 – 16.00	<i>Health break</i>	
16.00 – 16.15	Election of officers (Chair, Vice Chair and Rapporteur) and confirmation of membership for next 2 years	Secretariat (FAO)
16.15 – 16.30	Arrangements for next session	Matthias Halwart (FAO)
16.30 – 17.00	Closing remarks	FAO
17.00	<i>Adjourn</i>	

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Terms of Reference of the Advisory Working Group

1. FAO will establish the Advisory Working Group on Aquatic Genetic Resources and Technologies to advise FAO on matters concerning aquatic genetic resources and technologies, and to enhance international cooperation on aquatic genetic resource management.
2. The Advisory Working Group shall be established according to FAO's rules.
3. The Advisory Working Group shall consist of no more than 10 recognized experts in genetic resource use and conservation in fisheries and aquaculture.
4. Advisory Working Group members shall be appointed by the Director-General for a period of two years but may be renewable. In appointing experts, in addition to scientific and technical excellence, FAO will consider diversity and complementarity of scientific backgrounds and observe, as appropriate, the principle of equitable geographical representation and gender representation. Experts will be invited to participate in the Advisory Working Group in their personal capacity, as experts, and shall not represent the position of the government of which s/he is an official, or of the organization with which s/he is associated.
5. The working language of the Advisory Working Group will be English.
6. The scope of the Advisory Working Group shall include the conservation, sustainable use and development of all aquatic genetic resources relevant for fisheries and aquaculture.
7. Specific tasks of the Advisory Working Group shall be assigned by FAO with due consideration of the advice from COFI.
8. The membership of the Advisory Working Group may be changed by FAO depending on the specific advice being requested by FAO and/or COFI.
9. The Secretariat of the Advisory Working Group will be based in the Fisheries and Aquaculture Department of FAO headquarters, Rome, Italy.
10. The plan of work of the Advisory Working Group will be prepared and approved by the Advisory Working Group in consultation with the Secretariat taking into account tasks assigned to it in accordance with paragraph 7 above and available financial resources.
11. The Advisory Working Group shall prepare a report to the FAO Secretariat providing information on its activities and recommendations.
12. The Advisory Working Group may propose amendments to these terms of reference which shall be transmitted to COFI for consideration.

Documents made available to the Working Group

The following documents were made available to the Working Group:

- (i) First draft of the State of the World's Aquatic Genetic Resources
- (ii) COFI:AQ/IX/2017/6/Rev.1 Aquatic Genetic Resources for Aquaculture Development
- (iii) COFI:AQ/IX/2017/Inf.8 Status of preparation of The State of the World's Aquatic Genetic Resources for Food and Agriculture
- (iv) Thematic Background Study No 1: Incorporating genetic diversity and indicators into statistics and monitoring of farmed aquatic species and their wild relatives
- (v) Thematic Background Study No 2: Genetic resources for microorganisms of current and potential use in aquaculture
- (vi) Thematic Background Study No 3: Genome-based Biotechnologies in Aquaculture
- (vii) Thematic Background Study No 4: Genetic resources for farmed seaweeds
- (viii) Thematic Background Study No. 5: Genetic resources for farmed freshwater macrophytes: a review
- (ix) Preparation of a glossary and the harmonization of terms within the State of the World Report on Aquatic Genetic Resources (unpublished)
- (x) Draft glossary to accompany the State of the World report on Aquatic Genetic Resources (unpublished)
- (xi) Draft Framework of Minimum Requirements for the Sustainable Management, Development, Conservation and Use of Aquatic Genetic Resources (unpublished FAO Report)
- (xii) Report of the First Session of the Ad Hoc Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture CGRFA/WG-AqGR-1/16/Report www.fao.org/3/a-mr172e.pdf

FAO regional and economic groupings

In light of the recommendation of the AWG,

the secretariat reviews the regional analysis used in the first SoW AqGR and considers adopting a smaller number of regions, consistent with FAO regions and existing analyses of fisheries and aquaculture statistics in the analysis used in the second draft

The following **regional groupings** were established for the analyses of the Country Reports:¹⁴

Africa

Algeria; Benin; Burkina Faso; Burundi; Cabo Verde; Cameroon; Chad; the Congo; Djibouti; Egypt; Ghana; Kenya; Madagascar; Malawi; Morocco; Mozambique; the Niger; Nigeria; Senegal; Sierra Leone; South Africa; the Sudan; Togo; Tunisia; Uganda; the United Republic of Tanzania; Zambia.

Asia

Armenia; Bangladesh; Bhutan; Cambodia; China; Cyprus; Georgia; India; Indonesia; Iran (Islamic Republic of); Iraq; Japan; Kazakhstan; the Lao People's Democratic Republic; Malaysia; the Philippines; the Republic of Korea; Sri Lanka; Thailand; Turkey; Viet Nam.

Latin America and the Caribbean

Argentina; Belize; Brazil; Chile; Colombia; Costa Rica; Cuba; the Dominican Republic; Ecuador; El Salvador; Guatemala; Honduras; Mexico; Nicaragua; Panama; Paraguay; Peru; Venezuela (Bolivarian Republic of).

Europe

Belgium; Bulgaria; Croatia; Czechia; Denmark; Estonia; Finland; Germany; Hungary; Latvia; the Netherlands; Norway; Poland; Romania; Slovenia; Sweden; Ukraine.

Northern America

Canada; the United States of America

Oceania

Australia; Fiji; Kiribati; Palau; Samoa; Tonga; Vanuatu.

The following **economic groups** were established:

Developed countries and areas

Australia; South Africa; Georgia; Japan; Kazakhstan; Belgium; Bulgaria; Croatia; Czechia; Denmark; Estonia; Finland; Germany; Hungary; Latvia; the Netherlands; Norway; Poland; Romania; Slovenia; Sweden; Ukraine; Canada; the United States of America.

Least developed countries and areas

Bangladesh; Benin; Bhutan; Burkina Faso; Burundi; Cambodia; Chad; the Democratic Republic of the Congo; Djibouti; Kiribati; the Lao People's Democratic Republic; Madagascar; Malawi; Mozambique; the Niger; Senegal; Sierra Leone; the Sudan; Togo; Uganda; the United Republic of Tanzania; Vanuatu; Zambia.

Other developing countries

Algeria; Argentina; Belize; Brazil; Cabo Verde; Cameroon; Chile; China; Colombia; Costa Rica; Cuba; Cyprus; the Dominican Republic; Ecuador; Egypt; El Salvador; Fiji; Ghana; Guatemala; Honduras; India; Indonesia; Iran (Islamic Republic of); Iraq; Kenya; Mexico; Morocco; Nicaragua; Nigeria; Palau; Panama; Paraguay; Peru; the Philippines; the Republic of Korea; Malaysia; Samoa; Sri Lanka; Thailand; Tonga; Tunisia; Turkey; Venezuela (Bolivarian Republic of); Viet Nam.

Countries were also analyzed according to **aquaculture production** with the following countries analyzed as **large producers**, i.e. contributing more than 1 percent of global aquaculture production:

Chile; China; Egypt; India; Indonesia; the Republic of Korea; the Philippines; Viet Nam.

All other countries were considered small producers (<1 percent).

¹⁴ The groupings here are consistent with FishStatJ and the analyses in FAO's State of World Fisheries and Aquaculture.

Suggested annexes and case studies for the State of the World's Aquatic Genetic Resources for Food and Agriculture

The Working Group proposed the following as possible additional annexes:

- i. Annex of case studies
 1. Legal instrument example from Iran (Islamic Republic of)
 2. Development of effective policies. The Philippines or Ghana –TIVO project. Assessment of native genetic resources at same time as breeding programme
 3. Successful commercial development of breeding programme (GIFT story)
 4. Successful implementation of genetic technology IPN in salmon
 5. Successful *ex situ* conservation
 - a. Hungary – HAKI
 - b. Microalgal collections in US/Australia/Iran
 6. EU project: Austria Sterlet life project on the Danube river
 7. Challenges of collaboration
 - a. Amur River, Danube River, Caspian and Black Sea. An action plan for restoration of sturgeon
 - b. Lake Victoria cichlids and Nile perch
 - c. Rhine river international cooperation on migrating species and reintroduction
 8. Successful database – Germany, strain registry from US, CITES universal labelling system for the identification of caviar, Barcode of life, FishPopTrace
 9. Extension/training programme Iran/Norway TCP on rainbow trout breeding programme, INGA
 10. Genetic technologies and use of non-native species: their application/impact on AqGR (risk/benefit)
 11. Effective control of an introduced species
 12. Different ways to make sterile fish using molecular biology technology
 13. Coordination of Iranian Fisheries and Aquaculture
 14. For linkages between fishing and farming
 - a. Sea ranching and restocking programmes such as Salmon in the US and sea cucumber and abalone in Australia
 - b. Extensive aquaculture of mussels in Spain where aquaculture depends on natural populations
 - c. Sturgeon fingerlings from wild used for broodstock
 15. For protected areas
 - a. Chilean example of limited access area for aquaculture/fisheries
 - b. Germany UNESCO biosphere reserve (carps)
 - c. Lake Malawi and Lake Tanganyika
- ii. List of aquaculture species (subset of the ASFIS list)
- iii. Genetic marking and tagging as part of genetic improvement. Level of technology used to achieve marking or characterization depends on resources and capacity. Pros and cons. List of techniques

Framework of minimum requirements for sustainable management, development, conservation and use of aquatic genetic resources

(THE FRAMEWORK)¹⁵

Introduction

In several international fora FAO et al have highlighted that many countries need assistance to develop a responsible aquaculture sector due to limited national capacities and expertise, limited information on genetic resource use, and limited legislation and policy frameworks. Recognizing these needs, the FAO's Fisheries and Aquaculture Department, in consultation with the Committee on Fisheries (COFI) Advisory Working Group on Aquatic Genetic Resources and Technologies (Working Group) and with support from the Government of Germany began to develop a Framework of Minimum Requirements for Sustainable Management, Development, Conservation and Use of Aquatic Genetic Resources (Framework). This Framework can be used by FAO members as a guide to evaluate objectively the opportunities and gaps in capacities, infrastructures, governance tools and skills present within their national jurisdictions regarding the sustainable use, conservation and management of aquatic genetic resources in aquaculture.

Framework components	Minimum requirements
1) Information and databases – accurate and accessible information on AqGR will facilitate many of the elements of the Framework.	
Information on AqGR in country	Use of ASFIS at a species level for the directories
	Directory of AqGR in aquaculture including non-native species
	Distribution map of native and non-native AqGR in the wild and on farms
	List and map of significant native AqGR to be protected
Information on genetic technologies	Directory of acceptable technologies and any restrictions on their use
Information on the impacts of farmed AqGR have on society and the environment	Monitoring programme on number of farms using a species (or farmed type if possible)
	Monitoring programme on impact (positive and negative) of farmed-type on the human well-being
	Monitoring programme on impact (positive and negative) of farmed-type on the environment
General information	Directory of laboratories, institutions and centres of excellence working on AqGR
	Communication plan for dissemination of information to stakeholders and the public
	Single easily accessible database or information system on AqGR including the above elements
	Authoritative glossary of terms, technologies and concepts

¹⁵ The Framework was revised first through a video conference with selected experts, then through field mission to Zambia, then another expert group and finally by the COFI Advisory Working Group on Aquatic Genetic Resources and Technologies at their second session. This schedule was modified from the original with agreement from FAO.

<p>2) Governance and policy – effective governance will involve private industry, civil society and consumers and will provide for human and environmental well-being</p>	
	<p>Designation of competent authority to manage and oversee AqGR and the Framework and its implementation</p> <p>AqGR specifically included in national aquaculture strategy and/or development</p> <p>Comprehensive guidelines on AqGR development and management</p> <p>Resource management policy including zoning for aquaculture and AqGR</p> <p>Authoritative national legal instrument(s)</p> <p>Effective enforcement</p> <p>Incorporate, as appropriate, international instruments that relate to AqGR (such as CITES, CBD, Nagoya Protocol, CCRF) into national legislation</p> <p>Effective permitting systems for access to AqGR and application of technologies by private industry and research sector (academic and government)</p> <p>For shared AqGR (e.g., in shared watersheds, transboundary waters) there be links to regional and international entities</p> <p>Effective and transparent engagement between government departments, private industry and other stakeholders, for among other things, exchange of policy and technical information</p>
<p>Infrastructure and equipment – consideration should be given to developing partnerships and take advantage of economies of scale</p>	
	<p>A development plan (including networking and cost sharing arrangements) for access to all required infrastructure that is linked to national strategy</p> <p>Access to bio-secure facility(ies) for genetic management and/or genetic improvement of aquacultured species, including effective marking/tagging/identification</p> <p>Access to multiplication and dissemination centres</p> <p>Quarantine facilities, with primary emphasis to disease-control</p> <p>Access to genetic characterization services/laboratories</p> <p>Research, extension and training centres</p>
<p>Capacity building and training – capacity building will be required for many of the above activities</p>	
	<p>Information</p> <p>Governance, policy and planning</p> <p>Operation of infrastructure</p> <p>Enabling the private sector</p> <p>Extension service – government and/or academic</p>

Enabling the private sector – the private sector will be the long term driver of the development and sustainable use of AqGR	
	Extension service from government, industry, NGO or academic extension agencies
	Policies and practices that create an enabling environment for the development and use of AqGR
	Forum for industry to be involved in government decision and policy-making

Initial work plan

Activity	Status and output
1. Approval of the Working Group members	Completed
2. First meeting (Brazil, October 2015)	Completed – see meeting report
3. Biography of Working Group members submitted	Completed – see here
4. Shared directory established	Completed with updates planned
5. List of relevant links and publications submitted	On-going, with members drawing attention to relevant publications. The website to include links to relevant publications and/or the shared file account to have copies
6. Web page established	Completed – web page here
7. Terms of Reference for the Thematic Background Papers reviewed	Completed – Thematic Background Papers on-line
8. Technical assistance on the national reports provided	Completed – members of the AWG provided input into the design of the questionnaire
9. Advice on the analysis of country reports provided	Ongoing
10. Definitions on AqGR in FAO glossaries reviewed and improvements proposed	Completed – glossary has been reviewed and updates will be made.
11. Draft <i>SoW AqGR</i> reviewed	Ongoing with specific chapters assigned to Working Group members
12. Draft Framework developed	Completed
13. Framework refined	Ongoing – draft Framework endorsed and case studies being developed
14. Promotion of <i>SoW AqGR</i> enhanced	Ongoing
15. Linkages with the ITWG AqGR established	Completed
16. Intersessional meeting (Video conference, depending on funds) held	Completed – A videoconference was held to review an earlier draft of the Framework
17. Work plan revised (based on available resources)	Completed – first workplan completed following first meeting in Brazil
18. Second meeting (October 2017) Work plan to be revised following the second meeting	Completed – second meeting held Oct 19–20; Updated workplan to be distributed by November 30 including any new tasks requested by the Secretariat

In recognition of the tremendous opportunities to increase food production and improve livelihoods from the responsible use, management and conservation of aquatic genetic resources and technologies, the 31st Session of the FAO Committee on Fisheries endorsed the establishment of the *Advisory Working Group on Aquatic Genetic Resources and Technologies* to advise FAO on matters concerning aquatic genetic resources and technologies, and to enhance international cooperation on aquatic genetic resource management. This report contains the main findings of the second session of the Working Group, held in FAO Headquarters, Rome, Italy, 19–20 October 2017.

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