Shanghai Declaration:

Aquaculture for food and sustainable development

I Preamble

1 Aquaculture has undeniably established its crucial role in global food security, with its production largely meeting the supply-demand gap for aquatic food in the past decades. Rising aquaculture production, together with many improvements along the aquaculture value chain, shifting consumer habits, and other socioeconomic factors have contributed to doubling the average apparent per capita consumption of aquatic foods since the 1960s, even though human population has also more than doubled in the same period. In 2018, aquaculture accounted for 48 percent of the total fish[1] production and 52 percent of fish available for human consumption. Aquaculture makes significant contributions to livelihoods, employment, food security, and nutrition, and this contribution is expected to continue to grow through enhanced productivity and modernization, expansion and intensification, and increasing economic and geographic access and availability to nutritious farmed aquatic products.

2 At the same time, to feed an ever-growing human population, expected to reach almost 10 billion people by 2050, aquaculture development needs to continue its expansion while becoming more sustainable. Recognizing that the capacity of aquaculture for further growth, and also the need to avoid that such growth comes at the cost of deteriorating ecosystem health, animal welfare standards, biodiversity loss, or social inequalities, the aquaculture sector demands new, sustainable, and equitable development strategies. The private sector will remain the main actor in aquaculture production, and substantial public sector support and strong leadership will also be necessary with input and guidance from government and civil society playing essential roles in regulating aquaculture, and in supporting and promoting citizens' views, participation and benefits.

3 The Sustainable Development Goals (SDGs) are designed to be a "blueprint to achieve a better and more sustainable future for all". The SDGs focus on the elimination of hunger and reduction of poverty and inequality in all their forms, recognize the need for innovation and business development as well as social protection, commit to promoting and facilitating energy efficiency and clean energy, and seek to increase resilience to climate change, weather and natural disasters, market volatility and political instability. They further seek to reduce the pressure of human economic activity on the natural environment by stressing the need not just for habitat and ecosystem protection, but also increased resource use efficiency, and sustainable production and consumption, thereby spreading responsibility for delivering sustainability across all economic actors. Almost all the SDGs, and many associated targets, are relevant to aquaculture development, and aquaculture can make significant contributions to their achievement. Aquaculture's role for contributing the SDGs has not, however, been clearly identified or communicated, resulting in relatively weak inclusion in sustainability dialogues.

4 The implementation of existing guidance and initiatives designed to promote sustainable aquaculture (including the Code of Conduct for Responsible Fisheries (CCRF) and associated Technical Guidelines, the 2000 Bangkok Declaration and the 2010 Phuket Consensus) broadly support delivery of the SDGs. The Shanghai Declaration aims to build on and expand the scope of the CCRF and previous international declarations, taking full account of global agreements of relevance to aquaculture, including the FAO Committee on Fisheries (COFI) *Declaration on Sustainable Fisheries and Aquaculture* adopted by FAO Members in February 2021. The work of the COFI Sub-Committee on Aquaculture, including the development of Guidelines for Sustainable Aquaculture, is crucial in this respect. The Shanghai Declaration

[1] The term "fish" in this Declaration includes all aquatic food production groups, including molluscs, crustaceans and other aquatic animals, but excludes aquatic mammals, reptiles, seaweeds and other aquatic plants.

aims to provide guidance on maximizing aquaculture's contribution to Agenda 2030 and its SDGs, and specifically address three key questions: i) how does aquaculture contribute to the SDGs? ii) where does aquaculture need to be in 10 years? and iii) how do we get there?

5 The Shanghai Declaration was first outlined and developed by an invited group of experts, informed by regional and thematic aquaculture reviews commissioned by FAO in 2020 in advance of the Global Conference on Aquaculture Millennium +20 (GCA +20). Members of its International Organizing Committee and International Programme Committee further elaborated the Shanghai Declaration, with the Food and Agriculture Organization of the United Nations and the Network of Aquaculture Centres in Asia-Pacific acting as Secretariat while providing additional inputs. The advanced draft was posted online for comments by participants ahead of the GCA +20, which were considered in the final drafting.

II Vision, commitments and strategic priorities

We, the participants of the Global Conference on Aquaculture Millennium +20,

1 *Recalling* the goal of the 2030 Agenda for Sustainable Development to end poverty and hunger everywhere, and noting that the world is not on track to achieve Zero Hunger, with up to 811 million people facing hunger in 2020, nearly one in three people in the world not having access to adequate food in 2020, and one in four children under five remaining chronically malnourished, underscoring the immense challenge of achieving the Zero Hunger target by 2030;

2 *Considering* that implementing Agenda 2030 and the associated SDGs, the Paris Agreement and the Addis Ababa Action Agenda, requires new modalities for developing coherent and effective policies, programmes and investments, and that these new modalities require strengthening development partnerships, including North-South and South-South Cooperation, among governments, producers, wider industry, scientists and the public to facilitate the incorporation of aquaculture into the design of sustainable and healthy agri-food systems that reduce poverty, increase the human health benefits of consuming aquatic products and minimize negative externalities that may result from some aquaculture practices;

3 *Recognizing* aquaculture's role in supporting countries to achieve sustainable development, particularly in the fight against poverty, hunger, and malnutrition, and its contribution to the global agri-food system,[2] bearing in mind the continuous positive growth of the sector, which in 2019 contributed 85.3 million tonnes of fish as well as 34.7 million tonnes of aquatic plants, and *calling attention to* the wide diversity of the species produced by aquaculture through numerous production systems in diverse environments;

4 *Recognizing* that aquaculture is diverse, and that extensive, semi-intensive and intensive culture systems are all being practiced, ranging from small-scale backyard family fishponds to highly industrialized technologically-sophisticated market-driven commercial operations, and that aquaculture provides

[2] Food systems encompass the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal and natural environments in which they are embedded.

livelihoods and employment opportunities, generates economic incomes, and contributes to food security directly and indirectly;

5 *Noting* that fisheries and aquaculture products are among the most traded food commodities, with 37 percent of the fish production entering international trade, and *recognizing* that this trade generates an economic spillover effect creating jobs and providing producers and workers with a reliable income to buy sufficient, safe, and nutritious food, including fish, to meet their dietary needs;

6 *Recognizing* that aquaculture has been the fastest growing food production industry over the last five decades, has allowed the doubling of the average apparent per capita fish consumption since 1960, and is making increasing contributions to the provision of food for a growing population and to livelihoods all along the value chains, including pre- and post-production and supporting services;

7 *Emphasizing* that instruments such as the Agenda 2030 and its associated SDGs, the Common Vision for Sustainable Food and Agriculture, FAO Code of Conduct for Responsible Fisheries, the Bangkok Declaration and Strategy and the Phuket Consensus are mutually supportive and can work in harmony with the present Declaration to produce economically, socially and environmentally sustainable aquaculture value chains, and *further emphasizing* that implementing these instruments requires looking at sustainable and equitable development within and across all agricultural sectors in an integrated and holistic manner, taking into account synergies and trade-offs across sectors and across sustainability dimensions, while mainstreaming nutrition and advancing sustainable agri-food systems;

8 *Noting* the request of the Committee on Fisheries (COFI) to the FAO to consider guidance for concrete actions for the sector – according to national contexts, capacities and priorities – on the economic, social, and environmental dimensions of sustainable development and on climate change adaptation and mitigation, and *welcoming* the endorsement by FAO Members of the 2021 COFI Declaration on Sustainable Fisheries and Aquaculture;

9 *Welcoming* the development of the voluntary Guidelines for Sustainable Aquaculture as a tool towards further development of national policies for the aquaculture sector's sustainability;

10 *Noting* the potential and opportunities of emerging concepts such as One Health,[3] Nutrition-Sensitive Agriculture/Aquaculture[4] and Blue Transformation[5] to influence the development of sustainable aquaculture and its future trajectory;

11 *Recognizing* that developing aquaculture sustainably and equitably requires a holistic approach that values both human and animal health and welfare and *further recognizing* that aquaculture activities should be conducted in a manner that assures the health and welfare of farmed aquatic animals, by optimizing health through minimizing stress, reducing aquatic animal disease risks and maintaining a healthy culture environment at all phases of the production cycle.

12 *Noting with concern* the severe challenges posed to the natural world and humanity's well-being from the global climate crisis, *acknowledging* the recommendation of the UN High Level Panel for a Sustainable Ocean Economy to increase sustainable aquatic food production to help alleviate global climate impacts, and *recognizing* that many forms of aquaculture production (including the farming of algae, bivalves and filter feeding fish) can make significant contributions in this regard;

[3] www.fao.org/one-health/en/
[4] www.fao.org/nutrition/policies-programmes/en/
[5] www.fao.org/3/ne576en/ne576en.pdf

13 *Recognizing further* that gender equality and women's empowerment are critical to all SDGs, and that the aquaculture sector offers opportunities for women;

14 *Appreciating* the important role and contribution of small scale aquaculture in poverty eradication and in providing livelihoods, ensuring food security and nutritional needs as well as supporting the cultural heritage of local communities, especially in less developed countries where off-farm job opportunity is scarce;

15 *Noting with concern* that the COVID-19 pandemic has aggravated poverty, hunger and malnutrition, including an unprecedented impact on the aquaculture sector;

16 *Recognizing* that aquaculture can use energy more efficiently than some land-based animal production, and can be a very effective sustainable way of producing protein, essential fatty acids and important micronutrients;

17 *Recognizing* that aquacuture, when not developed in a sustainable way, can have a negative impact on the environment, and therefore the importance of applying an Ecosystem Approach to Aquaculture, as well as the need to continue reducing antimicrobial use in the sector and to ensure sustainable sourcing of feed ingredients, and *acknowledging* that some forms of aquaculture, such as pond fish farming, bivalve aquaculture or algae farming can provide a range of ecosystem services;

18 *Recognizing* the urgent need to intensify efforts to make full use of opportunities while addressing outstanding conceptual and practical challenges for sustainable aquaculture to fulfil its full potential;

19 *Noting* the need for aquaculture to be considered in global food sustainability dialogues, and as a national, regional and global priority, and the importance of developing strategic plans that encompass various subsets of the industry and wider community;

20 *Acknowledging* that urgent targeted action is needed to ensure aquatic food production and products continue to provide inclusive, effective and sustainable pathways to reduce poverty, secure livelihoods and underpin food security and nutrition, as vital to achieving the goals set in Agenda 2030;

We, the participants of the Global Conference on Aquaculture Millennium +20

21 *Support* a common and transformative **vision** for an aquaculture sector that leads the way towards more productive, efficient, resilient, climate-smart and socially and environmentally responsible agri-food systems, fulfils its potential to meet the increasing demand for safe, healthy, accessible and affordable aquatic food and aquatic products, with reduced impacts on the global environment, contributes to sustainable development and helps to eradicate poverty, malnutrition and hunger, and matures in an economically, socially and environmentally sustainable way.

22 *Recommend* the following overarching **commitments** to help achieve the vision, which are to be applied across each of the ten strategic priorities identified below:

1. ***Promote responsible aquaculture development*** – Responsible aquaculture explicitly considers the three dimensions of sustainability in a balanced and holistic way, paying special attention to the social dimension and vulnerable groups coordinated and coherent actions for its development throughout the entire value chain. Responsible aquaculture, built on due consideration of environmental, social and economic aspects, is transparent and bolsters credibility of the sector.

2. ***Promote good aquaculture governance*** – Good aquaculture governance consists of integrated, coordinated, multisectoral and ecosystem-based management, as well as nature-based and innovative solutions throughout the value chain. Good governance requires strong and effective leadership and accountability, and involves broad stakeholder engagement from across various disciplines and sectors for coherent, inclusive and effective governance mechanisms, including public policies and legal frameworks, risk management approaches, and planning and adequate monitoring mechanisms. Good governance requires strengthened capacities and cooperation of public and private sector institutions and other relevant stakeholders at all levels.

3. ***Strengthen partnerships to generate and share knowledge, information, and technology*** – Strengthened partnerships includes the reinvigoration of global development cooperation and networking among existing and planned centres of excellence, including through providing developing countries with financial, technological and capacity-building assistance through strengthened North-South and South-South cooperation. Inclusive dialogue platforms, creating and improving information systems and data collection, and facilitating flows of information enable better understanding of aquaculture's contribution to sustainable development, including through the monitoring and evaluation of the sector. Modernizing traditional aquaculture with innovative approaches, digital technologies, capacity development programmes, and education and extension activities will unlock employment opportunities.

4. ***Invest in aquaculture innovation, research and development*** – Private and public investment in aquaculture should be better facilitated, aligned, prioritized and enhanced, and targeted towards measurable improvements in aquaculture performance throughout the value chain and with a long term perspective. This requires an enabling environment, competent authorities, strengthened partnerships and multistakeholder innovation platforms. Investment should be well focused, comprehensive and at sufficient scale, and targeted at new technologies, research, development and innovation to unlock the full potential of sustainable aquaculture, to not just increase production but to address other issues such as poverty reduction, nutrition, employment, gender equality, inclusion, preserving ecosystems and biodiversity, adaptation to and mitigation of the impacts of climate change and other global impacts. Development assistance should pay particular attention to policy advice, human and institutional capacity development and monitoring and evaluation of progress.

5. ***Create open and transparent communication about sustainable aquaculture*** – Communication strategies, targeted to various audiences, are needed to disseminate and promote this Declaration and improve the image of aquaculture by highlighting its benefits (including its key role in nutrition and food security, livelihoods and economic growth, as well as its capacity to reduce the impacts of global climate change,), conveying an accurate image of its potential risks, and engaging in a respectful dialogue between different stakeholders, and encouraged and facilitated through a multistakeholder platform approach. Communication should include mainstreaming Agenda 2030 and its component instruments, including the SDGs, in the promotion, planning and development of aquaculture at international, national and local levels in order to further promote awareness and action towards their achievement. Communication strategies should also aim to increase the transparency and credibility of the sector and its social license to operate and improve knowledge, perceptions, and acceptability of aquaculture and its products.

23 *Identify* the following **strategic priorities** required to accelerate sustainable aquaculture development and its contribution to the SDGs, as described in Section III:

A ***Expand the contribution of aquaculture to sustainable agri-food systems for nourishing nations, reducing poverty and providing healthy, nutrient-rich and climate-friendly food to people;***

B ***Integrate aquaculture with the natural environment, with agriculture, capture fisheries, forestry, tourism, renewable energy and other sectors, and within agri-food systems for increased resilience;***

C ***Continually improve the performance of aquaculture, and its capacity to minimize impact on and make better use of natural resources and enhance ecosystem services;***

D ***Promote aquaculture development approaches that conserve and improve ecosystems and biodiversity, and reduce the carbon intensity of food production systems;***

E ***Protect and develop aquaculture based livelihoods and promote decent work and socially responsible enterprises;***

F ***Ensure women's empowerment by enhancing women's full access to equal opportunities through gender-transformative policies;***

G ***Promote opportunities for young women and men;***

H ***Promote Indigenous Peoples' participation in aquaculture;***

I ***Prepare for and potentially mitigate impacts from global crises, such as climate change, biodiversity loss, pollution and pandemics;***

J ***Strengthen data and information collection and analysis for monitoring the progress and contributions of aquaculture.***

24 Recommend to all stakeholders the following Call for Action that addresses the overarching commitments and the ten strategic priorities of the Shanghai Declaration, with a set of major supporting actions to achieve the vision for sustainable aquaculture.

III Call for Action

A) Expand the contribution of aquaculture to sustainable agri-food systems towards nourishing nations and providing healthy, nutrient-rich and climate-friendly food to people

Aquaculture has a role to play in the transformation of current agri-food systems from feeding people to nourishing people, emphasizing the importance of nutrition and health as key outcomes of agri-food systems. Aquatic food is recommended as a key component of a diverse, healthy diet. Fish and other aquatic foods are important sources of protein, essential fatty acids and micronutrients, especially for the poor and vulnerable. However, there are differences in the nutrition composition of aquatic foods based on species, farmed type and production systems, as well as in the way these foods are prepared and consumed. Sustainable Food Systems (SFS) must generate positive value along three dimensions simultaneously: economic, social (including women, youth, nutrition and health) and environmental (with a particular focus on global environmental and climate change impacts). Importantly, aquaculture production must be considered as an integral part of the global agri-food systems with intrinsic linkages to capture fisheries and terrestrial agriculture.

Stakeholders may support this strategic priority by:

1. Recognizing the role of aquatic food needs to play in building sustainable agri-food systems, and in addressing hunger, and the triple burden of malnutrition;
2. Recognizing that aquatic food is a key dietary component in many poor countries, especially in Africa and Small Island Developing States, and that aquaculture has a strong potential to sustain

future demand for aquatic food, but that aquaculture production is also imbalanced, with Asia generating 88.4 percent of the total in 2019;

3. Acknowledging that recent disruptions and threats to food security as a result of emerging crises like COVID-19 have led to a growing global demand for locally produced food items;
4. Recognizing that the growth in aquaculture production has not only had positive but also some negative impacts on people and the environment, and thus the need to maximize positive impacts and minimize negative impacts in further aquaculture development;
5. Encouraging the expansion of sustainable aquaculture wherever it can be practiced to mitigate global climate change and reduce its impacts, while increasing its supply for domestic consumption;
6. Adopting holistic and inclusive approaches, such as ecosystem approach to aquaculture, that link human, plant and animal and environmental health for a more sustainable and equitable aquaculture sector that is an integral part of a sustainable global agri-food system;
7. Adopting a nutrition-sensitive approach which considers the nutrient content of farmed aquatic foods;
8. Promoting the benefits of fish and other aquatic foods in diets (especially for pregnant women and children) and the inclusion of aquatic food in agri-food systems policies, given its potential and role in combatting all forms of malnutrition;
9. Promoting safe aquatic foods in national food-based dietary guidelines, school feeding programmes, and other food and nutrition strategies;
10. Encouraging partnerships and south-south cooperation for the purpose of enhancing the contribution of aquaculture to sustainable agri-food systems;
11. Adopting a holistic agri-food systems perspective, where possible, on the development of aquaculture to transcend the narrow focus of production issues, value chains and sectoral policies and contribute to achieving sustainable development in its three dimensions, economic, social and environmental;
12. Transforming supply chains, production, processing, trade and consumption of aquaculture food products as part of agri-food systems to make them more sustainable, resilient, ethical and inclusive;
13. Engaging and empowering social actors in the design and implementation of policies, programmes and investments to promote the access to and adoption of innovative and new practices and appropriate technologies;
14. Developing a Global Alliance connecting key institutions and stakeholders for sustainable aquaculture development and stronger advocacy in aquaculture;
15. Increasing awareness among policy makers/legislators of how sustainable aquaculture can contribute to sustainable development;
16. Promoting long term strategic planning of sustainable aquaculture, also including adequate implementation, monitoring and evaluation mechanisms of strategies, plans and projects to adjust rules, regulations, and incentives.

B) Integrate aquaculture with the natural environment, with agriculture, capture fisheries, forestry, tourism, renewable energy and other sectors, and within agri-food systems for increased resilience

Aquaculture production methods and practices are exposed to a range of environmental, social, and economic disruptions, including direct disruptions to on-farm activities, as well as indirect disruptions to inputs. The

ability to respond, adapt and recover to such disruptions is a necessary condition for production resilience. Aquaculture, if not managed properly, can have negative impacts. Lack of spatial planning and suboptimal zoning and site selection and/or area management can expose production to greater risk of environmental disruption or impact, and represents major constraints to the expansion of the aquaculture industry. In addition, poor aquaculture planning can result in low farm productivity, complicate access to and use of land and water resources, and create conflicts with other resource users. Such conflicts can disrupt production and result in additional socioeconomic and environmental costs. Aquaculture systems interact with other agri-food systems, for example through the feed inputs and competition within markets, creating risk for economic disruptions and requiring an agri-food systems approach to maintaining resilience and sustainability.

Stakeholders may support this strategic priority by:

1. Integrating aquaculture with other food production systems (for example combined rice and fish farming, integrated multitrophic aquaculture, aquaponics or other agricultural/livestock farming practices, saline-alkaline aquaculture) to enhance the sustainability, productivity, efficiency and resilience of people, communities and ecosystems;
2. Working across disciplines and sectors for greater policy coherence;
3. Promoting spatial planning and management to draw conceptual and operational guidance from the Ecosystem Approach to Aquaculture, developing aquaculture within the context of ecosystem functions and services, and developing aquaculture within the context of other sectors;
4. Strengthening aquaculture so that it takes place amongst numerous other activities and users of land and water (including in both rural, urban and peri-urban areas), develop joint objectives and strengthen guidance documents in key cross-cutting areas; and promote more integrated actions in aquaculture and across agriculture, forestry, fisheries and other economic sectors, that balance the different dimensions of sustainability, as well as marine spatial planning, integrated coastal zone management and integrated watershed management;
5. Promoting aquaculture that is interconnected with the global agri-food system, including through the use of sustainable aquaculture feed ingredients, the use of sustainable aquaculture products (including by-products) as animal feed ingredients and other inputs for agriculture, and supporting a diversity of production systems to prevent supply chain bottlenecks;
6. Stimulating demand-led and relevant research and innovations by strengthening partnerships and establishing and maintaining centres of excellence on aquaculture across the industry (private sector), academia, state and non-state actors, and encourage public-private partnerships and investments;
7. Investing in research and development for utilizing cultured aquatic plants as feed ingredients for aquaculture and terrestrial livestock and direct human consumption, to reduce the pressure on fish stocks and agricultural land, and reduce enteric methane emission from livestock;
8. Encouraging and promoting the development of regional and national multistakeholder platforms to instigate collaborative joint working among industry, research, academic and other stakeholders to develop strategic research and innovation agendas for local, regional and national aquaculture development;
9. Taking into consideration the need to ensure sustainability in all its aspects, economic, social and environmental and looking for synergies including with other sectors where possible and addressing trade-offs where necessary;

10. Embracing broad stakeholder involvement, for example private enterprises, public authorities, academia and research, producers and other aquaculture workers' associations and other social and non-governmental organizations through consultation and active participation, strengthening partnerships, and the application of mediation and conflict resolution mechanisms to build consensus around sustainable development objectives;
11. Bolstering private sector at all scales through inter alia the use of private public partnerships as a way to create shared value, to facilitate market entry and rights for small producers, to create an environment where the interests of civil society, businesses and government priorities are better understood and shared, and to leverage resources and knowledge, promote properly inclusive business models;
12. Identifying common issues/concerns among food producing sectors and stakeholders as starting points for dialogue and coordinated/coherent action on aquaculture development;
13. Creating inclusive dialogue platforms that lead to shared understanding and negotiated solutions across sectors and across the dimensions of sustainability, and developing tools to transform these solutions into changes in practices.

C) Continually improve the performance of aquaculture, and its capacity to respect and make better use of natural resources and enhance ecosystem services in an integrated and efficient way

Remarkable gains have been made in improving the efficiency of aquaculture production. However, as aquaculture and other sectors continue to grow, natural resources (for example, land, water, and raw materials for feed production) may degrade or become scarcer and competition will increase. Therefore, environmentally friendly, resource use efficient, and sustainable aquaculture should be encouraged, with due consideration to ensuring access to food for people and minimizing impacts on the environment.

Stakeholders may support this strategic priority by:

1. Recognizing the largely untapped potential of appropriate genetic technologies (both traditional and modern) to improve aquaculture production (especially in breeding), while conducting risk assessment before upscaling and dissemination of these technologies, ensuring that they are appropriate and adapted to local conditions, and while maintaining a cautious approach to the use of genetically modified organisms in aquaculture;
2. Strengthening broodstock and seed production and distribution systems for the conservation and sustainable use of improved aquatic genetic resources, and enhancing the extension and application of select farmed types;
3. Promoting the responsible use of emerging technologies like artificial intelligence, the Internet of Things, robotics, remote sensing, Geographic Information Systems, block chain technology and other tools to make aquaculture systems more precise, intelligent, climate resilient and sustainable;
4. Promoting aquatic biosecurity protocols and management agreements, including prevention of disease and integrated disease and pest management, and encourage measures to improve fish health and welfare;
5. Promoting control, prevention and management of transboundary aquatic animal diseases of relevance for aquaculture;
6. Harmonising aquatic animal and plant health management approaches and measures and effective cooperation at national, regional and inter-regional levels in order to maximize the effectiveness of limited resources;

7. Depending on the national legal context or ratification status, adhering to relevant international instruments related to the responsible use of antimicrobials, chemicals and veterinary drugs, including the FAO Action Plan on Antimicrobial Resistance (AMR) and principles of One Health, as appropriate;
8. Engaging with the feed industry to encourage the development and utilization of diversified and improved feeds that are precisely designed to the needs of farmed types based on age, genotype, environment and immune status;
9. Promoting species and practices with lower environmental impact, such as the farming of unfed and low trophic level species and species with efficient feed use as well as developing sustainable aquaculture practices, technologies and systems (including recirculating aquaculture and application of modern technologies);
10. Promoting decentralized and reliable supply of healthy seed to farmers, particularly small scale farmers;
11. Improving zoning or density of culture units in order to reduce the risks of habitat degradation, pollution and hypoxia;
12. Taking action to decrease aquaculture environmental footprint throughout the value chain, from production to consumption, including all the side industries associated with aquaculture, such as processing, transportation, storage and feed manufacture;
13. Encouraging governments, the fishing industry, aquaculture farmers and the feed industry to apply the principles of sustainability in the responsible use of wild fish in aquaculture feeds, including promoting the replacement of juvenile and low-value fish as feed with compound feed, while at the same time specifically avoiding the undermining of food security of local populations or other negative social or environmental impacts;
14. Reducing dependency on wild caught fish as sources for aquafeeds, increase the use of fishery processing wastes as raw material for fishmeal and fish oil, and promote use of alternative and sustainable feed ingredients (such as algae, insect meals, single cell proteins, or fish by-products) which are safe for the cultured organism and the environment;
15. Developing and promoting new, easy to use technologies to recycle and monitor "waste" nutrients from aquaculture to ensure their re-use within the ecosystem through integrated approaches and circular economy where waste from one part of the farming system is used by another part;
16. Improving the distribution of aquaculture products and the reduction of post-harvest losses to increase the positive impact of aquaculture;
17. Creating an enabling environment to target and support aquaculture innovation approaches that facilitate carefully planned innovations, gender-sensitive innovations, and fledgling innovations;
18. Encouraging technology transfer, networking, and partnerships in extension and education;
19. Encouraging public policies and efforts to practice more sustainable aquaculture and maintain ecosystem services through public and private incentives or rewards.

D) Promote aquaculture development approaches that conserve and improve ecosystems and biodiversity, and reduce the carbon intensity of food production systems

Many forms of aquaculture can provide ecosystem services and contribute to conservation, although its value and roles are rarely well recognized. Aquaculture systems depend on a variety of ecosystem services and products and therefore require healthy aquatic and terrestrial ecosystems. Although only accounting for a very small proportion of the environmental impacts of agriculture, aquaculture must, like other components

of the global sgri-food system, aim to minimize land use, safeguard biodiversity, reduce consumptive water use and substantially reduce effluents, wastes and greenhouse gas emissions.

Stakeholders may support this strategic priority by:

1. Conserving, protecting, enhancing and restoring ecosystems, their services and their biodiversity, including plant and animal genetic resources, water and soil resources, and at the same time prevent water pollution and reduce greenhouse gas emissions;
2. Applying the concepts of physical, ecological and social carrying capacity in aquaculture planning, use of environmental impact assessments, and monitoring aquaculture operations for impacts to ecosystems and biodiversity (including non-native or genetically altered species, transboundary aquatic animal diseases, and the use of antimicrobials and other chemicals);
3. Recognizing the advantages and promoting the use of extractive (for example, algae, bivalves and filter feeding fish) and unfed aquaculture species (for example, carps), including their provision of ecosystem services such as water quality improvement, and their lower impact on surrounding ecosystems;
4. Conserving and responsible restocking endangered species and enhance fisheries productivity through culture-based fisheries, and as appropriate, encouraging production of endangered species and native species with potential for aquaculture, including through the necessary research;
5. Promoting aquaculture systems, where appropriate, for their ability to provide habitat and refuge for both terrestrial and aquatic biodiversity;
6. Addressing the risks of antimicrobial resistance and the impact of veterinary medicines and other chemicals in the environment associated with aquaculture;
7. Developing methods and parameters to value ecosystem services provided by aquaculture.

E) Protect and develop aquaculture based livelihoods and promote decent work and socially responsible enterprises

The positive contributions to sustainable development of aquaculture are well recognized, and the economic, social, environmental and cultural benefits should be accessible to all including local communities, and not driven only by the pursuit of production goals and economic efficiency. However, if aquaculture is poorly regulated, managed or planned, it may exacerbate historical inequalities and bring about negative impacts. Discriminatory access to resources and services (for example, land, seed supply, water and marine space, credit and finance) undermines the development of livelihoods based on aquaculture. Women and small scale farmers are most likely to be disadvantaged as aquaculture enterprises scale up and develop, having less access to ownership of assets such as farming sites, production, processing and marketing assets, credit, insurance, technology and capacity building. In addition, as is the case in all agricultural sectors (and beyond), there is scope for the improvement of decent work conditions in the aquaculture sector.

Stakeholders may support this strategic priority by:

1. Supporting the formation, engagement and involvement with aquaculture organizations, including those representing women’s interests, throughout the aquaculture value chain, and at all scales of aquaculture;
2. Protecting and improving rural livelihoods via the design and access to social protection schemes that are supported and sustained by governments;

3. Depending on the national legal context or ratification status, adhering to relevant international instruments related to social protection and decent work, such as the International Labour Organisation guidelines, the UN Declaration on the Rights of Indigenous Peoples, the Convention on the Rights of the Child, Addis Ababa Action Agenda, UN Universal Declaration on Human Rights, Convention for the Elimination of all Forms of Discrimination Against Women, gender relevant provision of the 2030 Agenda including SDG5 (gender equality), SDG8 (decent work and economic growth), and SDG10 (reduce inequalities), and the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security;
4. Working with the private sector and certification bodies to promote and enshrine fair and equitable treatment of aquaculture workers;
5. Developing training opportunities for youth;
6. Optimizing existing value chains and enhancing traceability and market competitiveness, *inter alia* by using digital and organizational innovations;
7. Ensuring an equitable distribution of benefits to producers and workers, including overcoming international trade barriers and fostering suitable working conditions in the sector through the promotion of a constant dialogue within the industry and government and organizing vulnerable groups in associations, cooperatives, and unions;
8. Bridge the rural divide and empower youth and women to access information, technology and markets, while taking a gender-transformative approach to innovations;
9. Facilitating flows of information and traceability along the supply chain in vertically integrated production systems;
10. Establishing capacity building programs aimed at the professionalization and (self-) regulation of the industry throughout the value chain and at all levels, including government personnel that need to be able to take decisions based on the most recent best scientific information available;
11. Developing legal frameworks tailored to the specificities of the aquaculture sector and of its actors, including women and other disadvantaged groups according to national circumstances;
12. Developing aquaculture-based leisure business (such as recreational fisheries or tourism) to generate additional income opportunities for farmers and improve livelihoods;
13. Accelerating the identification and protection of traditional aquaculture systems that can potentially be listed to the Globally Important Agriculture Heritage System so that valuable traditional aquaculture modes would be revitalized.

F) Ensure women's empowerment by enhancing women's full access to equal opportunities through gender-transformative policies

Systemic factors that disadvantage women in economic and social structures have also applied to the development of aquaculture. Women have not benefited equally because their business and employment opportunities are circumscribed by, among other aspects, lack of sex-disaggregated data for use in planning and monitoring, and aquaculture policies that do not distinguish different women's and men's needs in development. The causes of gender blindness are rooted, largely, in development policies and research; discriminatory legislation, traditions and attitudes; and women's lack of access to decision-making. Of critical importance is the extent to which rural people, in particular small scale family farmers, youth and women, have secure and equitable human and labour rights, access to knowledge, personal security, health, essential services, markets, and resources, including land and water, control over their livelihood through

decent business and work opportunities, and access to diverse and nutritious food. More information is needed on women's current engagement in aquaculture, and what makes women lose (or retain) control over their activities depending on the scale, intensity and value of aquaculture enterprises. Overcoming gender-blindness, empowering women in aquaculture and making the development of aquaculture gender-transformative is the responsibility of everyone in the sector.

Stakeholders may support this strategic priority by:

1. Reviewing and promoting national legal amendments to remove and take action against gender and other forms of discrimination in laws and regulations framing directly and indirectly aquaculture development, and secure access of socially-marginalized groups to resources essential for aquaculture;
2. Mainstreaming gender targets in all aquaculture certification, accreditation, and labour policies and practices, as well as in toolkits and guidance on aquaculture development. Aquaculture practitioners need good technical instruments for gender-responsive planning, indicators of progress, training and communications;
3. Funding research that documents and analyses the causes of gender inequality to combat systemic gender inequalities and develop transformative solutions;
4. Increasing visibility and rewards for equal opportunities at all levels, including for leadership and decision making for women's participation and empowerment in the sector, promote aquaculture interventions that have the potential to transform gender relations;
5. Promoting equal opportunities and substantive equality in the aquaculture value chain through redressing disadvantage, addressing not only stigma and stereotyping in employment but also discrimination and abuse, and accommodating differences including through removing structural impediments to inclusion;
6. Increasing the understanding of the social dimensions of sustainable and equitable aquaculture, including the need to pay more attention to the situations and roles of women, and, where necessary, challenging the status quo.

G) Promote opportunities for young women and men

Aquaculture is not always a first choice of livelihood by youth, due to political, economic, technical, and social factors, limited access to space and water, financial services, markets, limited involvement in policy dialogues on issues that affect youth, and insufficient access to knowledge, information and education. Our knowledge on how these barriers play out on youth's motivation to join and partake in aquaculture is incomplete. Youth also face a near gerontocracy, and young women's access to educational opportunities and resources is even more proscribed than that of young men.

Stakeholders may support this strategic priority by:

1. Developing aquaculture training and education, and include it in existing curricula;
2. Building a youth-oriented approach to engage young women and men by creating attractive employment and income opportunities, tapping into their creativity and information and communication technology, virtual, and spatial skills, and supporting knowledge and skill building;
3. Funding research to understand the impact of economic, political and social shifts at global to local levels on youth involvement in aquaculture and develop solutions to motivate and engage young men and women to engage in aquaculture sector;

4. Promoting policies that explicitly target impacts on young men and women's involvement, based on understanding the diversity among youth and their needs;
5. Developing education programmes and curricula relevant to sustainable aquaculture;
6. Increasing the understanding of the social dimensions of sustainable and equitable aquaculture, including the need to pay more attention to the situations and roles of youth, and, where necessary, challenging the status quo.

H) Promote Indigenous Peoples' participation in aquaculture

Sustainable aquaculture provides healthy, nutritious and culturally appropriate food and it could represent an opportunity for socio-economic development by Indigenous Peoples. Indigenous People might benefit, if they so desire, from equitable access to aquaculture resources and value chains and equal participation and representation in policy-making processes associated with aquaculture development.

Stakeholders may support this strategic priority by:

1. Depending on the national legal context or ratification status, adhering to relevant international instruments related to Indigenous Peoples, including the United Nations Declaration on the Rights of Indigenous Peoples;
2. Ensure equitable representation and effective participation of Indigenous Peoples in the planning, consultation and decision-making process;
3. Cooperate to identify ways in which aquaculture can contribute to the nutrition and development of Indigenous Peoples, through the gathering and strengthening of evidence and information, statistics, and development of actions that assist and demonstrate their contribution to their self-determination;
4. Endeavour to obtain Free, Prior and Informed Consent (FPIC) for development of aquaculture activities with Indigenous Peoples, and prevent the development of inappropriate aquaculture that may negatively impact them;
5. In collaboration with Indigenous Peoples and taking into account their knowledge and traditions, establish guidelines to facilitate the development of public policies aimed at the development of aquaculture production systems by Indigenous Peoples;
6. Promote the exchange of information and experiences among countries in support of Indigenous Peoples involved in aquaculture;
7. Based on Indigenous Peoples´ food and knowledge systems, identify key issues to support aquaculture development in their Indigenous Peoples´ Food Systems, combining Indigenous Peoples´ traditional knowledge with innovation, and develop collaborative frameworks to advance their involvement in aquaculture, develop policy and strategies to improve nutrition and health, and develop through interculturality, culturally acceptable aquaculture systems based on the respect of FPIC and where there is a demand;
8. Increasing the understanding of the social dimensions of sustainable and equitable aquaculture, including the need to pay more attention to the situations and roles of Indigenous Peoples, and, where necessary, challenging the status quo.

I) Prepare for and potentially mitigate impacts from global crises, such as the climate change, biodiversity loss, pollution and pandemics

Global crises, such as climate change and the COVID-19 pandemic, have disrupted supply chains and markets, and caused human suffering and death around the world. Supply chains and markets are now being modified in response to the pandemic; world experts believe that the next ten years will be crucial in addressing the impacts of the climate crisis in order to avoid irreversible damage to the environment. Aquaculture, because of its diversity of farming systems, species and environments, can adapt to market forces, has more opportunities for lower 'carbon footprint' that can lessen or mitigate the impacts of the global climate crisis, and can help the overall food supply system be more resilient to other impacts such as natural disasters and human conflict.

Stakeholders may support this strategic priority by:

1. Embracing and expanding climate-friendly or climate resilient aquaculture with appropriate planning and management to understand where and how aquaculture can address climate change and other external impacts to the agri-food system;
2. Taking action to prepare for and adjust to both the current effects of climate change and the predicted impacts in the future;
3. Enhancing and/or developing environmental monitoring systems to strengthen aquaculture resilience and improve early warning;
4. Implementing risk reduction strategies, including through contingency planning for droughts, floods or pest outbreaks, and the adoption of more diversified and resilient production systems associated with effective safety nets;
5. Developing aquatic farmed types adapted to changing environmental conditions caused by climate change, diversifying aquaculture production, improving farming practices, promoting integrated farming systems and enhancing the capacity of farmers to respond to climate risks;
6. Where options exist, using a variety of species and production technologies that have lower carbon and environmental footprint than terrestrial species;
7. Utilizing traditional and modern and sustainable genetic technologies responsibly to create farmed types that are resistant to, can adapt to, or can minimize the impacts of climate change, for example able to withstand acidification, salinization and temperature and precipitation changes, through inter alia better conversion efficiency and wider environmental tolerances;
8. Identifying the sector's vulnerabilities to the impacts of climate change (for example, acidification, temperature changes, extreme weather events) and other external impacts specific to each area and developing disaster preparedness, risk mitigation and climate change adaptation strategies;
9. Locating aquaculture facilities away from areas that have a high probability of damage from external factors, such as floods, droughts and tsunamis;
10. Supporting and promoting the development and expansion of climate-friendly and more resilient forms of aquaculture;
11. Recognizing that the changing global climate could provide new opportunities for aquaculture due to the diversity of farmed types and culture systems available to the farmer and proactively promote these opportunities;
12. Integrating climate-proofing innovations that increase adaptation and resilience of the sector, including innovations in institutions, emissions reductions and renewable energy systems such as

co-locating aquaculture with wind turbines or photovoltaic power generation or using renewable energy heating and cooling systems and water pumps;

13. Understanding and applying risk analysis for aquaculture planning and management (pathogen, food safety and human health, genetic, environmental, climate, ecological [pests and invasive species], financial and social risks).

J) Strengthen data and information collection and analysis for monitoring the progress and contributions of aquaculture

The compilation of accurate, relevant and timely data facilitates monitoring, comparisons and analyses of status and trends that are essential for the responsible development of aquaculture and the sustainable utilization of the resources it requires. Accurate assessments of the status and progress of aquaculture support governments and relevant stakeholders in formulating better informed policies, strategies and plans and in the monitoring and reporting of aquaculture's contributions to economic development, food security and poverty alleviation.

Stakeholders may support this strategic priority by:

1. Improving aquaculture data collection and information systems paying attention not only to production but also to direct and indirect employment through the value chain, environmental performance indicators, and economic indicators;
2. Adopting methods of evaluating aquaculture and supply/value chains to include quality of production (nutritional and food safety) as well as quantity, making use of internationally accepted indicators of food and nutrition security and health outcomes and environmental impacts;
3. Encouraging monitoring and evaluation of sector progress, including targets and indicators aligned with the Follow-up and Review Framework of the 2030 Agenda, in support of monitoring and reporting on contributions of sustainable aquaculture to the SDGs;
4. Mandating the collection and dissemination of sex-disaggregated and other data relevant to gender equality in every jurisdiction and systematically use these data in aquaculture planning and development;
5. Creating and maintaining open and transparent aquaculture information systems and improving aquaculture data collection and analysis, including sex-disaggregated data and statistics for reporting progress and contribution of the sector to the SDGs;
6. Strengthening transparency and outreach of the biannual CCRF survey and progress reporting on sustainable aquaculture in FAO's Committee on Fisheries, and its Sub-Committees on Aquaculture and Fish Trade.

25 The Shanghai Declaration and its Call for Action were developed and adopted by the participants of the Global Conference on Aquaculture Millennium +20.