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## ASIA-PACIFIC FISHERY COMMISSION

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### **Aquaculture innovation, knowledge sharing and capacity development in the APFIC region**

1. Asia is the largest aquaculture producer in the world, providing 88.7 % of total world aquaculture production (82 million tonnes, excluding 32 million tonnes of aquatic plants). Aquaculture creates jobs for 20.5 million people in primary sector, these are mostly small-scale enterprises in Asia.
2. The aquaculture sector in Asia-Pacific has largely evolved from the traditional farming practices with gradual intensification in production and improvements in management sophistication. The intensification of production operations through higher density stocking and increased material inputs allows significant increases in productivity, however, when intensification goes beyond environment carrying capacity and its negative impacts are not effectively mitigated, the sustainability of the aquaculture operations is seriously threatened.
3. There are emerging challenges to the aquaculture sector from within the sector (antimicrobial resistance, disease, environmental quality) and without (climate change, fishmeal supply, demands of markets and trade barriers).
4. More and more stringent environmental and social standards demand significant improvement in sectoral performance in environmental and social benefits for better public acceptance. This requires transformative changes of aquaculture farming systems and technologies.
5. In addition, increasingly frequent natural disasters and extreme weather largely associated with climate change further increase the vulnerability of aquaculture sector.
6. To achieve the sustainable growth of aquaculture, there are pressing issues that need to be addressed effectively. This working paper summarizes some of the key issues facing aquaculture in the APFIC region and some potential steps that can be taken to support or improve sustainability in the sector. The information paper APFIC/21/INF7 refers.

## INNOVATION

7. The aquaculture sector needs to be more dynamic and vibrant to ensure continued development and adoption of innovative technology and farming systems to address the new and multi-faceted challenges to the sustainable growth for greater contribution to the attainment of SDGs related to food security and nutrition, poverty alleviation and sustainable resources utilization.

8. Innovations in farming technologies and materials cover diverse areas affecting system performance improvements may be technologically sophisticated or and include inter alia:

- Genetic improvements and selective breeding, improved hatchery mass-production technologies
- Feed and feeding, improved feeds and alternative feed ingredients
- Health management, and on-farm biosecurity measures and health monitoring, development of vaccines, tools or techniques for disease detection
- Water quality improvements, effluent treatment, water recirculation and biofloc systems
- Culture environment and facility monitoring system, web-based/automated/satellite tools, precision aquaculture

9. Innovations in on-farm management and culture practices are driven by changing economics of production, markets demands and regulatory or policy reforms. Such modified management practices address:

- Production intensity (more/less intensive)
- Reduction of environmental footprint (water use, feeds, effluent discharge) of aquaculture operations
- Reduced used of chemotherapeutants and anti-microbials
- Food safety, and product quality
- Diversification or integration of other organisms of different trophic levels (e.g. Integrated Multi-Trophic Aquaculture, IMTA, production systems; rice-fish systems)
- Aquatic animal health
- Mitigation of risks or adaptation to natural hazards and extreme weather events associated with climate change impacts
- Reduction of greenhouse gas emissions.

10. Innovations in business models, marketing and trade are also emerging. These are important, as they facilitate or incentivize the adoption of physical/technological innovations and new practices. They also influence changes in the behaviour of producers, traders, and consumers in response to new trends for achieving sustainable aquaculture development. These include improvements along the entire value chain:

- Organization of producers
- Social relations/partnerships between producers and markets
- Logistics, market/trade
- Value creation, Marketing strategies, branding
- Certification (Good Aquaculture Practice; sustainability standards; social standards)
- Access to information
- Financing and investment

## **APPLICATION OF ICT**

11. Many higher technology aquaculture production systems also benefit from the application of Information and Communication Technology and big data. The management of aquaculture sector is another area where data and information technology can greatly facilitate decision making:

### **FARM LEVEL**

- Precision aquaculture using ICT, AI and online applications, monitoring and automation that allow monitoring, documentation and control of biological processes in the fish farm (e.g. controlling the aeration, feeding and water exchange in response to changing water quality parameters)
- Input sourcing

### **MARKET/SECTOR LEVEL**

- Tracking diseases and assisting biosecurity measures
- Environmental monitoring, zoning, early warning
- Improving traceability and food safety
- Marketing of aquaculture products
- Linking producers and consumers

## **KNOWLEDGE SHARING CAPACITY BUILDING, COMMUNICATION**

12. There is a clear case for having access to knowledge and skills both in sustainable production practices as well as mitigation and improvement of the resource use footprint of aquaculture.

13. These lessons are needed within the Asian region, as well as transferrable to other regions.

14. Dissemination and scaling up the innovative technologies, systems and practices at national and regional levels can be facilitated through cooperation. There are challenges as the willingness to share competes with commercial interests, but overall there is a strong need to put farmers in touch with viable options to improve their system productivity, environmental footprint, profitability and resilience.

15. The APFIC member countries have considerable sectoral diversity, knowledge and training resources:

- Innovative or world leading production systems or species:
  - Specific species such as Grouper, freshwater prawn; Pangasius, Indian/Chinese carp; (more than 254 species are cultured in Asia)
  - Systems and management: low water exchange ponds, cage, raceways, integrated multi-trophic systems in marine environments; integrated carp; rice-fish; seaweeds; mangrove mariculture
  - Farmer organizations and marketing systems
- National Regional training institutions under regional cooperation umbrellas (e.g. SEAFDEC Aquaculture Department, Philippines; FFRC Wuxi China; CIFA, India)
- Regional cooperation mechanisms: NACA, SEAFDEC, BOBP-IGO, WorldFish

16. Networking and collaborations between research and extension institutions and private sector can facilitate this and is in line with FAO's commitments to its member countries.

17. The FAO Aquaculture Platform is a new initiative that is under development as a vehicle to pool, share and facilitate access to knowledge of best practices in sustainable aquaculture and coordinate access to this knowledge amongst training institutions and national agencies. It is also intended to coordinate the access of stakeholders to relevant training and networking

#### **SUGGESTED ACTION BY THE COMMISSION**

18. The Commission is invited to report specific items of new knowledge that have been applied in member countries in promoting sustainable aquaculture which can be shared with other countries, which have potential for cooperation, knowledge exchange and capacity building:

- Innovative aquaculture systems, production methods or unique species
- National training programmes and institutions

19. The Commission is further invited to identify specific capacity building needs or knowledge required for enhancing the sustainable growth of the sector.