December 2014

CENTRAL ASIAN AND CAUCASUS REGIONAL FISHERIES AND AQUACULTURE COMMISSION

TECHNICAL ADVISORY COMMITTEE (TAC)
THIRD MEETING
BISHKEK, KYRGYZ REPUBLIC **16-18 FEBRUARY 2015**
INLAND FISH HATCHERY MANAGEMENT

INTRODUCTION

1. This document aims to provide basic background information to TAC in its effort to generate scientific and technical advice on the hatchery management of key commercial inland species in the CACFish area.

2. Global aquaculture production has undergone a remarkable continuous increase over the past few decades. Despite rapid advances in aquaculture technology, the level of sustainable aquaculture management practices still remains low in many parts of the world, including the Central Asian and Caucasus (CAC) region. Fish hatchery production includes early stages of farming operations under controlled environments (i.e. spawning, artificial propagation, feeding, nursery and rearing of fry, fingerlings and juveniles). On the other hand, fry and juvenile fish that are used for grow-out in fish farms until market size, are generally obtained from commercial hatcheries. Hatchery-reared fish has high rate of survival due to controlled conditions of hatchery production. Furthermore, hatcheries are used for stock enhancement to replenish declining fish stocks or for conservation and restoration of threatened and endangered species. Thus hatcheries are crucially important to the overall success of aquaculture production, stock enhancement and conservation, and availability of fingerlings seems to be a general problem for the region. The existing hatcheries in CAC region produce either cold water fish (i.e. trout) or warm water fish (mainly carps). Apparently these hatcheries are not being run at their full production capacities. They are relatively old and generally have no extensive facilities, indicating the need for rehabilitation and modernization. Despite the privatization of state-owned enterprises over the last years, there are still few state-owned hatcheries in the region. Most such hatcheries, however, are under-utilized or not used at all among others due to limited budget allocation and human resources. However well-run state controlled hatcheries can ensure good genetic and healthy fingerlings.

3. In developed countries, as a part of national policies or plans, hatcheries have long been used for stocking of fish into various water bodies by releasing large numbers of hatchery produced fish for harvest by recreational and commercial fisheries. Also to a lower extent, hatchery-reared fish are also stocked into wild in CAC region. It should be noted that hatchery enhancement of wild fisheries has

been an issue of public concern due to reported or perceived irreversible ecological, genetic and biological changes caused by such fish stocking or introduction practices. Stocking programmes, plans or practices therefore should aim to maintain, restore and monitor the genetic diversity of wild and cultured fish populations.

4. Global aquaculture production has undergone a remarkable increase over the past few decades. There exist a variety of well-developed hatchery techniques and tools for farming of warm-water and cold-water inland fish species. The application of these techniques and tools however vary across the CACFish countries. As far as CACFish area is concerned, Turkey has by far the most developed inland fisheries and aquaculture industry in the CACFish area in terms of value and volume of production, capital investment and technology used. As underlined by the Regional Workshop on Inland Fish Hatchery Management, referred to in paragraph 8 below, Turkey's case would offer an opportunity to transfer experience, expertise and technology which has become one of principal focuses of CAC region in terms of development of aquaculture and associated hatchery production techniques. Following are major factors affecting Turkey's pronounced aquaculture industry development over the last decades: (i) national strategies; (ii) export-oriented production which brought about substantial changes; (iii) commercial supply of quality seed and feed; (iv) growing domestic manufacturing of aquaculture equipment and feed; and (v) a skilled pool of scientists, farmers, hatchery managers and workers. The Regional Workshop noted that good practice examples of inland hatchery management and well- planned activities of stocking of hatchery-reared fish also exist in other countries of CAC region, for instance in Armenia, Azerbaijan and Kazakhstan.

5. Quality seed and fish feed have been reported to be one of the success factors for hatchery production. Supply of quality seed and feed however remains one of key challenges to the development of aquaculture in CAC region where there are a relatively low number of inland fish hatcheries. Hatchery operation requires regularly supply of broodstock from wild population while keeping a portion and sufficient numbers of hatchery-reared fish as future broodstock to establish a healthy broodstock pool based on sound genetic principles. Inland broodstock fishes are mostly obtained from rivers, creeks, and lakes. In addition, attention should be given to the potential impacts of inevitable domesticated escapees from hatcheries. More important, proper management should be in place to minimize the genetic drift of hatchery reared fish and, as far as stock enhancement and conservation is concerned, to secure the integrity of the wild stocks. To sum up, successful hatchery operations depend upon a number of closely interlinked factors among which:

- Economic feasibility,
- Production strategy,
- Site selection,
- Design of hatchery, including indoor and outdoor facilities,
- Soil and water characteristics,
- Hatchery equipment and facility maintenance,
- Water supply, water use (flow-through, partial reuse or recirculating systems), water treatment, and
- Fish health, genetic diversity and biosecurity.

6. A great deal of effort has been spent in developing better management practices, guidelines and policy framework for sustainable and responsible aquaculture at global, regional and national levels. In this context, as a non-binding international fisheries instrument, FAO Code of Conduct for Responsible Fisheries (1995) includes specific provisions for responsible aquaculture production:

- 9.3.3: States should, in order to minimize risks of disease transfer and other adverse effects on wild and cultured stocks, encourage adoption of appropriate practices in the genetic improvement of broodstocks, the introduction of non-native species, and in the production, sale and transport of eggs, larvae or fry, broodstock or other live materials. States should facilitate the preparation and implementation of appropriate national codes of practice and procedures to this effect.

- 9.3.4: States should promote the use of appropriate procedures for the selection of broodstock and the production of eggs, larvae and fry.
- 9.4.1: States should promote responsible aquaculture practices in support of rural communities, producer organizations and fish farmers.
- 9.4.2: States should promote active participation of fishfarmers and their communities in the development of responsible aquaculture management practices.
- 9.4.3: States should promote efforts which improve selection and use of appropriate feeds, feed additives and fertilizers, including manures.
- 9.4.4: States should promote effective farm and fish health management practices favouring hygienic measures and vaccines. Safe, effective and minimal use of therapeutants, hormones and drugs, antibiotics and other disease control chemicals should be ensured.
- 9.4.5: States should regulate the use of chemical inputs in aquaculture which are hazardous to human health and the environment.
- 9.4.6: States should require that the disposal of wastes such as offal, sludge, dead or diseased fish, excess veterinary drugs and other hazardous chemical inputs does not constitute a hazard to human health and the environment.
- 9.4.7: States should ensure the food safety of aquaculture products and promote efforts which maintain product quality and improve their value through particular care before and during harvesting and on-site processing and in storage and transport of the products.

7. Fish farmers in CAC region sell their fish at relatively acceptable prices despite many challenges are facing the aquaculture industry. In order to remain competitive, the fish farmers would need to have greater product variety and submit higher quality of fish and fish products and while employing modern production technologies and establishing sufficient gen pool and proper strategy for broodstock management. . To this end, considerable improvements in hatchery production need to be achieved while keeping up to date with the rapid technical improvements in aquaculture production and processing ranging from small family-operated farms to large-scale commercial farms. It is being widely reported that state aid to fisheries and aquaculture industry in CAC region is almost neglible or non-existent. There has been great debate at global level over the state aid to fisheries and subsidies in international fisheries trade. It is being observed that some countries are allocating more state aids, among others, to environmentally friendly construction and production technologies as well as fisheries research and development.

8. The Regional Workshop on Inland Fish Hatchery Management, which was held in Bishkek, Kyrgyz Republic, from 27 to 30 October 2014 as a scheduled activity of the TAC, discussed the status of inland fish hatchery management, including hatchery production in CACFish area. The Workshop identified the following key findings and challenges and made recommendations for a region-wide moving towards a more effective inland fish hatchery management and fish production:

Current situation

- The CACFish region, apart from Turkey, generally has poor modern hatchery operations management:
- The hatcheries in the region are generally small scale and also classification scale varies by countries;
- Most fish farms do not have infrastructure for managing broodstock, hatchery management, including larvae and fry production for supply to other farms/companies;
- Trout, carp and sturgeon are the main produced species;
- Hatcheries commonly employ intensive and semi-intensive culture systems;
- Despite the potential, coregonid fish production are not utilized (or are utilized in small amounts, e.g. in the Kyrgyz Republic, (some two million larvae) at hatcheries in the CACFish area;

- Polyculture hatchery production is limited;
- Lack of national polices, strategies and plans for hatcheries;
- Lack of monitoring and evaluation of programs;
- Lack of individual hatchery programs/plans;
- Little attention is given to environmental management (site selection, EIA; sustainable water use; water release from hatcheries, etc.);
- Little consideration is given to the genetic management in hatchery production cycle (renewing broodstock through wild broodstock fishing; establishment of sufficient gene pool for effective broodstock management; assessment of risks of inbreeding and domestication under the hatchery production, etc.)
- Inadequate use of disease-free fish eggs during eggs incubation in hatcheries, disease prevention;
- Limited use of hatcheries for restocking the exhausted wild fish populations ;
- Water is generally is not treated (cleaned) at the hatcheries before it is discharged into the aquatic environment;
- There is insufficient networking between farmers, traders, associations and decision-makers;
- Limited local expertise is used in design, planning and management of hatcheries

Problems or challenges

The workshop identified the following major hatchery problems or challenges:

- Lack of reliable fish eggs supply for hatchery production;
- Broodstock management and use of wild fish for partial replacement of hatchery broodstock missing;
- Documentation and record keeping of fish brought into hatcheries and used for production;
- Fish feed supply;
- Robust polices/plans for effective use of hatcheries for broodstock enhancement;
- Environment, biosecurity and health management;
- Water quality management;
- Use of certified, healthy fish seed;
- Disease prevention and management;
- Competition between various water consumers;
- Shipment of eggs and fish seed;
- Compliance with relevant legislation, regulations, rules and licensing conditions;
- Improvement of feasibility;
- Governmental aid to fisheries and aquaculture;
- Access to export markets;
- Promotion of better management practices for hatchery operations; and
- Development of hatchery operation protocols.

Recommendations

- Modern technology transfer to inland hatcheries;
- Promotion of modern technologies for propagation, fish production and environment protection;

- Promotion of modern disease testing techniques and certification of quality of fish seed reared in hatcheries ;
- Genetics and risk assessment for restocking;
- Promotion of recirculating aquaculture systems;
- Improvement of hatchery operations efficiency;
- Reduction of stocking risks to natural populations;
- Promotion of better hatchery management practices;
- Guiding principles for hatchery management;
- Development and implementation of hatchery operation standards, guidelines and reports;
- Genetic assessment should be a part of any broodstock management, enhancement/replacement plan;
- Studies on fish biology and production of new freshwater fish species in hatcheries, and their requirements under controlled conditions;
- Application of modern reproduction methods in inland hatcheries;
- Development and implementation of national and/or international programmes;
- Training of managers and farmers on hatchery issues and operation practices;
- Thematic trainings on fish rearing, larvae growing, live food production, reproduction methods, recirculating systems, different reproduction methods, fish disease management and prevention;
- Water quality analysis and management;
- Inventory status of inland hatcheries in the CACFish region; and
- Establishment and development of cooperation systems between research institutes, hatcheries, experts and managers for sustainable hatchery management.

9. Although global aquaculture production has undergone a remarkable increase over the past few decades, the use of modern techniques to increase fish production and improve the quality of cultured fish has not been extensively applied in the CACFish area, mainly because of technical and financial restrictions, but also due to the lack of sound national policies for the exploitation, protection and conservation of aquatic genetic resources. The CACFish area has great potential for the aquaculture development, the success of which depends, inter alia, upon the hatchery operations. Increased research and development capacity will certainly contribute to increased and sustainable fisheries and aquaculture development. Priorities for hatchery production and management may focus on increased and more feasible environment-friendly production technologies; production and marketing strategies; diversification of the farmed species; hatchery as an instrument for conservation of threatened and endangered fish species; sound management practices of stocking of hatchery-reared fish into natural waters with careful follow-up and monitoring of results; public health and biosafety; and fish welfare issues. The fisheries and aquaculture industries in CAC region may witnesses an increased production in future if an initial rapid technological shift occurs in parallel with creation of enabling conditions, including institutional and technical capacities, and incentives for sustainable aquaculture. Short-term attention should focus on reliable supply of high quality fish seed and feed as well as improvement of production by gradually filling technology gaps. Another area requiring close attention is setting up licensing conditions for fish farming and monitoring of compliance with respective laws, regulations, rules, other regulatory requirements.

SUGGESTED ACTION BY TAC

10. Hatchery management is a critical aspect of aquaculture production, stock enhancement and conservation of fish species. Seemly, both in the CACFish Area and in wider CAC region hatchery management operations requires to be accompanied by improvements in technology, policy frameworks and research. Acquainted with the essential skills, technical know-how and better

management practices, hatchery managers and decision-makers should comprehensively address critical issues of relevance to hatchery management.

11. Against the background outlined above, TAC would have a role in development of a scientific/technical hatchery management framework that can be applied in the CACFish area, taking into consideration regional needs, challenges and future challenges outlined above. In this context, TAC may, for example, develop regional principles, guidelines and recommendations for hatchery management plans and regulatory frameworks aiming at promoting good practice on sustainable hatchery management and operations.