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**CENTRAL ASIAN AND CAUCASUS REGIONAL
FISHERIES AND AQUACULTURE COMMISSION**

Seventh Session

**11-13 October 2021
Istanbul, Turkey**

**REPORT OF THE FIFTH MEETING OF THE TECHNICAL ADVISORY
COMMITTEE,
VIRTUAL MEETING, 23–24 NOVEMBER 2020**



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**CENTRAL ASIAN AND CAUCASUS REGIONAL FISHERIES AND
AQUACULTURE COMMISSION**

Report of the

**FIFTH MEETING OF THE TECHNICAL ADVISORY COMMITTEE OF THE
CENTRAL ASIAN AND CAUCASUS REGIONAL FISHERIES AND AQUACULTURE
COMMISSION**

Virtual Meeting, 23–24 November 2020

CENTRAL ASIAN AND CAUCASUS REGIONAL FISHERIES AND AQUACULTURE COMMISSION

Report of the

FIFTH MEETING OF THE TECHNICAL ADVISORY COMMITTEE OF THE CENTRAL ASIAN AND
CAUCASUS REGIONAL FISHERIES AND AQUACULTURE COMMISSION.

Virtual Meeting, 23–24 November 2020

PREPARATION OF THIS DOCUMENT

This is the final version of the report as approved by the Fifth Meeting of the Technical Advisory Committee of the Central Asian and Caucasus Regional Fisheries and Aquaculture Commission (CACFish), which was held virtually from 23 to 24 November 2020. The report was prepared by the CACFish Secretariat. The material in the appendixes is reproduced as submitted.

FAO. 2021.

Report of the Fifth Meeting of the Technical Advisory Committee of the Central Asian and Caucasus Regional Fisheries and Aquaculture Commission. Virtual Meeting, 23-24 November 2020. FAO Fisheries and Aquaculture Report No. 1334. Ankara. 79 pp.

ABSTRACT

The Fifth Meeting of the Technical Advisory Committee (TAC) was held virtually from 23 to 24 November 2020. The meeting was attended by participants from three of the Central Asian and Caucasus Regional Fisheries and Aquaculture Commission (CACFish) member countries, namely, Azerbaijan, Kyrgyzstan, and Turkey. The following invited countries were present at the Meeting: Georgia, Kazakhstan, Turkmenistan, Ukraine and Uzbekistan. The meeting comprised 52 participants. The TAC discussed scientific recommendations on the following issues of relevance to CACFish: (i) Aquatic genetic resources; (ii) restocking and culture-based fisheries; and (iii) Post-harvest market measures, rules, and standards for safe, quality fish and fish products. The Meeting noted that limited progress had been made with respect to the delivery of the Second Five-year Regional Work Programme (2016–2020). The TAC also reviewed the Third Five-year Regional Work Programme for 2021–2025. The Committee agreed to abolish, subject to approval of the Commission, the RWP with a view that: (i) a weak, dysfunctional programme creates a negative perception for the Commission; and (ii) the possibility of finding external donor funding for the programme has been particularly difficult as a result of the COVID-19 crisis. The Committee agreed on its work plan for 2021–2022 intersessional period. The TAC described the involvement of non-CACFish Member States in the work plan activities as essential to sustainability and catalysing regional cooperation.

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OPENING OF THE MEETING

1. The Fifth Meeting of the Technical Advisory Committee (TAC) was held virtually from 23 to 24 November 2020. The meeting was attended by participants from three of the Central Asian and Caucasus Regional Fisheries and Aquaculture Commission (CACFish) member countries, namely, Azerbaijan, Kyrgyzstan, and Turkey. The following invited countries were present at the Meeting: Five countries were invited to attend the meeting: Georgia, Kazakhstan, Turkmenistan, Ukraine and Uzbekistan. The meeting comprised 52 participants. A list of participants is presented in Appendix 2.
2. In the absence of Chair (Armenia), the vice-chair of the TAC, Turkey, represented by Mahir Kanyilmaz, opened the meeting. He introduced himself and welcomed the participants. Referring to the significant impact COVID-19 had had on daily life, society and business, he acknowledged the efforts that had been made to keep the Commission operational by holding virtual meetings and events. He thanked the CACFish Secretariat for preparing and making the meeting documentation available online. He extended his thanks to the participants for their attendance.
3. Haydar Fersoy, CACFish Secretary, extended a cordial welcome to the participants and expressed his pleasure to be back with the Commission. He noted that the previous TAC meetings generally took place over the course of three days, but due to the COVID-19 pandemic, the Commission had changed the format of the meeting to fit into a two half-day virtual event.

ADOPTION OF THE AGENDA

4. The Committee adopted the agenda without changes. The agenda is presented in Appendix 1.
5. The list of documents placed before the meeting is presented in Appendix 3.

UPDATES ON DECISIONS, INTERNATIONAL AND REGIONAL ACTIVITIES

Main decisions and recommendations of the respective FAO fisheries governing bodies and CACFish

6. Nabil Gangi, FAO Deputy Regional Representative for Europe and Central Asia, and Secretary of the Regional Conference for Europe (ERC) briefed the meeting on the main decisions and recommendations arising from the Thirty-second and Thirty-first Sessions of the FAO Regional Conference which were held virtually between 2-4 November 2020, and in Voronezh, Russian Federation on 16-18 May 2018, respectively. He specifically presented information related to fisheries and aquaculture. The Meeting noted that after reviewing the report of the 6th Session of CACFish, the ERC had: a) discussed work priorities for fisheries and aquaculture development in the CACFish area of competence, their alignment to achieving the universal SDG goals and the FAO Regional Initiatives, and the need to consider the priorities at the Seventh Session of CACFish to be held in Tajikistan in May 2021, and b) encouraged relevant Members of the ERC, and particularly those from Central Asia and the Caucasus to announce their intentions to join the Commission.
7. The meeting was briefed on the main decisions and recommendations from the Thirty-third Session of the Committee on Fisheries (COFI) held in Rome between 9-12 July 2018. The Meeting noted that at the Tenth Session of the COFI Sub-Committee on Aquaculture (SCA), held in Trondheim, Norway between 23–27 August 2019, Turkey was elected as the first Vice-chair for the Eleventh Session of SCA (2021), and reiterated its offer to host the Twelfth Session of the Sub-Committee to be held in 2023.
8. The Committee reiterated the importance and relevance of regular attendance of the Central Asian and Caucasus States at COFI events and its subcommittees. In this regard, attention was drawn to the Thirty-

fourth Session of COFI which was scheduled to take place in Rome, Italy from 13–17 July 2020, but has been postponed until 1–5 February 2021 due to the COVID-19 pandemic.

9. An update on the main decisions and recommendations taken by CACFish at its Sixth Session held in Izmir, Turkey on 15–18 October 2018 was provided.

Activities and outputs of regional fisheries projects

10. The Secretariat briefed the Meeting on the status and key outputs of FAO regional fisheries and aquaculture projects that are being implemented in the CACFish competence area, namely: (i) “Capacity Building for Sustainable Fisheries and Aquaculture Management in Central Asia – FISHCap” and (ii) “Improved technical capacity of fish farmers and authorities on fish feed development in Central Asia”. The Meeting noted that the Global Environment Facility (GEF) had endorsed financial support to the FAO Project “Fisheries and Ecosystem Based Management for the Black Sea” which is expected to be operational in 2021.

Technical documents published and/or in press

11. The meeting noted the technical documents prepared and/or jointly published by the Commission as FAO Publications since the Fourth Meeting of the Committee, which included 1 manual, 1 technical report, and 2 guides.

DISCUSSION AND ENDORSEMENT OF TECHNICAL AND SCIENTIFIC ADVICE TO THE COMMISSION

Fish genetics resources-practical training on molecular methods

12. Sirin Firidin from the Trabzon Central Institute for Fisheries, Turkey, briefed the Meeting about the Regional training on Fish Genetics Resources-Practical Training on Molecular Methods, which was held in Trabzon, Turkey from 19–22 March 2019. The Meeting took note that theoretical and practical laboratory training sessions had been used to teach the use of modern molecular genetic technologies in aquaculture. The Meeting further noted that the training constituted a part of Commission’s work directed towards the conservation and management of aquatic genetic resources. In this regard, the Meeting was presented with the key findings and recommendations of the Regional Expert Meeting on Conservation and Management of Fish Genetic Resources, which was held in Trabzon, Turkey from 2–4 May 2017.
13. The Meeting noted that the participants to the workshop comprised managers or executives from the national fisheries organizations who had no background in molecular fish genetics. In this regard, the Committee highlighted the importance for countries to nominate attendees with appropriate fields of expertise.
14. The meeting was reminded of Turkey’s proposal made at the Fourth Session of the Commission (2015) concerning the use of the National Fisheries Gene Bank. The gene bank has been established at the Trabzon Central Institute for Fisheries (Turkey), and is expected to be operational in 2021. It has been designed to benefit the Central Asian and Caucasus region.
15. At the Meeting, Turkey further offered technical collaboration in the following areas: (i) aquaculture development in the Central Asian and Caucasus countries; and (ii) the development of sturgeon farming, including broodstock and hatchery management.
16. The Committee welcomed the opportunity to conduct studies to identify, maintain and conserve aquatic genetic resources in the Central Asian and Caucasus region. FAO and Turkey could provide technical

support and collaborate with the respective countries in the region. Several participants expressed an interest in working collaboratively. The Secretariat was asked to work closely with Turkey to develop a joint initiative with the National Gene Bank. The Regional Expert Meeting highlighted the need to strengthen regional technical capacity for research and the characterisation of aquatic genetic resources through trainings, researcher exchanges, protocol and manual development, joint laboratory and field studies, and the promotion of advanced genetic technologies.

17. The Meeting noted that: (i) FAO's first report on the State of the World's Aquatic Genetic Resources for Food and Agriculture was launched in 2019; (ii) the Commission on Genetic Resources for Food and Agriculture, in 2019, asked FAO to prepare a draft Global Plan of Action for Aquatic Genetic Resources, which will be prepared in consultation with the regions and in collaboration with the Committee on Fisheries (COFI); and (iii) FAO Regional Workshop on "Development of A Global Information System For Farmed Types of Aquatic Genetic Resources (incorporating a review of strategic priorities for a Global Plan of Action) for Europe and Central Asia was held between 5 to 8 October and 15 October 2020.

Provision of technical advice on restocking and culture-based fisheries (CBF)

18. The Secretariat introduced a working document CACFish/TAC5/2020/3, reflecting the key outcomes of the Regional Training Workshop on the Provision of Technical Advice on Restocking and Culture-based Fisheries, which was held in Bishkek, Kyrgyzstan from 11–13 June 2019.
19. The Meeting noted the key outcomes of the workshop-technical and socio-economic considerations for the development, implementation and monitoring of restocking and CBF programmes; recommendations; and proposed actions. The workshop outcomes are presented in Appendix 4.
20. The Meeting further noted that: (i) although restocking and culture-based fisheries have been adopted by fisheries management regimes throughout the world, in most cases, the efficacy of these practices have not been properly evaluated. The lack of evaluation is due to poor or the irregular monitoring and assessment of technical, ecological, biological, and socio-economic factors, and (ii) a scientific practical approach is a key success factor driving change, and (iii) not all types of water bodies in the Central Asian and Caucasus region can support fisheries, and thus culture-based fisheries can only be used as a strategic management tool in selected water bodies.
21. Following the introduction provided by the CACFish Secretariat, the Vice Chair initiated a general discussion on restocking and culture-based fisheries. However, the Meeting did not witness any interventions by the participants.

Post-harvest market measures, rules, and standards for safe, quality fish and fish products

22. The Secretariat briefed the meeting of the main outcomes and recommendations of the CACFish Regional Workshop on Post-harvest market measures, rules, and standards for safe, quality fish and fish products, held in Istanbul, Turkey between 12–13 November 2019. The workshop addressed a range of pressing issues facing the post-harvest sector. The workshop presentations, which were delivered by experts of FAO, EUROFISH, the Norwegian Ministry of Trade, Industry and Fisheries, and UNCTAD, included the following topics: (i) quality assurance and food safety regulations; (ii) transport and HACCP processing standards; (iii) traceability; (iv) certification; (v) marketing and international trade regulations, and (vi) climate impacts on the post-harvest sector. The workshop also included country presentations by Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkey and Uzbekistan. The Meeting noted that a SWOT analyses of the post-harvest sector in these countries indicated: (i) post-harvest management practices vary between the

countries, and (ii) improved management and food safety during post-harvest and processing would add considerable value to the national fisheries/aquaculture sectors.

23. The Meeting noted the following key recommendations from the workshop:

- Increase the production of high value commercial fish species.
- Strengthen the legal frameworks to ensure hygienic fish production and increase the potential to produce large volumes of fish.
- Assist in the sustainable development of the aquaculture industry, especially Cyprinids and other freshwater fish.
- Introduce modern technologies and equipment to support aquaculture development.
- Train specialists to increase access the international markets, and to monitor fish farms.
- Promote international cooperation on food safety within the private sector and at a government level.

24. The Meeting took note of the following issues related to improving post-harvest outcomes in the fisheries and aquaculture sectors in the Central Asian and Caucasus region:

- Increase technical capacity and interest in the culture and production of high-value commercial fish and fish products.
- Create a favourable environment for the development of the fish processing sector.
- Most of countries need to strengthen their legislation to ensure the safety of fish and fish products through the use of appropriate hygiene protocols, laboratory analysis, and marketing.
- Trade of fish and fish products plays an essential role in boosting fish consumption and achieving global food security by connecting producers with distant markets for which local supplies may be insufficient.
- Increase regional fish consumption.
- The Eurasian Economic Union (EAEU) provides for free movement of goods, services, capital and labour in the region.

25. The Meeting did not hold a technical discussion following the general discussion mediated by the Vice Chair.

STATUS AND FUTURE DIRECTION OF THE SECOND FIVE-YEAR REGIONAL WORK PROGRAMME (2016-2020), INCLUDING A REVIEW OF THE COMMISSION'S DRAFT THIRD FIVE-YEAR REGIONAL WORK PROGRAMME (2021–2025)

26. The CACFish Secretary briefly summarized the progress with the Second Five-year Regional Work Programme (2016–2020), referring to the background paper CACFish/TAC5/2020/4. The Meeting noted that limited progress had been made with respect to the delivery of the RWP2 activities. This was primarily due to budget limitations. The Secretary provided a comparative overview of the implementation status and challenges with respect to the First (2010–2015) and Second Five-year Work Programmes of the Commission. The meeting noted that the first Five-year Work Programme of the Commission (RWP) had not realised the anticipated impacts since its inception in 2010. He stressed that the first RWP in particular was too ambitious and could not be achieved – an issue that influenced the scope and indicative budget of the second RWP. The major factors identified as contributing to the weak collective impact of the two RWPs were noted as follows: (i) the RWP relies too heavily on external financial resources; (ii) its dependence on external inputs from regional FAO programmes/projects, and (iii) allocation of insufficient

budget from the CACFish autonomous budget due to an increased accumulation of member states payment arrears.

27. Secretariat introduced the Third Five-year Regional Work Programme for 2021–2025 (RWP3) (Appendix 5), drafted by the CACFish Secretariat and building on the RWP2. The secretariat invited the Committee to review the RWP3. The Vice-Chair led a discussion on future of the RWP, suggesting that the Committee consider two options as noted by the background paper: (i) continuation of the programme for an additional five-year term (i.e. adoption of the Third Five-Year Work Programme of the Commission; RWP3), or (ii) abolish the programme. Following discussions, the Committee agreed to abolish, subject to approval of the Commission, the RWP with a view that: (i) a weak, dysfunctional programme creates a negative perception for the Commission; and (ii) the possibility of finding external donor funding for the programme has been particularly difficult as a result of the COVID-19 crisis.

INTERSESSIONAL WORK PROGRAMME FOR 2021–2022

28. The TAC took the note of the intersessional work programme activities conducted after the fourth meeting of the TAC (November 2017). These comprised:
- Regional training on best practices for cage culture in reservoirs and lakes (5–8 December 2017; Elazig, Turkey),
 - Fish Genetics Resources - Practical Training on Molecular Methods (19–22 March 2019; Trabzon, Turkey),
 - Regional Workshop - Provision of Technical Advice on Restocking and Culture Based Fisheries (11–13 June 2019; Bishkek, Kyrgyzstan), and,
 - Regional Workshop - Post-harvest market measures, rules, and standards for ensuring safety and the quality of fish and fish products in Central Asian and Caucasus countries (11–13 November 2019; Istanbul, Turkey).
29. The Meeting noted that the activity “Inland stock assessment in selected large water bodies”, scheduled for May 2020, was not delivered due to the COVID-19 pandemic.
30. The draft programme of work proposed by the CACFish Secretariat for the next intersessional period received strong support from the Committee, resulting in vivid technical discussions. A proposal for technical assistance for the artificial propagation of sturgeon came from Turkey, which was supported by the Committee, as part of a practical training activity.
31. The Committee highlighted that each TAC activity/event generally had its own specific target audience. In this regard, the Committee noted that the participants to the “Fish Genetics Resources-Practical Training on Molecular Methods (19–22 March 2019; Trabzon, Turkey) had no previous background in fish genetics, and were poorly qualified in terms of benefitting from the training. The Committee asked the CACFish Secretariat to pay attention to the participant nominations issue, and ensure that in future, appropriately qualified participants were selected from the participating countries.
32. The Committee agreed on the following work plan for 2021–2022 intersessional period:

Activity	Year	Estimated budget (USD)	Location
i) Regional workshop on inland stock assessment in selected large water bodies	2021	40 000	Tajikistan
ii) Regional workshop on ecosystem-based planning and management of fishery and aquaculture resources	2021	35 000	TBD
iii) Identification of fish genetic resources from Central Asia and Caucasus (A desk, field and laboratory study)	2021–2022	50 000	N/A
iv) Bio-economic and management approaches to CBF development (A modelling and field study)	2021–2022	40 000	TBD
v) Regional synthesis - gender in fisheries (A desk and field study)	202–2022	35 000	TBD
vi) Ad-hoc training for artificial propagation of sturgeon	2021–2022	15 000	Turkey
vii) Sixth Meeting of the TAC	November 2022	35 000	TBD

33. The TAC recognized that a prolonged COVID-19 situation in the region would require a shift in the working mode of the Committee during the intersessional period (2021–2022). There was a common agreement to conduct several webinar activities as part of the agreed work plan. The TAC described the involvement of non-CACFish Member States in the work plan activities as essential to sustainability and catalysing regional cooperation.

OTHER MATTERS

34. The Meeting did not discuss any other business.

DATE AND PLACE OF THE NEXT MEETING

35. The TAC agreed to organize its sixth meeting in November 2022. The place of the meeting will be determined at a later date.

ON-GOING OR SCHEDULED REGIONAL ACTIVITIES (RESEARCH PROJECTS, PROGRAMMES, CONFERENCES, WORKSHOPS, EVENTS) OF RELEVANCE TO TAC (VERBAL REPORT BY PARTICIPATING STATES)

36. Based on the Country Reports, provided in Appendix 6, the Meeting was presented with summary briefs on country-wide activities, challenges and priorities. The Meeting noted that the COVID-19 pandemic made it difficult to undertake the national projects and programmes at the pre-pandemic levels, and that the fishery and aquaculture industries had been severely impacted by the pandemic. The Meeting heard some examples of recently completed or on-going work on legislative, strategic and policy regulations, and sectoral

planning. The Committee noted with appreciation that internal consultative decision-making processes are underway for Uzbekistan to become a party to the Commission.

ADOPTION OF THE REPORT

37. The Meeting was informed that the Commission had previously given its approval for the adoption of the report within 15 days after the virtual meeting. The report, including appendices, was adopted on 7 December 2020, after its circulation to the non-member participating countries for its review and to Member States for its review and subsequent approval.

Agenda

23 November 2020

- 09.30-12.00
(*Ankara time*)
1. Opening of the Meeting
 2. Adoption of the agenda
 3. Updates on
 - Main decisions and recommendations of respective FAO fisheries governing bodies and CACFish (*working document: CACFish/TACV/2020/2*)
 - Activities and outputs of regional fisheries projects
 - Technical documents published and/or in press
 4. Discussion and endorsement of technical and scientific advice to the Commission (*working document: CACFish/TACV/2020/3*)
 - Fish genetics resources-practical training on molecular methods
 - Provision of technical advice on restocking and culture-based fisheries
 - Post-harvest market measures, rules, and standards for safe and quality fish and fish products

24 November 2020

- 09.30-12.00
(*Ankara time*)
5. Status and Future Direction of the Second Five-year Regional Work Programme (2016-2020), including review of Commission's draft Third Five-year Regional Work Programme (2021-2025) (*working document: CACFish/TACV/2020/4*)
 6. Intersessional Work Plan for 2021-2022 for consideration of CACFish
 7. On-going or scheduled regional activities (research projects, programmes, conferences, workshops, events) of relevance to TAC (verbal report by participating States)
 8. Any other matters
 9. Date and place of next TAC meeting
 10. Adoption of the report

APPENDIX 2**List of participants****AZERBAIJAN**

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APPENDIX 3**List of documents****Working documents**

CACFish:TAC5/2020/1	Provisional agenda of the Fifth Meeting
CACFish:TAC5/2020/2	Main decisions and recommendations of respective FAO fisheries governing bodies and CACFish
CACFish:TAC5/2020/3	Restocking and culture-based fishery
CACFish:TAC5/2020/4	Status and future direction of the Second Five-Year Regional Work Programme (2016–2020)

Information documents

CACFish:TAC5/2020/Inf.1	Provisional list of documents
CACFish:TAC5/2020/Inf.2	Provisional list of participants

Reference documents

CACFish:TAC5/2020/Ref.1	Report of the Thirty-third Session of the Committee on Fisheries, Rome, Italy 9–13 July 2018
CACFish:TAC5/2020/Ref.2	Report of Thirty-first Session of the FAO Regional Conference for Europe, Voronezh, Russian Federation 16–18 May 2018
CACFish:TAC5/2020/Ref.3	Report of the Sixth Session of CACFish, 15 to 18 October 2018 Izmir, Turkey
CACFish:TAC5/2020/Ref.4	Report of the Fourth Meeting of the Technical Advisory Committee of the Central Asian and Caucasus Regional Fisheries and Aquaculture Commission, Tbilisi, Georgia, 28–30 November 2017
CACFish:TAC5/2020/Ref.5	Second Five-year Regional Work Programme of CACFish (2016-2020)

APPENDIX 4**OUTCOMES OF THE REGIONAL TRAINING WORKSHOP ON THE PROVISION OF TECHNICAL ADVICE ON RESTOCKING AND CULTURE-BASED FISHERIES**

As part of the 2016-18 CACFish Programme of Work, a Regional Training Workshop on the Provision of Technical Advice on Restocking and Culture-Based Fisheries was held in Bishkek, Kyrgyzstan on 11-13 June 2019. It was attended by 40 participants from the following countries: Armenia, Azerbaijan, Georgia, Kyrgyzstan, Kazakhstan, Tajikistan, Turkey, Turkmenistan, Russian Federation, Ukraine, and Uzbekistan. The Interstate Commission for Water Coordination of Central Asia (ICWC) was invited to the workshop. Respective experiences of FAO Project “Towards Sustainable Aquaculture and Fisheries Development in the Kyrgyz Republic (GCP/KYR/012/FIN) was shared at the meeting.

- 1) The main objectives of the regional workshop on CBF were to:
 - Review the current situation of member’s and invited country’s stocking activities,
 - Exchange experiences among the participants regarding the main criteria for fish stocking and developing culture-based fisheries,
 - Underline the contribution of stocking to recreational fisheries/sport fishing, and
 - Identify/address related problems and provide recommendations for future consideration and implementation when stocking fish in the CACFish competence area.

- 2) The topics discussed were supported and complemented with case studies and country reviews. Case studies and country presentations drew further attention towards existing bottlenecks, experienced problems, and feasible solutions in the CACFish region. The following case studies were presented at the workshop:
 - The ecological state of the water bodies of the Aral Sea basin and the impact of their fish productivity on transboundary watercourses’,
 - Restocking and recovery of the sturgeon population in Turkey,
 - Towards sustainable aquaculture and fisheries development in the Kyrgyz Republic, and
 - Empirical models for predicting fish yields in the waterbodies of the Kyrgyz Republic.

- 3) The workshop also included presentations of country reviews (Armenia, Azerbaijan, Kyrgyzstan, Tajikistan, Turkey, Georgia, Kazakhstan, Ukraine, Uzbekistan and the Russian Federation) on the status of restocking and CBF applications.

- 4) The workshop took note of the following key issues:
 - The rationale, techniques developed and options/measures for Inland Fisheries Enhancement (IFE),
 - Species selection criteria, factors for stocking success, and the environmental risks of stocking,
 - The characteristics of water bodies and their impact on fisheries production,
 - Trophic level (water productivity),
 - Effects of age and stocking season on restocking,

- Control of untargeted fish species and the control/elimination of invasive species, and
- Contribution of fish stocking to inland fisheries development and regional income diversification.

5) The Meeting identified the following major challenges:

It is especially important to take into consideration the fact that not all types of water bodies can equally support fisheries. Some water bodies in the CACFish coverage area and in other invited participating countries have marginal potential, or would be completely unable to support sustainable fisheries. The reasons for their limited development potential were summarized as follows:

- Unfavourable hydro-climatic conditions that negatively impact river discharge patterns. Unpredictable annual and seasonal fluctuations in water levels and reductions in flood plain areas reduce the chances for productive natural spawning,
- Flash floods are common in the region, and runoff in all sections of rivers wash out fish populations and temporarily destroy the natural food sources for the fish, and
- Water-borne industrial pollution and the salinization of reservoirs and rivers associated with irrigation systems are common problems found across the Central Asian region.
- There are many water reservoirs in the region. These are artificially formed water bodies that fundamentally change riverine aquatic ecosystems. The creation and maintenance of sustainable fisheries in a water reservoir depends on its primary use. Water reservoirs built for generating hydropower, accumulating rain, surface or underground waters require diverse water management systems. It is important to note that the fisheries potential of a reservoir is dependent on its primary use (power generation, irrigation, agriculture, etc.), the water supply, and the water level management system.
- The region has extensive irrigation networks. The contribution that irrigation canals can provide to fisheries production depends on their size, the carrying capacity of the water body, and seasonality.
- In addition to the hydrological suitability of the different water bodies for fisheries development, there are also technical, ecological, economic and social considerations and preconditions, which when combined, determine how CBF should be planned, implemented and evaluated.

6) The Meeting suggested the following actions and research priorities:

- The consolidated conclusion of the workshop was that the development of fish stocking and CBF programmes presents complex challenges, especially with respect to the ever-increasing demand and hence competition for shrinking water resources, due in part to climate change.
- Presentations/discussions highlighted the importance of:
 - The use of clear terms and technical definitions, understood uniformly by all concerned and effected stakeholders,
 - Gathering sufficient physical, chemical, biological, economic and social information on water bodies where CBF will be introduced or enhanced,
 - Establishing systematic decision-making processes to include the standardisation of procedures for setting objective goals, and estimating the positive and negative impacts of proposed fisheries enhancement interventions for a given water body, and

- Addressing and developing recommendations to mitigate the negative impacts of anthropogenic activities on water resources. This is a key issue that should be viewed as a standard procedure when considering interventions to enhance inland fisheries.

7) Conclusions of the workshop were as follows:

- Stocking fish is one of the most important CBF actions, and represents a complex multidisciplinary process that takes into consideration environmental, ecological and socio-economic factors. The linkages between these disciplines should be considered when developing CBF systems, setting stocking rates, and establishing fisheries management objectives. The definitions used CBF systems are presented in Box 1.

Box 1: Definitions used in Culture Based Fisheries

Conservation – To maintain genetic diversity – usually to conserve endangered species or stocks.

Compensation – To provide for a phase in the life cycle that has been suppressed by human interventions such that the fish population would disappear without restocking.

Enhancement – To maintain the fish stocks above a level that would be naturally sustained in the presence of heavy exploitation.

Environmental improvement – To introduce a fish species that is expected to favourably modify the system.

Forage species – To provide a prey species to enhance the production of angling or commercially exploited species.

Increase diversity – To supplement the range of species available in a fishery.

Maintenance – To sustain stocks despite environmental or fishing pressures that prevent the fish population reaching the natural carrying capacity of the system.

Niche filling – To provide stocks to utilize a trophic or spatial resource which is perceived as unexploited.

Pest control – To provide a fish species to control flora or fauna perceived as unfavourable to man.

Put-and-take – To provide catchable-sized fish for rapid exploitation by anglers (requires minimal environmental input).

Put-grow-and-take: To provide fish that must first grow to a catchable size before being exploited by anglers (requires limited environmental input).

Re-population – Establishment of a stock of fish in waters from which it has previously been eliminated.

- The workshop presentations embraced all the important aspects related to CBF:
 - Rationale, techniques, and options/measures for IFE implementation.
 - Species selection criteria, influencing factors for stocking success, and the environmental risks of stocking:
 - Types, utilization and qualities of a water bodies and their capacity to support fisheries,
 - Trophic level (water productivity),
 - Effect of age and stocking season on stocking success, and

- Control of untargeted fish species and the control/elimination of invasive fish species.
- The contribution of fish stocking to inland fisheries development and regional income diversification.

Technical and ecological aspects

- The climate and thermal characteristics/conditions of a water body determines the range of fish species that can be supported and the productivity of the fishery.
- Two chemical characteristics of surface waters, halobity and saprobity can be used to estimate fisheries productivity. Of these, both salinization and the over-enrichment of waters with decaying organic materials are common problems that reduce productivity.
- In order to develop a stocking plan (e.g. fish species, and stocking rates) for a water body, a Trophic Level Assessment (TLA) to characterize the productivity of water body, the existing food web and fish fauna should be undertaken. The assessment should be used to inform the stocking plan. In the absence of a TLA, it is not possible to develop an ecologically sustainable CBF management plan.
- To maintain the genetic diversity of a native fish strain in a large water body or river system, the stocked larvae/fry/fingerlings should be the progeny of locally captured brood fish.
- In natural lakes, the range of fish species that are stocked should be limited to those that are endemic. Historical practices that involved the introduction of new species or the use of genetic variants of existing species is not recommended.

Economic and social aspects

- The primary use of a water body (hydropower generation, irrigation, industrial, communal and drinking water supply, bathing, commercial and recreational fisheries) restricts the type and intensity of CBF.
- The location of a water body, or more precisely its vicinity to or remoteness from settlements limits its potential for fishery development and exploitation. Remote fishing areas are often difficult to access, and are often poorly served by public transport networks (e.g. roads, busses).
- A lack of fish seed supply, the distance to seed supplies, and access to high quality seed are commonly reported constraints to the development of CBF.
- The close vicinity of human settlements (village, town or city) to CBF sites presents an increased risk for illegal, unregulated and unreported (IUU) fishing. Solutions to the IUU fishing issue is the development of community-based fisheries management and fisheries co-management systems.
- Skilled, experienced specialists and field staff trained in CBF management are limited, as are the training opportunities for CBF at higher and vocational education establishments. The lack of a knowledge base and technical capacity in many countries limits the capacity to develop CBF programmes.
- CBF can significantly increase employment (positions such as warden, seasonal workers, etc.) and generate fishing tourism in areas and regions where living standards are usually low due to high levels of unemployment and limited work opportunities.

- Government support to CBF initiatives is often limited. For example, poor legislative and regulatory frameworks; problematic processes for privatizing/leasing water bodies; poor coordination with other ministries; inadequate research and teaching institutions. When state or local government ownership rights of a water body are leased out, the leases should be granted on approval of sustainable management (e.g. stocking, fishing, monitoring etc.) and business plans.
- The introduction and adaptation of action plans, techniques and practices from other regions or countries should take into consideration national and local experiences and traditions.

8) Recommendations of the workshop

- The consolidated conclusion of the workshop was that the development of CBF pose complex challenges, and most notably, with respect to the impacts of climate change and the increasing demand and competition for the shrinking water resources in the region. The presentations/discussions highlighted the importance of:
 - Using clear terms and technical definitions, understood uniformly by all levels of concerned and affected parties;
 - The need to gather sufficient physical, chemical, biological, economic and social data to optimise fisheries planning, and to ensure the adoption of appropriate CBF models;
 - The need to establish standardised systematic decision-making processes for objectively setting goals and estimating the positive and negative impacts of a planned fisheries intervention on a given water body;
 - The need to develop effective mitigation measures to address anthropogenic impacts water resources (qualitative and quantitative impacts). Mitigating these key impacts should be a viewed as a standard element in the design of enhanced inland fisheries systems.
- It was concluded that there are many factors that limit the development of CBF in the region. Though there are significant areas of inland waters in the CACFish region of competence, not all of the water bodies are suitable for CBF development. It is important to determine, which water bodies are suitable for CBF development, and at each locale, establish the most suitable development model e.g. commercial or recreational fisheries or combinations thereof.
- It was recommended that an inventory of water bodies suitable for CBF should be developed. The water bodies should be classified in terms of their CBF potential, and guidance should be provided on how they could most effectively be developed. This would include a uniform classification of water bodies, development options, and actionable roadmaps to assist decision makers, field professionals and local communities. Development options for small water bodies should be grouped according to their climate, physio-chemical and biological characteristics. Larger transboundary water bodies, or those with unique characteristics will require individual development plans that address the specific characteristics of the waterbody. Improved planning and implementation protocols for CBF whilst assisting decision makers and field personnel, will also improve the social acceptance and improve the public awareness of the interventions.
- The restocking programmes that are required under CBF require a supply of fish seed (larvae, advanced fry and fingerlings). While stocking options include eggs, larvae, advanced fry and fingerlings of different size classes, a reliable supply of these materials needs to be secured.

Consideration should be given to improving hatchery facilities in the CACFish region of competence and where appropriate, the introduction of new hatchery technologies. Training in fish propagation techniques needs to be introduced, and where necessary improved.

- Where appropriate, cold water and saline tolerant strains of common carp should be considered for introduction into those waters that have been negatively impacted by climate change or anthropogenic activities.
- In addition to promoting ecological sustainability, CBF management plans should be designed to be economically sustainable and maximize the societal benefits.
- The lack of qualified personnel to develop and manage CBF in the region remains a significant constrain to the development of the sector. A training programme involving government agencies, national and international NGOs and interested stakeholders needs to be developed.
- Community-based fisheries co-management systems should be adopted to addresses issues of illegal, unregulated and unreported (IUU) fishing. Associations and social organizations, such as fishermen's and anglers' associations should be encouraged to work with government agencies in raising awareness of the impacts of IUU fishing, and to encourage the cooperation of local communities.
- Property and access rights to the fish stocks under CBF management systems need to be clarified and clearly defined in the fisheries management planning process.
- In order to support the development of CBF in the CACFish competence area, a development programme needs to be implemented in each country. The programme framework should comprise a series of actions that should be supported and coordinated through a regional TCP program. This programme framework should include the following:

An inventory of the current status of CBF activities in CACFish countries:

- A systematic national review of past and present CBF practices and operations.
- An inventory of the environmental, economic and social indicators that impact CBF operations.
- The development of criteria to categorize inland water bodies with respect to their potential to support CBF. The criteria will form the basis the development of a national fisheries database for inland water bodies that show potential for CBF development.
- Elaboration of a national CBF database of inland water bodies.

Needs assessment

- Classification of water bodies according to their potential to support CBF, their characteristics and potential production yield, and
- Prioritize water bodies for CBF development, and develop an implementation plan for their development.

Establishing technical guidelines and protocols

- Elaboration of a framework to support the implementation of financially and ecologically sustainable CBF systems. Based on international best practice, the framework should include management systems and protocols, financial arrangements, the development, implementation and

evaluation of stocking programmes, environmental monitoring, establishing catch rates and harvesting, access rights and the control of IUU fishing.

- It was recommended that participating countries should establish national teams incorporating the necessary technical disciplines e.g. fisheries management, fisheries and aquaculture research, water quality and irrigation specialist etc. The team would be coordinated and supported/advised by subject specialists appointed and coordinated by the CACFish Secretariat. The program should have the working title: “Enhancement of culture-based fisheries (CBF) in Central Asia”. The team would help in the development and implementation of a pilot study in the CACFish competence area.

THIRD FIVE-YEAR WORKPLAN FOR 2021-2025

1. GUIDING PRINCIPLES, VISION, REGIONAL GOALS, AND OBJECTIVES

The guiding principles, vision, regional goals, and objectives of the Third 5-Year Regional Work Programme (2021–2025) (RWP3) are as follows:

Guiding principles:

The RWP3

- Builds on the Second 5-Year Regional Work Programme (2016–2020) of Commission,
- Seeks collaborations with CACFish Member States, non-CACFish member States and key stakeholders from the region,
- Reflects the common interests and priorities of all parties to the Commission,
- Comprises progress review, updating, monitoring and follow-up processes to be undertaken by TAC and Commission,
- Emphasizes the need for institutional capacity building,
- Emphasizes on knowledge sharing, and promotion of better management practices,
- Seeks external funds, and
- Seeks contribution of FAO fisheries/aquaculture projects.

Goals:

- Continually promote sustainable management and development of the fisheries and aquaculture sector in the Central Asian and Caucasus region, and
- Contribute to the increased production of inland capture fisheries and aquaculture (including culture based fisheries).

Main objective:

- Strengthen the institutional, scientific, technical, legal and structural capacities in order to promote the development, conservation, rational management and best utilization of living aquatic resources, and

Vision:

The vision of RWP3 is to be a self-reliant and effective regional cooperation mechanism that promotes sustainable and responsible inland fisheries and aquaculture in Central Asia and Caucasus.

The following are some of the main factors that could best contribute to achieving the vision:

- Partnership and collaboration,
- Policy coherence for management and development of sustainable inland fisheries and aquaculture,
- Concerned regional effort to regulate fisheries and aquaculture in a better and sustainable manner,

- Strengthened networking among key stakeholders,
- Enhanced research capacity,
- Education and training,
- Implementation of incentive programmes, and
- Promotion of co-management.

Key regional priority areas addressed by RWP:

Regional priorities of RWP3 areas follows:

- Increased inland fisheries and aquaculture production,
- Fisheries planning and policy; food safety and rural development,
- Fisheries and aquaculture production as well as handling, harvesting, processing, and marketing of fish and fish products,
- Fisheries research and technology transfer,
- Institutional capacity building for management and conservation of fisheries resources, and
- Fisheries co-management.

II. CONTEXT OF THE WORK PROGRAMME

The content of RWP3 falls primary into two sets of inter-linked categories: (i) technical components; and (ii) programme coordination, management, monitoring and evaluation. RWP3 comprises a non-exhaustive list of activities, taking into account the technical component of the RWP1 (2011-2015) and RWP2 (2016-2020). The sets one and two are elaborated in detail in Section V and VI, respectively. As seen in Section V, the technical components of RWP3 are given in section IV:

The Rules of Procedures of the Commission comprise a range of varying specified responsibilities and tasks to TAC, including technical oversight, monitoring and evaluation of projects and programme of work activities of Commission.

There are six essential considerations for the RWP3:

1. As an operational programme of Commission, it will function towards, among others, developing institutional capacity for data and information exchange, promotion of better management practices, and enhanced research capacity.
2. The Commission provides the essential financial and human resources required for smooth running of the RWP3. However, external donor funds and technical support from and collaboration with other projects/programmes of FAO and donors and partners are thought to be necessary.
3. As with RWP1 and RWP2, RWP3 runs on a rolling basis. In other words, the programme activities do not necessarily be finalized at the end of the 5-year programme period. If it is deemed necessary, new additions and amendments can be made to RWP3 during inter-sessional implementation period by the Commission at its annual sessions. The programme thus embarrasses flexibility to incorporate arising issues and reflect future demands.

4. The development and implementation of specific projects/programmes and activities under the work programme shall be undertaken by the CACFish members with the assistance of the CACFish Secretariat.
5. The implementation of the programme and the activities under it shall be coordinated by the CACFish Secretariat. TAC, on the other hand, shall monitor and evaluate the programme while the Commission has full autonomy to manage the programme.
6. The work programme shall consist of varying types of activities. Key RWP3 activities include:
 - Trainings and workshops,
 - Technical and institutional assistance on the better management practices and technology transfer,
 - Projects/programmes,
 - Policy development, planning and fisheries legislation updating.

III. INSTITUTIONAL OUTCOMES OF THE WORK PROGRAMME

A crucial set of outcomes of the work programme is the adoption of institutional strategies, procedures and processes that will sustain the Commission. These outcomes for the Commission itself as an organization will enhance its ability to achieve the over-arching outcomes desired for the better sector governance, stronger institutional support, and improved technology and production systems.

The institutional outcomes shall be:

- 1) **A higher profile of inland fisheries and aquaculture in national plans and development programmes:** A major outcome of the work programme would be the due recognition of the importance of the sector in national development and its capacity to contribute to poverty alleviation and the achievement of food security. Successful results would cumulatively raise the profile of the sector in national development plans, rural development plans and poverty reduction strategies and programmes. The indicator or practical proof of this would be an increased allocation of state budgetary funding for the management and development of the sector.
- 2) **Stronger working relations among stakeholders:** The five-year implementation period of the work programme should enable the sector to establish and strengthen important working relations among the primary stakeholders within the sector including governments, producers, consumers, suppliers of technical inputs, service providers, NGOs, donors and regional and international institutions and development agencies. Participatory approaches to be adopted by the work programme will involve stakeholders in policy-making, planning, implementation and monitoring. The desired outcome of such relations would be an easy and open flow of information, closer cooperation, and trust between stakeholders.
- 3) **Integration into rural development programmes:** The work programme will seek to integrate aquaculture and inland fisheries planning within the overall rural development planning, taking into account multi-sectoral developments and views. Sectors that need to be collaborated with include among others water/irrigation, hydropower, tourism, education, agriculture, food, import/export and health. Multi-sectoral co-ordination will bring agencies together; raise awareness of the potential of inland fisheries and aquaculture in other rural development sectors to improve national and local economies, as well as community livelihoods and household incomes.

- 4) **Synergy with programmes of other institutions and organizations.** To add value to its own projects and to other projects in the region, to build on other related efforts rather than competing with or duplicating them, the work programme shall be designed to establish functional linkages with projects and donors that have fishery- and aquaculture-related mandates in the region.

IV. TECHNICAL COMPONENTS

The RWP3 has the following overall objective and consists of five thematic components:

Overall objective: Promotion of strong management and development of fisheries and aquaculture in the Central Asian and Caucasus regions.

<i>Components</i>	<i>Specific Objectives</i>
1: Fisheries and aquaculture management	Improved regional management of the inland fisheries and aquaculture sector for a more orderly, rapid and sustainable development and increased economic opportunities.
2: Aquaculture	Improved production technology and systems for increased aquaculture production.
3: Inland fisheries and conservation	Improved inland fisheries management and conservation practices in the region.
4: Post-harvest and marketing	Increased quality and safety of fisheries and aquaculture products available in the markets in the region.
5: Research & capacity development	Improved capacities for fisheries research and technology development, extension, education and training in fisheries and aquaculture

Component 1: Fisheries and aquaculture management

Activities	Outputs	Key performance indicators	Timeframe	Budget (USD) and budget sources
<i>1.1 Provision of technical advice on the modernization of laws and regulations governing fisheries and aquaculture</i>	Improved legal, institutional and regulatory framework			
1.1.1. Review of laws, policies and regulations governing fisheries and aquaculture	Updated national laws, policies and regulations governing the fisheries and aquaculture		2023	50 000 RWP
1.1.2. Review of technical fishing regulations, licensing and logbook systems	Updated technical fishing regulations, licensing and logbook systems		2023–2024	40 000 RWP
1.1.3. Regional workshop on planning and policy development for increased aquaculture production in the beneficiary countries	-Preliminary study report - Recommendations for TAC and CACFish		2022	35 000 RWP
1.1.4. Regional Training on Geographic Information Systems in fisheries and aquaculture management and planning	A preliminary project on Geographic Information Systems is in place	- Preliminary study report - Recommendations for TAC and CACFish	2022	40 000 RWP
1.1.5. Regional Workshop on Incorporation of Ecosystem Approach to Fisheries into planning and management	Strengthened capacity for Ecosystem Approach to Fisheries into planning and management	- Workshop and TAC recommendations - Number of participants	2021	40 000 RWP
<i>1.2. Improvement of the fisheries and aquaculture data and information in the region</i>				
1.2.1. Regional review of fisheries and aquaculture data and information system in the Central Asian and Caucasus region	Improved capacity for Fisheries data collection and management	- Study report - Recommendations for TAC and CACFish	2022	40 000 RWP
Budget subtotal (USD)				245 000

Component 2: Aquaculture

Activities	Outputs	Key performance indicators	Timeframe	Budget (USD) and budget sources
2.1. Capacity building for production systems	Improved inland aquaculture production systems	Renewed or new facilities and production systems		
2.1.1. Farming of new fish species	Diversified aquaculture production	Mission reports of experts	2021	35 000 RWP
2.1.2. On-farm feeding and feed management in aquaculture	Increased capacity for fish feed management	Mission reports of experts	2023	40000 RWP
2.1.3. Regional training workshop on cage culture systems in lakes	Increased capacity for lake aquaculture		2022	40 000 RWP
2.1.4. Regional training on fish disease and health management in aquaculture	Increased capacity for fish health management	Workshop and TAC recommendations	2024	40 000 RWP
2.1.5. Regional workshop on freshwater fish hatchery management of main commercial species	Increased capacity for freshwater hatchery aquaculture production	Workshop and TAC recommendations	2022	40000 RWP
2.1.6. Regional training for hands-on training on pond aquaculture of main commercial species	Increased capacity for pond aquaculture	Workshop and TAC recommendations	2022	35 000 FISHCap
2.1.7. Practical hands-on training on production of live feeds	Increased knowledge and skills for production of live feeds	Mission reports of experts	2023	35 000 RWP
2.2. Support to the sustainable development of aquaculture in the region for improved food security and human nutrition, targeting smallholders and extension agents				
2.2.1. Regional workshop on adaptation of Best Management Practices (BMPs) for aquaculture farm management	Increased knowledge of BMPs	Workshop and TAC recommendations		40 000 FISHCap
Budget subtotal (USD)				305 000

Component 3: Inland fisheries and conservation

Activities	Outputs	Key performance indicators	Timeframe	Budget (USD) and budget sources
3.1. Support to inland fisheries management and conservation objectives				
3.1.1. Workshop on the habitat rehabilitation for inland fisheries			2024	40 000 RWP
3.1.2. Provision of technical advice on the establishment of Monitoring, Control and Surveillance (MCS) systems in inland fisheries			2021–2023	30 000 RWP
3.1.3. Regional Workshop on the Elaboration of National Plans of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IUU)			2022	40 000 RWP
3.1.4. Inland Fisheries Resource Enhancement and Conservation	Increased institutional capacity for inland fisheries resource enhancement and conservation	Workshop and TAC recommendations	2024	40 000 RWP
3.2. Provision of technical advice on preservation of genetic resources	Increased knowledge on preservation of fishery genetic resources	- Workshop recommendations - Number of trainers - IUCN Red List of threatened species	2021	50 000 RWP
Budget subtotal (USD)				200 000

Component 4: Post-harvest and marketing

Activities	Outputs	Key performance indicators	Timeframe	Budget (USD) and budget sources
<i>4.1. Provision of post-harvest management, food safety and quality and HACCP certification</i>	Increased availability of high quality and safe fish and fisheries products in the domestic markets in the region			
4.1.1. Development/updating of post-harvest management by development/effective implementation of marketing measures, rules, standards for safe and quality fish and fish products	Enhanced post-harvest management and increased quality and safety of fish and fish products	- TAC recommendations - CACFish decisions or recommendations	2021–2024	60 000 FISHCap or other external budget
4.1.2. Provision of technical advice on fish marketing and fish processing and diversification of processed fish and fish products	Enhanced capacity for processing and diversifies processed fish and fish products	Mission reports of experts	2021–2024	60 000 RWP
<i>4.2. Provision of fish market information</i>				
4.2.1. Development of a (national) fish market information system	An operational fish market information system	- Fish market information system - TAC recommendations - CACFish decisions or recommendations	2021–2024	60 000 RWP
Budget subtotal (USD)				180 000

Component 5: Research & capacity development

Activities	Outputs	Key performance indicators	Timeframe	Budget (USD) and budget sources
5.1. Support to research in fisheries and aquaculture	Improved capacities for applied research and technology transfer			
5.1.1 Training of researchers, technical ministerial staff, hatchery managers and representatives of fishers' organization	Increased institutional and technical capacity	Training reports - Number of people trained	2021–2024	300 000 RWP
5.2. Capacity development				
5.2.1. Short-term exchange visits for experts and scientists	Increased knowledge and technical capacities	Visit reports - Number of people trained	2021–2024	160 000 RWP
5.2.2. Preparation of training materials on various aspects of fisheries and aquaculture	Increased accessibility of information and knowledge.	- Training reports - Number of people trained	2021–2024	60 000 FISHCap or other external budget
Budget subtotal (USD)				520 000
Grand total (USD)				1 450 000

COUNTRY REPORTS

A) AZERBAIJAN

BRIEF DESCRIPTION OF FISHERIES INDUSTRY IN AZERBAIJAN (FISHERY AND AQUACULTURE)

FISHERY

Fisheries production by main species

Capture fisheries in the Republic of Azerbaijan is carried out in the Caspian Sea, the Kura River and inland waters. The prime target fish species for fishery are sturgeon, salmon, common freshwater fish (kutum, Caspian asp, European carp, fresh water sander, shemaya, roach, Eastern bream, barbel, etc.), as well as lamprey, shad, etc. The main target of fishery is sturgeon (beluga, Caspian/Russian sturgeon, starred sturgeon). Next to sturgeon in its commercial value rank semi-anadromous fish: Eastern bream, fresh water sander, Caspian roach, European carp, etc. Data on fish catch by species for 2017-2019 are presented in Tables 1.

Table 1-Fish capture (tons) in Azerbaijan according to the catch quota in 2017-2019

Fish species	2017	2018	2019
Белуга – Beluga (<i>Huso huso</i> Linne)	--	--	--
Осетр – Caspian/Russian Sturgeon (<i>Acipenser guldenstadtii</i> Brandt)	--	--	--
Севрюга – Starred Sturgeon (<i>Acipenser stellatus</i> Pallas)	--	--	--
Сельди – Shad	75	82	81
Кильки – Kilka	559	1 073	694
Кутум – Kutum (<i>Rutilus frisii kutum</i> Kamensky)	100	112	106
Сазан – European Carp (<i>Cyprinus caprio</i> Linne)	37	48	46
Вобла – Roach (<i>Rutilus rutilus caspicus</i> Jakovlev)	50	69	60
Лещ – Eastern Bream (<i>Abramis brama orientalis</i> Berg)	31	55	41
Жерех – Caspian Asp (<i>Aspius aspius</i> Linne)	1	3	2
Судак – Fresh Water Sander (<i>Sander lucioperca</i> Linne)	5	21	10
Кефаль-остронос – Leaping Gray Mullet (<i>Liza saliens</i> Risso)	59	85	70
Шемая – Shemaya (<i>Chalcalburnus chalcoides</i> Güeldenstäedt)	5	14	8
Сом – Catfish (<i>Silurus glanis</i> Linne)	3	5	5
Щука – Pike (<i>Esox lucius</i> Linne)			1
Карась золотой – Crucian Carp (<i>Carassius carassius</i> Linne)	25	31	20
Рыбец – Vimba (<i>Vimba vimba persa</i> Pallas)	4	3	3
Other fish species	11	13	30
Total:	965	1 614	1 177

In the Kura River, primarily sturgeon fishery is carried out, that since 2011 has been conducted exclusively for the purpose of artificial (controlled) reproduction to replenish natural populations and for research purposes. Carp species (Cyprinidae) fishery is carried out both in the Kura River and in the Caspian Sea. Eastern bream is the dominating species in catches in the Kura River, the share of its catches varies from 40 to 50% over the years; fresh water sander follows in importance in catches – 15-26%; the third most important species in catches is roach – 12-17%. The carp fishery in the Caspian Sea is based on two types of fish, of which kutum makes up 27-60% of the catches; the second most important is the roach, the catches of which make up 10-19% of the total catch. Inland fisheries is carried out mainly in large water reservoirs – Mingachevir and Shamkir; various cyprinids (Cyprinidae) and percids (Percidae) species are caught there.

There are very few fish species of commercial value in the Caspian Sea. Besides shads, these include kilkas and mullet. The fishery for mullet and shads has an upward trend, but their stocks in the Azerbaijan sector of the Caspian Sea are underexploited. Judging by the weight of the total fish catch, kilka currently holds the first position – up to 50-75% of the total fish catch. In recent years, mainly marine fish species have been captured: kilka, sprat and mullet.

Employment of the Population in Fisheries

The following numbers of large fishing companies (legal entities) were engaged in capture fishery by years: 2015 – 5, 2017 – 2, 2019 – 2. Apparently, the number of fishing companies has fallen almost three times over the past 5 years.

In 2019, only 11 fishing vessels were engaged in fishing activities, they used a cone net to catch kilka (deep-sea fishing). Each of the 11 fishing vessels involved in fishing activities employed an average of 6 people, for a total of about 66 people. About 300 people, including about 15% women were involved in the coastal infrastructure for preparing vessels to gain the sea, as well as in the course of fish products processing and the market activity for the sale of caught fish on the coast.

In 2016, a total of 625 boats (small size fleet, coastal fishing) were registered. Each of the 625 boats had an average of 4 people aboard, for a total of about 2,500 people.

National fishing fleet

At present, 11 national vessels are engaged in commercial fishing in the Southern Caspian in line with permits from regulatory authorities. In recent years, fishing vessels exclusively caught kilka. In the Caspian Sea, trawlers, seiners, boats and some others vessels are used for fishing. For shad fishing, sea nets for herring are used. Currently, most of the fishing vessels in the Azerbaijan sector of the Southern Caspian use a cone net to catch Caspian kilka with electric light. Improving this method for kilka catching, fish pumps are used, attracting fish to them with an electric light. The most important in the Caspian Sea is kilka fishing using underwater electric light. Centrifugal fish pumps and airlifts are used. Currently, all three fishing methods are applied in the industry in the Caspian Sea: cone purse net, centrifugal fish pumps and airlifts. Three kilka species live in the Caspian Sea: common (*Clupeonella delicatula caspia* Stetovidov), anchovy (*Clupeonella engrauliformis* Borodin), and bigeye (*Clupeonella grimmeri* Kessler). Fish of all three species are attracted to the light, but the most abundant in the catches is the common kilka. In the Caspian Sea, trawl fishing is used for scientific research surveys.

In 2017, the number of fishing vessels, involved in catching of kilka with a cone net amounted to 12 ones, while the number of fishing boats was 561.

In 2018, the number of fishing vessels, involved in catching of kilka with a cone net amounted to 12 ones, while the number of fishing boats was 694.

In 2019, the number of fishing vessels, involved in catching of kilka with a cone net amounted to 11 ones, while the number of fishing boats was 625.

Status of the Main Fish Stocks

Stocks of sturgeon species (beluga, ship, Caspian/Russian sturgeon, starred sturgeon), Caspian salmon and kilkas remain at a consistently low level. The reason for decline in sturgeon and Caspian salmon stocks is the impossibility of natural propagation of these fish due to blockage of the Kura river by the Mingechaur HPP dam, the lack of breeders for the purposes of artificial (controlled) reproduction, a decrease in the food reserve for the major commercial fish species (low abundance of kilka, which serve as food for them) in the Caspian Sea, as well as poaching. Since 2011 Azerbaijan, similar to all other Caspian countries, has been maintaining a technical moratorium on sturgeon fishing in the Caspian Sea.

The reason for the decline in kilka stocks over the past 20 years has been the invasion of the ctenophore *Mnemiopsis leidyi* into the Caspian Sea at the end of the 1990s. The adverse effect of this invasion was manifested and increased especially significantly after 2001. The role of the invasive planktophage ctenophore *M. leidyi* in the Caspian ecosystem is reduced to undermining of the food supply of kilka by eating out large amounts of zooplankton, thus creating a disastrous situation for food consumers. With the emergence of *M. leidyi* in the Caspian Sea, there observed a decline in abundance and a decrease in catches of kilka, the overall capture of which in the Caspian basin decreased from 271 thousand tons in 1999 to 54 thousand tons in 2003 (Sedov et al., 2004), that is for 5 times. In 2007, the catch of kilka in Azerbaijan was about 3,667 tons, while in 2009 – only about 840 tons. Then catches of kilka had subsequently decreased – from 708 tons (in 2010) to 485 tons (in 2011), then – from 342 tons (in 2014) to 206 tons (in 2013). In 2014 and 2015 catches of kilka were as low as 163 and 138 tons respectively.

Abundance of mullet and shad have been at satisfactory level and shows an upward trend, but their stocks in the Azerbaijan sector of the Caspian Sea are underutilized.

AQUACULTURE

Fisheries production by main fish species

Aquaculture farms in Azerbaijan operate in two directions. The first direction is the artificial (controlled) reproduction of juveniles of valuable commercial fish species, destined for release in natural water bodies (the Caspian Sea, the Kura River, water reservoirs) for fattening in order to replenish the stocks of these species. This direction is also referred to as pasture aquaculture that is under the state authority. The second direction is fish farms that rear fish of marketable size and fish stocking material.

At present, there are three hatcheries operating in Azerbaijan. In the lower reaches of the Kura River, the Khilli Sturgeon Fish Hatchery operates, that annually reproduces and releases juveniles of the Kura sturgeon (*Acipenser persicus*), starred sturgeon (*Acipenser stellatus*), ship (*Acipenser nudiiventris*) and beluga (*Huso huso*) into the Kura region of the sea. The Azerbaijan Experimental Marine Fish Hatchery is engaged in the reproduction of Kura salmon (*Salmo trutta caspius*). Up to 50 thousand of 50-gram juveniles are released into the Caspian Sea annually from this hatchery. The Gyzylagach Fish Farm specializes in the release of carp species, including kutum (*Rutilus frisii kutum*), European carp (*Cyprinus carpio*) and herbivorous grass carp (*Ctenopharyngodon idella*) and silver carp (*Hypophthalmichthys molitrix*). The annual release of carp breeds by this enterprise amounts to four million juveniles. Data on artificial reproduction of fish by species for year 2019 are shown in Table 2.

Table 2-Artificial reproduction of valuable commercial fish species in Azerbaijan in 2019

Fish species	Release of juveniles into the wild, mln. psc.
Sturgeons (Caspian/Russian sturgeon, stellate sturgeon)	0.342
Caspian (Kura) salmon	0.168
Cyprinids (kutum, European carp, grass carp, silver carp)	3.417
Total:	3.927

In 2004, at the Khilli Sturgeon Fish Hatchery it was initiated the establishment of a sturgeon broodstock. It comprises currently about 7 thousand individuals of various sturgeon species. The production of commercial fish and fish stocking material is privately owned. The main fish species for commercial aquaculture are European carp, silver carp, grass carp, trout, African catfish, sturgeon fishes. Over the past 30 years, the volume of aquaculture production in Azerbaijan has significantly decreased from 40 thousand tons at the end of the 1980s to 500-707 tons per year in 2017-2019, while the price of fish products has increased several times. In 2017-2019 aquaculture products share was about 32% (24-42%) of the total fish production in the country. Dynamics of indicators for pond and lake culture in 2017-2019 are presented in table 3.

In recent years, the number of people employed in the private sector of aquaculture is about 1,000 people, and the total volume of reared and caught fish products is about 500-707 tons per year, mainly due to European carp (213-224 tons) and trout (102-312 tons). There are no accurate data on the annual volumes of aquaculture fish production in Azerbaijan in 2019; judging by expert estimates, it was about 5,000 tons. However, it should be recognized that the production capacity of freshwater aquaculture is not fully utilized; mariculture is at an initial stage of development. Efforts to develop freshwater aquaculture and mariculture do not correspond either to the global trends in the dynamic development of this area of fishery activity, or to the existing potential of the Azerbaijan Republic.

Table 3-Dynamics of indicators for aquaculture in Azerbaijan in 2017-2019

Indicator	Year		
	2017	2018	2019
Number of persons engaged in pond and lake fish farming	104	110	113
Area of ponds and lakes under aquaculture, hectare	4 929	1 189	1 174
Reared (caught) in aquaculture fish, tons, including:	707	500	539
Sturgeon	5	-	-
European carp (sazan)	213	220	224
European carp (cultured sazan)	30	30	32
Grass carp	28	33	40
Silver carp	43	65	82
Trout	312	102	102
Other fish species	76	50	59

In total, 39 legal entities and individuals engaged in commercial fish farming were legally registered in 2014. The largest of them have been: AzVarvara, Azforel, AzCaviar, Nerekend, AzFishFarm. According to research conducted, about 700 fish farms have been involved in commercial fish farming.

Employment of the population in aquaculture

At present, about 40 enterprises of various forms of ownership are legally operating in the country's fishery complex. About 1,000 people work in aquaculture farms (fish farms), with the 25% share of women among them. The staff of fish farms ranges from 20 to 120 employees, depending on the volume and nature of works. According to expert estimates, the number of individuals employed in the private aquaculture sector in recent years amounted approximately to 800 in 2017, to 900 in 2018 and to 1,000 in 2019.

EVALUATION OF STATISTICS, RESEARCH AND RESOURCES

In the overall balance, the country's protein-based food market is only with 2% formed thanks to fish and fish products. Per capita consumption of fish products in 2007-2009 amounted to about 1.7 kilograms per year. However, in recent years, there has been an increase in the per capita consumption of fish products: in 2017 – 7.9 kg, in 2018 – 7.4 kg, in 2019 – 7.6 kg.

At present, the demand and satisfaction of the needs of the population of the Republic of Azerbaijan is carried out mainly through the import of some of its species from other countries, mainly for assortment, and partly due to local fish products. The ratio of domestic and imported fish products over the past 3 years can be estimated at about 10-90%.

In the Republic there are not any specialized markets for selling fish and fish products. In cities and regions, centers of the Republic, markets have sections for the sale of fish and fish products. These sections function within the general market infrastructure. Due to the small volumes of fishery and supply of fish and fish products to the markets in small lots, auctions do not deal with such a small scale of product supply. Fishermen sell their catches by themselves or through legal entities or individual dealers. Fish markets and wholesale companies are privately owned. The share of fresh and frozen fish sales at markets is seasonally dependent.

POLICY AND LEGISLATION

Azerbaijan officially joined the Central Asian and Caucasus Regional Fisheries and Aquaculture Commission (CACFish) in March 2014. In June 2014, the 3rd Session of CACFish was held in Baku.

The organization of fisheries, management, reproduction, protection and regulation of the use of aquatic biological resources in Azerbaijan is carried out on the basis of the "Law on Fisheries", adopted in 1998. Prepared with technical support from FAO, a new improved "Law on Fisheries" No. 1015-IVQD was adopted by the Parliament (Milli Majlis) on June 27, 2014 and approved by the Decree of the President of the Republic of Azerbaijan. The new law has introduced articles providing for the development of aquaculture in the country. In 2016-2017 a number of bylaw decrees of the Cabinet of Ministers were adopted, which allowed to improve the regulation of capture fishery, aquaculture, the regime of specially protected fishery territories, accounting for fishery enterprises, conducting works on fish acclimatization and with hybrids and other activities.

Since 2011, Azerbaijan refused from the commercial catch of all four sturgeon species (beluga, ship, Caspian/Russian sturgeon, starred sturgeon). Azerbaijan, like all the other Caspian littoral states, maintains a technical moratorium on sturgeon fishing. In September 2014, in Astrakhan' (Russian Federation), the Presidents of all five Caspian countries signed an "Agreement on the conservation and rational use of aquatic biological resources of the Caspian Sea." This Agreement was ratified by all the Caspian states in 2016 and, in compliance with that, the actual status of the Commission on Aquatic Bioresources of the Caspian Sea was elevated from the interdepartmental level to the intergovernmental one. Three sessions of the intergovernmental Caspian "Commission on the Conservation, Rational Use of Aquatic Biological Resources and Management of Their Joint Stocks" were held in 2017 and 2018 in Azerbaijan, and in 2019 – in Iran.

FISHERIES MANAGEMENT AND SECURITY MEASURES

The government agencies that responsible for the control of fisheries and aquaculture are the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan (MENR) and structural subdivisions of the MENR: Department (Service) of Biodiversity Conservation and Department (Service) of Environmental Protection.

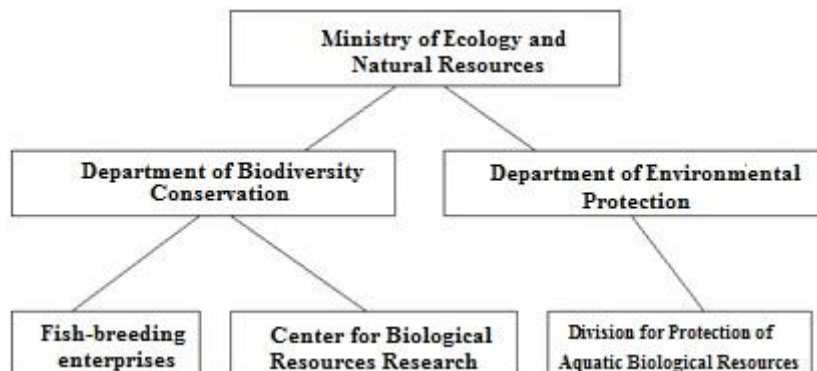


Figure 1: Diagram of the fisheries and aquaculture management system

The Center for Biological Resources Research carries out studies to determine the stocks of commercial fish, define the allowable catches and catch quotas for aquatic biological resources. The Department of Biodiversity Conservation issues permits for fishery in defined areas of water bodies in a certain season, for a certain amount of fish catch, depending on the allocated quota. Division for Protection of Aquatic Biological Resources operates as a unit of the Environmental Protection Department. This division implements based on the existing legal norms measures to combat illegal fishing and violations of fishery regulation. The fight against poaching is carried out jointly with other power state structures – the Ministry of Internal Affairs, the Ministry of Emergency Situations and the State Border Service of Azerbaijan Republic.

In the structure of the Department of Biological Diversity Conservation, there is a Division for the reproduction and regulation of aquatic biological resources, which issues permits (fishing tickets) for fishing, and also coordinates and controls the activities of three hatcheries that involved in replenishment of the stocks of valuable commercial fish species in the Caspian Sea, Kura River and inland water bodies.

Reforms in the management of the capture fisheries and aquaculture sector, as well as scientific research, are ongoing, and structural changes to improve the infrastructure have been conducted.

B) KAZAKHSTAN

BRIEF DESCRIPTION OF NATIONAL INLAND CAPTURE FISHERIES

The Republic of Kazakhstan has no access to the World Ocean. The only available sea is the Caspian that is actually a large brackish lake, the water area of which is divided between five Caspian littoral states. However, actually Kazakhstan carries out capture fisheries in the Caspian Sea only in the coastal zone, in the exclusive economic zone (EEZ) of the Republic of Kazakhstan. Therefore we consider these activities as fisheries in inland waters. Thus, all further information refers to fish stocks that are wholly located in the EEZ and/or territorial waters. At the same time, in each water body there are separate stocks of commercial fish species (populations), those are in no way related to each other.

The current global capture fisheries is divided into two different sectors: artisanal fisheries and the industrial fisheries. Almost all capture fisheries in Kazakhstan are currently related to the former sector. They are low-tech and labor-intensive types of fisheries and their activities are restricted to fishing in coastal zone and aquatic areas of inland water bodies.

The existing system of capture fisheries in Kazakhstan is, in FAO terminology, “small-scale coastal fisheries carried out by local communities”.

It is observed a large share of specialized fisheries by fixed nets, that develop selectively the stocks of commercially valuable species, as well as a decrease in the share of fisheries by active fishing gear, which use the stocks of all fish species most evenly.

Data on total inland fisheries production

According to data of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan, in 2019 the volume of products (services) in fisheries and aquaculture increased by 7.2% compared to the previous year and amounted to 10,574.8 million tenge. The major share in the total volume of manufactured goods (services) fell on Turkestan (21%), Atyrau (16%), Kyzylorda (14%), East Kazakhstan (14%) and Almaty (12%) regions. During the reporting year, 45.6 thousand tons of fish were caught, of which 17.9 thousand tons was of Eastern bream, 6 thousand tons – fresh water sander, 3.2 thousand tons – crucian carp, 1.99 thousand tons – European carp (carp), and 958 tons – mullet (table 1).

Table 1 – Catches of fish by species in 2019 (tons)

Fish species	Bream	Fresh water sander	Roach, Caspian roach	Perc h	Crucia n carp	Catfish	Europea n carp	Caspian asp	Pike	Total
Capture, tons	17 874	6 003	5 743	890	3 157	1 131	1 990	1 027	1 025	45 645

Worthy of note is the underexploited stocks of the Caspian marine fish species. The catch of mullet amounted to 958 tons, catch of shad – to 386 tons, while kilka has not been exploited by capture fisheries. Moreover, valuable commercial fish species (European carp, fresh water sander, Caspian asp, etc.) accounted only for 27% in the structure of the official capture.

The total annual fish catch limit for 2019 was 51.8 thousand tons. The actual catch for 2019 amounted to 45.6 thousand tons (88%). For the period from February 15 to July 1, 2020, a limit of 24.3 thousand tons was approved by the Order of the Ministry of Ecology, Geology and Natural Resources. The actual catch for the first quarter of 2020 was 2.1 thousand tons (9%). Also, for the period from July 1, 2020 to July 1, 2021, a limit of 65.2 thousand tons was approved by an order of the MEGPR. Currently, the period from 1 July of the current calendar year to 1 July of the next calendar year is considered as a fishing year.

The official catches of fish in Kazakhstan amounts to 40-45 thousand tons when estimating the total allowable catches, while in the middle of the last century, up to 100 thousand tons were caught annually. It should be noted that the official fish catches do not always correspond to the actual one. As in other countries, in Kazakhstan took place so-called IUU (illegal, unreported and unregulated) fishing that is one of the main challenges of the industry, consuming time and significant efforts of all facilities to resolve. At this, there is no mechanism to monitor and regulate recreational fishing to assess the extent of IUU fishing, while the scale of recreational fishing is quite significant. The scale of the so-called “unreported” catches (i.e. not taken into account by official statistics on the legal fishermen catches) is especially large.

Employment by gender data

Currently, there is no information on employment by sex (men/women) in certain sectors of the fisheries industry (aquaculture, capture fisheries, processing of fish products). The statistics record general employment in the field of "Agriculture, forestry and fisheries."

According to data of the Central Asian Bureau for Analytical Reporting, women in Kazakhstan make up just over half of the country's total population, but their contribution to economic performance, growth and well-being is significantly below their potential. In the field of agriculture, forestry and fisheries, men account for 56.9%, women – for 43.1%. The percentage of active legal entities, those headed by females is 14.8.

Features of the national fishing fleet

The fishing fleet is mainly represented by small scale vessels – steel fishing boats of SMB-40 type. Purpose of the boat – servicing of active and passive fishing gears and transport of the catch. Its overall length is 11.28 meters and displacement – 10 tons. The maximum number of people on board is 4 people. It is equipped with a 40/80 horsepower stationary engine. In seine fishing, fishing boats (project 102B) of 11 meters long are also used. Exclusively for fisheries in the Caspian Sea more powerful fishing vessels of PTS and PTR types have been used, but they are few in number.

As well a large number of small boats (motor boats) with outboard motors, ranging from 20 to 40 horsepower, are used.

At present, the so-called “Fishing Effort Standards” are set in Kazakhstan. Fishing effort is the volume of production operations directly aimed at the extraction of fish resources and other aquatic animals, including the permissible number of fishing gear and technical means, floating crafts, fishermen on fixed fishery water bodies and/or areas for commercial fishery. In other words, the standard of fishing effort is the maximum possible number of fishing gears, fishermen, vessels on a water body or a fishing area to ensure the safe exploitation of stocks.

For instance, on the Zhaiyk River (Ural), the standard for fishing vessels is 32 units, for boats – 96 units; on Lake Zhaisan (Zaysan) – 42 vessels and 84 boats; on the Small Aral Sea - 36 vessels and 108 boats, on Lake Balkhash - 108 vessels and 120 boats.

Status of the main fish stocks

Each body of water has separate stocks of commercial fish species (populations), those are in no way related to each other. The greatest pressure is experienced by populations of valuable species (fresh water sander, European carp, whitefish). At the same time, poor catch is observed for less commercially valuable fish species. The status of some commercial fish stocks is shown in Table 2.

Table 2-Biomass of the commercial (spawning) stock of some commercial fish species in the main fishing water bodies, tons (2019)

Commercial fish species	Caspian Sea	Lake Balkhash	Lake Zhaisan	Small Aral Sea	Zhaiyk River (Ural)
Eastern Bream	3 768	15 407	19 842	7 199	9 767
Fresh water sander	1 827	2 665	6 425	4 198	1 452
Caspian roach (roach)	3 649	996	382	7 614	2 614
Perch	202	-	1 117	-	-
Pike	-	-	1 129	187	214
Crucian carp	455	585	222		691
Catfish	2 159	1 457	-	223	301
European carp	5 106	1 351	-	685	1 759
Caspian asp	1 743	1 345	-	539	2 370
Shads	1 197	-	-	-	-

By order of the Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated March 26, 2020 No. 82, the standards for the optimal size of commercial fish species populations were approved. Critical values of the commercial stock biomass have been established, that is, the boundary landmark of the commercial stock, upon reaching which it is necessary to make management decisions in order to restore the depleted fish stock. Such values for fish species have been defined for the Kazakhstan part of the Caspian Sea and 18 inland water bodies.

BRIEF DESCRIPTION OF NATIONAL AQUACULTURE

To ensure fish and fish products supply for food security, Kazakhstan needs to produce domestic product in amount of 252 thousand tons. At present, according to official data, about 45 thousand tons are harvested in water bodies, in addition 7 thousand tons are produced by aquaculture. Natural water bodies have certain limits of fish productivity, therefore, under the most favourable conditions, capture fisheries can provide products up to at most 70-100 thousand tons. The rest have to be obtained via aquaculture. In recent years, this sector of fishery industry has made an impressive leap - from 730 tons in 2015 to 6.9 thousand tons in 2019, but this is not sufficient. To date, 180 fish farms are engaged in the farming of commercial fish, including: 99 lake commercial fish farms; 56 pond farms; 5 cage culture farms; 20 recirculating aquaculture systems (RAS) and tank culture farms.

Aquaculture (fish farming) in our country, although it has been developing at a good pace, does not have a special regulatory instrument, but it deemed necessary. In addition, the climate of Kazakhstan is distinctly continental, therefore fish farming can be effectively developed taking into account the peculiarities of natural and climatic conditions with governmental subsidies, currently there are not so many of them. The development of fish farming will help to relieve the pressure on the wild populations of natural water bodies. In addition, it is expected that development of fish farming provides multiplier social and economic effect. Thus, the growth of business activity related to development of commercial fish farms will contribute to employment generation, mainly in rural localities.

State support is carried out through governmental subsidies for the subsector of fish farming, since subsidies for fisheries capacities can lead to depletion of the base raw material for fisheries - stocks of aquatic biological resources. In 2014, fish-breeding enterprises received investment subsidies in the amount of 145.8 million tenge, in 2015 – 25 million tenge, in 2016 – 538.4 million tenge; in 2017 – 82.5 million tenge; in 2018 – 68.6 million tenge.

For the development of fish farming, state support is envisaged in the following areas: reimbursement of 25% of investment costs for the purchase of machinery and equipment for fish farms; reimbursement of 30% of the cost of fish feed expenses in the course of rearing sturgeon, salmon and carp fish species.

Aquaculture productions by main species in 2019 were as follows: trout – 759.8 tons; carp – 1900.2 tons; European carp – 1580.2 tons; Caspian (Russian) sturgeon – 141.3 tons; sterlet – 35.8 tons; salmon – 25.9 tons; silver carp – 230.4 tons; Caspian roach – 61.5 tons; perch - 48 tons; peled – 220.9 tons; grass carp – 288.4 tons; fresh water sander – 1500 tons.

In 2019, in line with the government order, fish farms released more than 73.8 million juveniles of valuable fish species into fishery water bodies, including 4.1 million juveniles of valuable species released on a competitive basis by private fish-breeding enterprises. In 2020, within the framework of the government order, fish farms were planning to release 75 million juveniles of valuable fish species into fishery water bodies.

IMPROVEMENTS IN THE SYSTEM OF FISHERIES AND AQUACULTURE MANAGEMENT

Changes that occurred during the intersessional period are described (**CACFish-Technical Advisory Committee (TAC) - Fourth meeting**, Georgia, Tbilisi, 28 November 2017 -- 30 November 2017).

The functions of the authorized body for fisheries were transferred from the Ministry of Agriculture to the newly created Ministry of Ecology, Geology and Natural Resources (MEGNR) of the Republic of Kazakhstan. State control and supervision in the field of fish resources is carried out by the Committee for Forestry and Wildlife (CFW) of the MEGNR of the Republic of Kazakhstan. CFW has 14 regional territorial inspections of forestry and wildlife, with a staff of 610 people, of which 559 are state inspectors.

Within the framework of the Law of the Republic of Kazakhstan of October 28, 2019 "On amendments and additions to some legislative acts of the Republic of Kazakhstan on the regulation of the agro-industrial complex", the following amendments were introduced:

- On the approval by the authorized body of the plan for stocking of fishery water bodies, which will make possible to ensure stocking of water bodies in volumes comparable to the developed catch limits.
- On the transfer of fishery water bodies, previously assigned for commercial fishing, for fish farming (aquaculture). This amendment will allow users currently engaged in commercial fisheries to switch over to fish farming, especially in the northern regions, where there are numerous lakes, hence they are most suitable for fish farming.
- On expanding the list of measures to compensate for damage to fish resources in the course of arranging and implementation of economic and other activities. This amendment will allow to implement compensatory measures via stocking of water bodies, carrying out dredging and effecting of other activities to create favorable conditions for fish resources. At the same time, economic entities are entitled to choose measures to compensate for damage to fish resources, including construction of infrastructure of a reproduction complex or reconstruction of the existing complexes for reproduction of fish resources, financing of scientific research, as well as creation of artificial spawning grounds in river floodplains and in the marine environment (reefs).
- On the organization of a competition for securing fishery water bodies and (or) sites in electronic form from 2021. This amendment will allow to carry out tenders for securing fishery water bodies openly, transparently and simplify the processes of their holding. At the same

time, measures of responsibility for offenses in the field of fisheries have been strengthened, which primarily to provide for the confiscation of the property of lawbreakers.

- In 2018, the "Standards for fishing effort in fishery water bodies and (or) sites" were approved (order of the Deputy Prime Minister of the Republic of Kazakhstan – the Minister of Agriculture of the Republic of Kazakhstan of July 12, 2018 No. 298). In 2019, the Committee for Forestry and Wildlife, basing on the results of the monitoring of catches by natural resource users, amended the Fishing Effort Standards.
- By Order of the Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan No. 82 of March 26, 2020, the standards for the optimal population sizes of commercial fish species were approved. Critical values of the biomass of the commercial stock have been established, that is, the boundary reference point of the commercial stock, upon reaching which it is necessary to make management decisions to restore the depleted fish stock. Such values for fish species have been established for the Kazakh part of the Caspian Sea and 18 inland water bodies.

The fisheries sector is made of several different areas: capture fisheries, fish farming (aquaculture) and fish processing. The main challenge of the fisheries industry today is the lack of a long-term programme of its development. The Concept for the Development of the Fishing Industry until 2030, developed on the basis of the instructions of the Prime Minister of the Republic of Kazakhstan, Askar U. Mamin, sets global targets to increase fish production from 52.44 thousand tons in 2019 to 120 thousand tons by year 2030. The target increase in exports – by 60% will allow to raise tax revenues to 4.8 billion tenge and investments to 69.8 billion tenge by the year 2030. In addition, a draft law "On aquaculture" has been developed. To update the law a working group has been created from among officials, producers and scientists.

Brief information on processing, preserving, storing, transporting and marketing of fish and fish products

The allocation of fish processing facilities is traditionally tied to large fishery water bodies. At the same time, the bulk of fish processing are sited in the following regions: Atyrau, Almaty, East Kazakhstan and Kyzylorda. The capacity of 83 fish processing enterprises amounts to 87 thousand tons per year, but their workload does not exceed 43%.

Advances in fisheries and aquaculture research

For many years, the Research and Production Center for Fisheries (formerly KazNIIRkH) has been the main executor of budgetary programmes for determining the limits of fish catch in fishery water bodies. Currently, investigations have been carried out in more than 100 water bodies. In recent years, the methodological base has been significantly strengthened, changes have been made to the research methods established by the "Rules for the preparation of biological justifications for the use of the animal world", taking into account the best world practices, as well as own methods (a "temporary method" for assessing the number of fish in fishing rivers, determination of removal rates for populations with depleted reserves). As a result, the trust in fishing forecasts on the part of authorized bodies has increased, and the fish catch limit has been approved practically within the proposed and scientifically rounded ranges.

Within the framework of scientific and technical programmes, a number of patents have been obtained in the field of fish protection from entering water intake structures of various types. They have been implemented in different region of Kazakhstan that will contribute to conservation of fish stocks and enhance the fish protection efficiency up to 70-80%. "Fishing Effort Standards" was developed and introduced into fishing practice, (by order of the Ministry of Agriculture of the Republic of Kazakhstan), designed to make the capture fisheries in water bodies biologically safe at large-scale, which should be

expressed in conservation of commercial fish stocks. The economic effect of the implementation of the "Fishing Effort Standards" is enormous, since it will prospectively lead to a reduction and subsequent eradication of unreported fishing, which in recent years has become a real scourge for the rational and safe exploitation of fish resources. As a result of the Regulations effect, in 2019 the reported catch increased by 7 thousand tons. Resulting from the Regulations effecting, fishing organizations have lost an opportunity to use manpower without formal labor contracts. This is social protection of people, as well as an increase in budgetary revenues due to income tax.

In the field of natural resources, a project to develop resource-saving fishery methods in water bodies of Kazakhstan is of great importance. To date, a new fishing gear has been introduced into the Caspian Sea fishery, namely a small-frame ventter, which allows to develop the currently underexploited shad stocks. Scientists have developed, built and tested a device for mullet fishing, and received a patent for a useful model. The introduction of these fishing gears into practice of sea fishing should provide a significant economic effect.

In the field of aquaculture, cost-effective fish rearing technologies have been developed and applied into practice at fish farms. The regional specialization of lake and pond fish farming has been developed. As a result of the introduction of these technologies, a positive experience has already been gained in rearing peled in water bodies of the Northern Caspian and carp in the water bodies of Southern and Eastern Kazakhstan. The developed technologies has proven to be of high profitability. Also, for the first time, technologies for artificial reproduction of valuable rare fish species – Balkhash marinka and lenka (uskucha) have been developed, that is urgent in the context of species conservation in the wild and in aquaculture.

Improvements in fisheries data and collection systems

Since 2018, the issuance of permits for the use of the animal world (fishing permits) has been completely converted to electronic format.

As part of the governmental programme for digitalization of economic sectors, the Ministry of Digital Development, Innovation and Aerospace Industry was instructed to develop proposals for the implementation of a system of fish products traceability.

C) KYRGYZSTAN

Description of the state of inland fisheries

In the Kyrgyz Republic, capture fisheries, after the ban (Law No. 73) of the Kyrgyz Republic "On the prohibition of the production, transportation, purchase, sale and export of valuable and endemic fish species in the Issyk-Kul and Son-Kul lakes" as of August 4, 2008 No. 191 (as amended of the Law of the Kyrgyz Republic of March 03, 2009) for fishing in the Issyk-Kul and Son-Kul lakes, was carried out mainly in the large fishery water bodies developed by fishing: the Toktogul, Kirov, Orto-Tokoi and Bazar-Korgon reservoirs. The main fish species in reservoirs and lakes are the Issyk-Kul trout - gegarkuni, whitefish - ludoga, peled, European carp, Eastern bream, tench, fresh water sander, grass carp, silver carp, marinka.

Before the ban on fishing was introduced, about 30 facilities were engaged in commercial fishing. The most important problems in this fisheries sector are the lack of incentives to invest in high-performance fishing equipment and logistics, as well as poaching, which depletes fish resources. To date, commercial fishing in large fishery reservoirs is not conducted.

Measures are being taken to release (stock) juveniles of salmonids, whitefish and cyprinids into lakes Issyk-Kul and Son-Kul, Orto-Tokoi reservoir and other water bodies of the Kyrgyz Republic.

Stocked water bodies: Issyk-Kul and Son-Kul Lakes, Orto-Tokoi Reservoir etc.	The number of released juveniles of whitefish-ludoga, carp-European carp, Issyk-Kul trout, mln.	
	2019	10 months of 2020
Total:	12 627	11.4

Recreational and sport fishing. Fishing with issued permits (fishing cards and tickets) is carried out on the Chu, Naryn, Talas, Kara-Darya Rivers and their tributaries, as well as on other rivers, more than 30 in total. The target for recreational and sport fishing are 15 fish species, of which 2 species are catch limited valuable species (Amu-Darya trout and river osman).

In 2019 the total catch of fish in the country's waters for recreational and sport fishing and for artificial reproduction was less than 10 tons (data from the Fisheries Department based on sold fishing cards and tickets for trout and osman). Services on recreational and sport fishing are provided by 8 regional public organizations that are part of the structure of the Union of Societies of Hunters and Fishermen of the Kyrgyz Republic. The total number of anglers (with account of rural population) engaged in recreational and sport fishing is more than 100,000 people.

The most acute problems of this sector of fisheries are: decrease in fish resources in rivers and tributaries, owing to the increased demand for this type of recreation and the intensification of the fishing itself, as well as weak control over fishing by the government authorities responsible for environmental protection and engaged in regulating fishing activities

Description of the status of aquaculture

Pond fish culture is the main and most productive subsector of modern aquaculture in the Kyrgyz Republic.

The total area of the pond water land in this period is about 1,020 hectares, including 825 hectares of fattening ponds and 195 hectares of rearing ponds. Pond fish culture is based on the polyculture farming of rainbow trout, carp and herbivorous fish species. The main fish production is concentrated in the Issyk-Kul, Chui and Osh regions, where more than 75% of all fish is produced.

The capacity of pond fish farming in the country with the existing water resources of ponds and compliance with fish-biological standards can amount to 600 tons of marketable fish per year. Hundreds of private enterprises are currently involved in pond fish farming.

The most significant challenges of pond farms, along with high wear and tear of equipment, inefficient logistics and problems of lending are associated with the more complicated process of production, that requires sustainable financing and skilled specialists. This aquaculture sector requires the use of special compound feeds, high-quality fish stocking material (compliant with standards), complex specialized equipment for eggs incubating, growing of fish stocking material and marketable fish, conducting fish breeding and reclamation activities, etc.

In fish farms, the problems of production intensification, replenishment and maintenance of the broodstock size, application of organic and mineral fertilizers, etc. are poorly solved. The lack of laboratories for analyzing the oxygen content in water, determining the acidity, alkalinity of water, etc. is also a problem. So far have not been solved problems of facilities' (subjects of fisheries management) interest protection when discharging water from reservoirs created for irrigation or hydropower purposes.

Cage culture is one of the most promising areas of fish farming for the Kyrgyz Republic and is characterized by high economic efficiency. The most favorable water and climatic conditions for its development are available in Lake Issyk-Kul, in reservoirs of the Naryn cascade of hydropower plants (HPP) and other water bodies.

Other suitable for cage culture water bodies practically have not been developed (with the exception of the Kurpsay reservoir, where this type of fish farming is used). The activity of cage fish farms in the most promising for cage culture reservoirs of the Naryn HPP cascade is associated with the need to adapt the production technology to water and climatic conditions (wind and wave regimes, temperature and water flow), as well as to a large amplitude of seasonal changes in the water level fluctuations owing to water discharge for electricity production.

A significant barrier to the growth of commercial fish production in the country is the lack of specialized enterprises for the production of complete fish feeds, affordable for facilities, involved in fisheries. The cost of purchased feeds make a major part of the ongoing production expenses. Farmers are forced to either use expensive imported feeds, or buy low-quality domestically produced feeds, that reflects adversely on the growth, weight and quality of fish. The development of aquaculture is also hampered by the small capacity for processing fish and unresolved logistics problems with the rapid delivery of quality fresh and live fish products to large settlements.

Dynamics of commercial fish production in the Kyrgyz Republic*

Year	2015	2016	2017	2018	2019	For 10 months of 2020
Marketable fish in tons.	1 100	2 020	2 138	2 577	3 028	3 217

*data of the Department of Fisheries of the Ministry of Agriculture, Food Industry and Melioration of the Kyrgyz Republic

Employment of the population by gender

Gender issues are a priority for aquaculture-related activities from the entire value chain from production, processing and marketing. The Department of Fisheries is currently expanding efforts in line with a FAO project to ensure that women and men, involved in aquaculture, benefit equally from their activities.

The dominant position of women is mostly represented in fish farms engaged in production of fish stocking material, retail sales of fish and fish products, and fish processing. In 2019, the number of fish farmers in the Republic increased to 1,139 farmers, of which 988 were men and 151 – women.

Four aquaculture cooperatives have been established with the assistance of the FAO project. These cooperatives have 234 members (households), of which 122 are women and 112 are men

Fisheries and aquaculture management improvements

By the Resolution No. 546 of the Government of the Kyrgyz Republic of October 15, 2019 "On approval of the Programme of Fisheries and Aquaculture Development in the Kyrgyz Republic for 2019-2023", a strategy for the development of fisheries and aquaculture until 2023 has been adopted. The Programme formulates the main goals, objectives, directions and methods of effective functioning of the fishery complex. The draft Programme sets three prime priorities.

The first priority is to restore and develop the potential of fisheries through pasturable fish culture, small-scale capture fisheries and recreational fisheries. The objectives of this priority are aimed at stimulating the development of pasturable fish farming, supporting small-scale commercial fisheries, the production of fish stocking material, improving the regulation of recreational and sport fishing.

The second priority is to ensure the accelerated development of aquaculture via supporting the small and medium-sized production sector of carp and trout culture, as well as through supporting the creation of value chains and cooperation. The objectives of this priority are aimed at supporting small and medium-scale fisheries aquaculture facilities, raising their awareness and adapting cage culture technologies to local conditions.

The third priority is to improve the management system of the fishery complex in the terms of the structure optimization, specific and effective action plans implying the ecosystem approach, support of producers of fish stocking material and commercial fish, and stimulating private sector investment. The objectives of this priority are aimed at improving management by the authorized state body, enhancing the regulatory framework, expanding interaction with business associations and strengthening their potential.

The priorities are being implemented by creating favorable conditions for private enterprises, supporting the development of structural industries, ensuring the comprehensive development of fisheries, primarily in large fishery water bodies.

Reforming the management of the fishery complex

- To attract private investment and restore structural enterprises, it is necessary to restructure state-owned fish farms in the form of joint stock companies. As well to save the Ton fish hatchery and the Uzgen fish farm as structural enterprises;

Recovery and development of capture fisheries capacity

- Securing the rights to use water bodies/fishing areas for a period of at least 25 years (to make appropriate changes to the Resolution of the Government of the Kyrgyz Republic No. 561 of September 7, 2009), currently the term of water bodies/fishing areas utilization is 10 years;
- Development and implementation of a mechanism for economically sustainable activity of fish stocking material producers by compensating for their expenses, through including production costs in the prices for quotas and fish catch limits.

Restoration and development of aquaculture capacity

- Effective regulation of relations during water discharges in reservoirs for energy-irrigation and irrigation purposes;

- Technical support for the application of cage fish culture technology in reservoirs used for energy-irrigation purposes (with a variable level of the water table);
- Training on technology of cage and tank fish farming, the best management practices in aquaculture, and stimulating the growth of product quality.

An integrated approach to the development of large fishery water bodies and territories

- Comprehensive development of fisheries in large fishery water bodies and territories, the development of all structural production sectors (capture fisheries + aquaculture + feed production);
- Fisheries management based on a system of joint management (co-management) of fisheries by the authorized governmental body, and of the private sector, in view of the rational use of resources and the interests of local communities;
- Providing fisheries enterprises with a part of the functions on fish stocks protection in the fight against poaching in assigned water bodies and fishing areas;
- Creating value chains and cooperation.

The Department of Fisheries was established under the Ministry of Agriculture, Food Industry and Melioration of the Kyrgyz Republic by Resolution No. 153 of the Government of the Kyrgyz Republic of March 13, 2020 "On some issues of the Ministry of Agriculture, Food Industry and Melioration of the Kyrgyz Republic".

The Department's goal is to achieve sustainable development of the fisheries sector based on the conservation and enhancement of fish stocks, active development of modern forms and methods of aquaculture and capture fisheries in the water bodies of the Kyrgyz Republic, aimed at increasing the production of fish products and satisfying the domestic demand of the Kyrgyz Republic population for high-quality fish products.

Tasks of the Department: improving the fish productivity of water bodies and increasing the fish production, conducting fishery ichthyological studies of aquatic biological resources, monitoring and analyzing the state and number of fish stocks, fisheries regulation.

Information on processing, preservation, storage, transportation and marketing of fish and fish products

The processing companies produce various fish products (chilled, frozen, salted, dried, cold and hot smoked, food caviar, etc.) from the rainbow trout reared in the Republic.

For export, fish is provided mainly chilled and frozen, as gutted carcass and fillets. The capacity of these enterprises for processing trout is about 5.0 thousand tons per year. In the course of processing of fish food products, that comprises handling, preservation, marketing, transportation and waste management, enterprises comply with the requirements of the Technical Regulations of the EAEU and the Customs Union "On safety of fish and fish products" (TR EAEU 040/2016), "On food safety "(TR CU 021/2011).

Data on export and import

	2015	2016	2017	2018	2019	10 months of 2020
Kind of activity						
Export (fish and fish products)	-	232.6	897.5	442	2 375.9	1 868.7
Import (fish and seafood)	7 519	3 236.6	1 163	975	5 188.4	2 816.4

Advances in research and development in fisheries and aquaculture

The Department of Fisheries, along with the FAO Project “Sustainable Development of Aquaculture and Fisheries in the Kyrgyz Republic”, is carrying out research work in the state fishery lakes Issyk-Kul and Son-Kul, as well as in a number of reservoirs, in order to promote sustainable fisheries management in the country.

The main focus of the research work is directed to the study of the Issyk-Kul and Son-Kul lakes, since these lakes are the main biological and economic resources in the country and at present they are facing problems related to the reduction of biodiversity and anthropogenic impact. In addition, a ban on fishing was introduced in these lakes (in 2008) as a precautionary measure. At present, research is needed to assess the impact of the moratorium and develop a further action plan for the management and conservation of fish stocks.

Based on the conducted studies, the following research works have been defined by the Fisheries Department and the FAO project as themes for dissertation researches for the PhD degree:

- Ecology and management of fish resources of the Issyk-Kul Lake;
- Bioenvironmental assessment of commercial fish species of Son-Kul Lake.

Resulting from the research works to be conducted, recommendations for the management of fisheries in these lakes should be provided. In addition, a number of scientific papers, based on research work, have been published in the Kyrgyz Republic, the Russian Federation and Ukraine.

Due to the situation provoked by COVID-19 and the spread of coronavirus infection, the need to ensure the sanitary and epidemiological safety of employees of the Department, as well as representatives of the departments, organizations and public associations, participating in joint events. In the I-II quarters of this year were not held monitoring studies on the state and size of fish stocks in lakes Issyk-Kul, Son-Kul and other state fishery water bodies of the Republic.

Results of studies, completed or ongoing, related to the work of the TCC

The activities related to mention below research directions, considered in the work of the Commission in the Kyrgyz Republic, have not been carried out:

- *Fish genetic resources: practical training in molecular analysis methods;*
- *Providing technical recommendations on stock renewal and commercial (pasture) fish farming (CACFish/TAC5/2020/3);*
- *Post harvest measures, norms and standards to ensure the safety and quality of fish and fish products.*

Prioritized research area suggested for consideration of the TAC

Study of diseases of both cold-water and thermophilous fish species.

Due to the lack of a specialized laboratory for fish diseases in the Republic, diagnostics and study of parasitic, viral and bacterial fish diseases have not been conducted. Also, there are no methodological manuals that allow to objectively reveal the causes of infectious diseases that in turn complicates the work of veterinarians, fish farmers and ichthyologists involved in studying of fish diseases. The fish farms of the Republic need to enhance the volumes of fish stocking materials and marketable fish production through the increase in fish productivity of water bodies, inter alia by reducing losses caused by various fish diseases. To cope with the diseases properly, it is necessary to create an ichthyopathological laboratory completed with modern equipment that foremost allows to reveal what fish diseases occur in the ponds and water bodies of the Republic, what are their incidences, etc. Fish diseases often lead to massive fish mortality, causing significant damage to fish farms. Transfer of fish (brood fish, fry, eggs) from some water body to a pond, without taking into account the parasitic factor, is often associated with transfer of parasites. As well, the fish introduced into the new water body becomes infected with local parasites and dies.

On the basis of the laboratory, it will be possible to conduct training in the basics of ichthyopathology, advanced training for fish breeders (farmers), conduct practical training for students, and be engaged in scientific work in the field of fish diseases.

D) TURKEY

BRIEF DESCRIPTION OF NATIONAL INLAND CAPTURE FISHERIES

Fisheries production by main species

The capture fishery of Turkey is mainly concentrated on marine fisheries. Turkey has a great number of vessel in the fishing fleet. The Ministry of Agriculture and Forestry has stopped to issue new license for marine fishing vessels since 2002 in order to reduce the fishing pressure on fish stocks. In Turkey, total amount of fisheries products landed in 2019 is 463 168 tons of which 431 572 tons fished from marine waters while 31.596 tons fished from inland waters. The total capture production including inland and marine waters in last 5 years have fluctuated between 300-500 thousand tons (Table 1) related to catch amount of dominant species such as anchovy and bonito which are highly dependent on water temperature, nutrition and environmental conditions.

Table 1: Freshwater capture production statistics in 2015-2019 (tons)

Year	Inland		Total
	Landings (tons)	% in total catch	Inland and Marine (tons)
2015	34 176	7.9	431 907
2016	33 856	10.1	335 320
2017	32 145	9.1	354 318
2018	30 139	9.6	314 094
2019	31 596	6.8	463 168

Source: TurkStat

In last five years, inland capture fishing amount has been relatively stable and the average of the last five years is about 32 thousand tons. The average share of inland catch in total catch (inland + marine) is about 8.7% in the last five years (2015-2019). The revenue generated by inland fisheries is 148.5 million TL (26.1 million USD with 5.68 TL/\$ parity) in 2019. The most landed 4 species are pearl mullet, gibel carp, sand smelt and common carp, respectively.

Freshwater fish are mostly consumed in the local market close to the production site. It is very easy and very quick to deliver the fish with no transportation fee to the consumer and there is no need to freeze or processed them due to short supply-demand cycle. Freshwater fishing products are more preferable than sea products by the people living areas where freshwater species are fished.

National fishing fleet structure

According to Fishery Law No.1380, it is mandatory to have fishing licence for fishers and fishing vessels. The procedures related to issue of licence are performed by the provincial directorates of the Ministry. Distribution of the fishing vessels in 2019 according to length classes are given in Table 3. The highest number of vessels is in the length class of 5-7.9 meters for both marine and inland waters with the total number of 11 100.

The most common fishing gears used in inland water are gillnets, fyke-nets and traps. Trawl nets are completely banned in inland water. A great majority of marine fishing vessels in Turkey are small scale vessels, which are smaller than 12 meters in length, with the number of 13 726 vessels and they are comprises 89.8% of the total vessels in number.

Table 3: Fishing vessels by length classes (2019)

Area of Activity	Length Classes (m)							Total
	0-4,9	5-7,9	8-9,9	10-11,9	12-19,9	20-29,9	30+	
Marine	700	8.970	3.256	800	849	465	275	15.315
Inland	272	2.130	254	22	62	0	0	2 740
Total	972	11 100	3 510	822	911	465	275	18 055

Source: DGFA

Status of Main Fish Stock

Regarding catch amount, the most fished species pearl mullet, gibel carp, sand smelt, common carp, snail, mullet, cray fish. The most important species are common carp and an endemic species, pearl mullet that is found only Lake Van (Table 4). The shares of both species pearl mullet and common carp in inland capture fishery production were 26% and 22% respectively in last five years (2015-2019).

Table 4: Catches of freshwater products in 2015-2019 (tons)

Years	Pearl Mullet	Common Carp	Sand smelt	Snail	Mullet	Frog
2015	8 850	7 223	4 930	733	1 161	535
2016	9 950	4 736	4 640	1 317	1 136	486
2017	9 830	3 543	4 892	1 156	1 424	547
2018	9 945	2 906	4 630	1 521	1 088	487
2019	9 970	3 058	4 744	1 828	1 102	454

Source: TurkStat

Table 5: Catches of freshwater products (tons) 2019

Species	Quantity (tons)	Species	Quantity (tons)
Pearl Mullet (Tarek)	9 970	Pike Perch (Levrek-Sudak)	415
Gibel Carp (Gümüşi Havuz Balığı)	6 555	Other	404
Sand Smelt	4 744	Wels (Yayın)	370
Common Carp	3 058	Eel (Yılan)	330
Snail	1 828	Trout (Alabalık)	301
Mullet	1 102	Catfish (Kara Balık)	203
Cray Fish (Kerevit)	696	Pike (Turna)	190
Transcaucasian Barb (Şiraz)	640	Rudd (Kızıl Kanat)	110
Frog	454	Bream (Çapak)	72
Bighand Goby (Kaya Balığı)	415	Chub (Akbalık)	42
Tench (Kadife)	404	Gökçe*	41
TOTAL		31.596	

*Endemic species

Source: TurkStat,

BRIEF DESCRIPTION OF NATIONAL AQUACULTURE

Turkey supports the aquaculture sector for safe/reliable production and sustainable food. The support provides ecofriendly production process with respect to primarily animal welfare and hygiene standards. It is also aimed to serve the development of technical infrastructure (hatcheries) at facilities for smooth transition to new regulation for sustainable ecosystem instead of exploiting fish offspring from nature. These minor funds support database records at aquaculture facilities, and increase productivity, range and quality of fisheries products.

Although it is still a developing industry. Aquaculture production has been increasing significantly in Turkey over the last two decades. Since the introduction of the National Marine Aquaculture Development Plan that was amended in 2009 and aligned with EU regulations, production capacity increased while feeding and labour costs decreased by means of automation and stability was granted as aquaculturists gained legal assurance. This was a big step to go forward.

Turkish Ministry of Agriculture and Forestry tasked with development of the sector, prioritizes the following items in its 10th Development Plan (2014-2018):

- Preparation of breeding stock management and breeding programmes
- Encouraging ecofriendly aquaculture systems
- Taking measures for continuous feed supply flow for aquaculture production
- Exploration the alternative feed resources

Aquaculture production by main species

In Turkey, there are 1.693 inland fish farms with 216 543 ton/year capacity and 434 marine farms with 306.229 ton/year capacity and both of freshwater and sea farming play an increasingly important role in the production of fisheries products (Table 6).

Table 6: Fish farms and capacities, 2019

Activity area	No of farms	Capacity of farms (tons/year)
Fresh water	1 693	216 543
Marine water	434	306 229
Total	2 127	522 722

In 2019, the aquaculture production was 373.356 tons, the share of marine water is 256.930 tons and the share of inland water is 116.426 tons (Table 7).

Table 7: Distribution of Aquaculture Fish Production in 2015-2019 (tons)

Years	Marine production (tons)	%	Freshwater production (tons)	%	Total production (tons)
2015	138 879	57,8	101 455	42,2	240 334
2016	151 794	59,9	101 601	40,1	253 395
2017	172 492	62,4	104 010	37,6	276 502
2018	209 370	66,7	105 167	33,3	314 537
2019	256 930	69,8	116 426	31,2	373 356

Source: DGFA

Table 8: Aquaculture productions of dominant marine species in 2019

Species	Quantity (tons)	Price (TL/kg)	Value (TL)
Rainbow trout	9 411	19.70	185 396 700
Gilthead sea ream	99 730	21,89	2 183 089 700
European sea bass	137 419	23,41	3 216 978 790
Mussels	4 168	8,74	36 428 320
Others*	6 202	43,20	267 914 200
Total	256 930		5 889 807 710

*Others: Red porgy, meagre, brown meagre, common dentex, pink dentex atlantic bluefin tuna.

Table 9: Aquaculture productions of inland species in 2019

Species	Quantity (tons)	Price (TL/kg)	Value (TL)
Rainbow trout	116 053	15,34	1 799 751 770
Salmonids	2 375	23,55	55 931 250
Common carp	203	10,34	2 099 020
Wels catfish	121	11,50	1 391 500
Frogs	43	23,16	995 880
Tilapia	6	13,10	78 600
Total	118.801		1 860 248 020

In recent years, fish production by aquaculture has increased. Competition between fish farmers dealing with aquaculture in trout, sea bass and sea bream production has caused the sector to seek new fish species.

Employment in Fisheries and Aquaculture

In 2018, the overall employment in the harvesting sector (i.e. marine and inland fisheries) was 35 937 fishers, a 3,66 % decrease compared to 2010. Aquaculture sector employment in 2018 was 10 600, more than double comparing with the early 2000s. In 2018, there were 2 286 farms (1.860 inland and 426 marine) with 486.786 tons total capacity. About two-thirds of these farms were rainbow trout farms. The remaining were mainly producing sea bass and sea bream farms. Aquaculture production is mostly done by small to medium size family-operated units. The processing sector is also growing. In 2018, it employed 6.400 people, over triple comparing with the late 1990s.

MANAGEMENT IMPROVEMENTS IN FISHERIES AND AQUACULTURE

Turkish Ministry of Agriculture and Forestry is the sole authority body responsible for developing and implementing policies on fishing, aquaculture, conservation of fisheries resources, quality, safety and hygiene of fisheries products and fisheries research. The Ministry conducts its services and activities through 81 Provincial Directorates. Law-1380 on Fisheries is the primary legislation tool governing fisheries, aquaculture and fishery related activities in Turkey.

Throughout the country, in order to increase the effectiveness of the Directorate General of the Fisheries and Aquaculture in the provinces, 43 Fisheries and Aquaculture Branch Offices within the Turkish Ministry of Agriculture and Forestry Provincial Directorates have been established. Those Branch Offices have become operational as of 2015. Of 43 provinces in which Branch Offices operates, 28 provinces resides in coastal provinces, while 15 provinces are away from the shores.

On the other hand, various ministries and authorities have different roles and responsibilities to support fishery and Aquaculture sector for national objectives. The Ministry of Development which acts as the general authority for national objectives and strategic planning provides further broad guidelines and framework for how the fisheries and aquaculture sectors contribute towards national objectives and strategy. The Ministry of Interior (Coastguard and Gendarmerie), the Ministry of Environment and Urbanization, the Agricultural Bank and the Turkish Statistical Institute (TurkStat) are responsible for other functions related to fisheries and aquaculture sectors. Turkish municipalities are responsible for quality control and conservation in the local open markets.

Policies and policy-making

Policies are formulated under national development plans prepared by the Ministry. The 10th Development Plan covers priority areas identified for the 2014-2018 period. Turkey's priority for fisheries and aquaculture is to use its resources optimum for sustainable improvement of the country welfare. Some of the current and future measures aimed at sustainable fisheries and aquaculture include:

- Creating an effective control and investigation mechanism
- Adapting fishing capacity to available resources
- Improving data collection and analysis
- Introducing new species for aquaculture
- Researching alternative feed supply chain for aquaculture
- Conducting research and development for both the fisheries and aquaculture industries; blend knowledge with experience

Management Applied to Main Fisheries and Aquaculture Fisheries

The national policy for the fisheries and aquaculture industry has traditionally focused on promoting production. This policy includes both fisheries and aquaculture management and development measures. These management measures have focused on the control of fishing effort via restrictions on tools and materials and the enforcement of fishing seasons. Law No. 1380 of 1971, as amended by Laws 3288 of 1986 and 4950 of 2003, is the framework law for all fisheries and aquaculture and related activities. The law provides the basis for the regulations and notifications, issued under the authority of the Minister, which are used to regulate the fisheries. Article 1 of the Law gives the scope of the Act- "protection, production and inspection of fishery products" – and Article 2 gives the definitions, including the fishery products, which are amplified by other regulations.

Technical measures

The Turkish Implementing Regulation on Fisheries, 1995, is the fundamental regulatory instrument for marine and inland fisheries. The regulation covers:

- Fishing License Issue and Formats
- Provisions on Production Areas
- Prohibition on Explosives and Hazardous Substances
- Fishing Tools and Materials
- Prohibitions, Limitations and Liabilities
- Fishery Product Hygiene
- Inspection and Control

The main mechanism of fisheries regulation is to publish the necessary information in the Official Gazette every six months after consultations and to inform the entire industry with it. The Notifications

set the rules and general principles for the technical measures to be taken. Technical measures by notifications include:

- tools and material restrictions and prohibitions,
- control measures for fishing areas,
- establishment and extent of protected areas,
- seasonal limitations; species size limits,
- capture prohibitions for species.

Progress Related to Achieving a Sustainable Fisheries Sector Management

Fisheries Information System

Turkey's Fisheries Information System (SUBIS) has been implemented in 2008 and updated since then regarding to recent demands of responsibilities of General Directorate for Fisheries and Aquaculture. SUBIS comprises all fisheries and aquaculture related registries and data such as vessel records, licences, catch certificates, aquaculture facilities information subsidies, fishing permits, quotas, landing data, logbooks, sale notes, control and surveillance data. The Ministry has established a GSM/Satellite based vessel monitoring system and electronic logbook in 2016. The Vessel Monitoring System covers fishing vessel over 12 meters in length.

Vessel Decommissioning Scheme

Turkish marine fishing fleet is mostly dominated by small scale fishing vessels in quantity. There are 15.315 fishing vessel in total and only 1.586 of them are larger than 12 meters. Since 2012, number of fishing vessel has been decreasing gradually because of the buyback programs for the fishing vessels larger than 10 meters initiated by Directorate General for Fisheries and Aquaculture (DGFA). So far, 5 programs finalized in 2012, 2013, 2014, 2016 and 2017. Thanks to the buyback programs, a total of 1.264 vessels were decommissioned until end of the 2017.

Aquaculture

Article 13 of the Law states that those who wish to farm aquatic species for commercial purposes are obliged to apply to the Ministry by informing the Ministry about the location, characteristics and management of the facilities, and submit the enterprise's project and plans. Permission is issued by the Ministry if there are no adverse effects in terms of public health, the national economy, navigation or science and technology perspective. The provisions of the last paragraph of Article 4 of the Fisheries Law 1380 are also applicable for production units to be established in the sea and inland waters.

According to Article 13 of the Fisheries Law, the procedures and principles related to aquaculture are determined by the Aquaculture Regulation, which was issued in 2004. Aquaculture Regulation was amended 3 times by order of 2007, 2009 and 2010. This regulation covers and sets out rules for the following issues:

- Site selection for inland and marine farms
- Application and evaluation procedures for fish farming licenses
- Approving the projects and issuing licenses
- Improving production capacity, species etc., cancellation (closing down farms), site changes and sales
- Other aquaculture activities (tuna fattening, organic farming, integrated production systems)
- Importing brood fish, egg and offspring

- Compulsory technical staff employment
- Fish health management
- Environmental impacts and protection
- Monitoring and control of farming activities

All aquaculture producers must have an aquaculture license of registration from the DG for Fisheries and Aquaculture. The details of the application, issuing and cancellation of the aquaculture license are described in the Aquaculture Regulation issued in 2004. Entrepreneurs or applicants need to submit their applications either to central offices or Provincial Directorates of the Ministry with all the related necessary documentation-for example a written application with species, capacity and production system clearly mentioned and a map of the area (1/25 000 scale). Applications for trout, carp, sea bass and sea bream on-growing farms and hatcheries for these species up to two million offspring/year capacity can be submitted to the Provincial Directorates, while applicants for other on-growing species (namely turbot, sturgeon, eel, algae, molluscs and crustacean species) and trout, carp and sea bass/sea bream hatcheries with a annual capacity of more than two million have to apply directly to the Aquaculture Department in Ankara.

A team of experts from the central or provincial office then visits the site and prepares a preliminary survey report. If the report is positive, a preliminary license is issued for eight months and can be extended up to four months. Supporting documentation submitted for the preliminary license must include an application letter, site map (1/25 000 scale), the preliminary survey report and a water quality report.

The entrepreneur can then prepare the full project documentation, which includes a farm or hatchery design and feasibility report and an environmental impact assessment (EIA) report. Approval is also needed from other related institutions and/or ministries dependent on the nature of the project. If the project is approved, the license (Fish Farming Document) is issued with a 'Producer Certificate'; this usually takes about 1 year. The rental contract period for marine cage sites is maximum 15 years and the contract might be terminated earlier by the government.

According to current EIA legislation (issued in 2003) those farms with annual capacity less than 30 tons do not require an EIA. Farms having annual capacities between 30-1 000 tons may require EIA and this is decided by EIA commissions in each province. Farms aiming to produce over 1 000 tons per annum must submit an EIA report.

BRIEF INFORMATION ON PROCESSING, PRESERVING, STORING, TRANSPORTING, AND MARKETING OF FISH AND FISH PRODUCTS

Fish utilization

Fish consumption in Turkey, especially anchovies, based on fish caught at sea and fish are usually consumed fresh. Per capita consumption of fish over the last years has been around 7-8 kg, with yearly variations in the availability of small pelagic fish. Generally, the products produced by the sector are fresh, chilled, frozen, canned, marinated and brine fishery products. Fish processing facilities are located in Marmara and Aegean regions; not only near to main aquaculture and catching areas, but also near to consumers centres.

Regarding fish processing facilities/plants, they have to be registered according to the national Fishery Law No 1380 and other related regulations; furthermore, those facilities which export to the EU have to be approved by the Ministry as the Competent Authority. There are 165 licensed fish processing facilities nationwide, of which more than 100 are approved for exports to the EU.

Domestic and international markets

Domestic market for aquaculture products has largely extended over the last couple years. Main species that are being sold on domestic market are trout, sea bass and sea bream. Freshwater fish is mainly sold in the local market and is generally consumed close to the production area.

Over the last couple years, there have been growing interests among large companies to domestic-market-oriented products.

The opening of fishery products sections in big supermarkets with their better hygienic conditions have resulted in positive pressure in sector for improvements since the consumers prefer shopping these products from them. The retail markets have developed their conditions and started to compete with supermarkets.

With predominated by the sale of trout, sea bream, sea bass, the big portion of the export in 2013 was done to Netherlands, followed by Germany and Italy. Almost all of the Turkey's tuna production was exported to Japan.

In 2013, the main source of imported fish was Norway followed by the Iceland as key suppliers of fishery products to Turkey. The main important species were mackerel, tuna fish, herrings, salmon species, cods, sardines and cuttlefish.

IMPROVEMENTS IN FISHERIES AND AQUACULTURE RESEARCH INCLUDING MAIN RESULTS OF RESEARCH STUDIES OF RELEVANCE TO THE TAC

The result of the projects are accessed at the link given below:

Central Fisheries Research Institute, Trabzon, Turkey.

<http://arastirma.tarim.gov.tr/sumae>

Mediterranean Fisheries Research Production and Training Institute, Antalya, Turkey.

<http://arastirma.tarim.gov.tr/akdenizsuurunleri>

IMPROVEMENTS IN FISHERIES DATA AND COLLECTION

Turkish Statistics Institute (TURKSTAT) is the competent authority for statistics and undertakes its duties in close collaboration with the Ministry of Agriculture and Forestry. TURKSTAT has collected landings and effort data since 1967. Apart from marine fishery statistics, TURKSTAT collects inland and aquaculture fishery statistics through the Ministry and publishes yearly. TURKSTAT data sets include several variables of the vessels whose length is at or above 5 meters: number of fishing vessels, Overall Length (LOA), Gross Tons (GT), power of the main engine in terms of kilowatts (kW), and other important ones. The Fisheries Information System (FIS: English abbreviation, SUBIS; Turkish abbreviation) was installed in Ministry in 2008. Data regarding inland fisheries and aquaculture has been collected regularly and automatically through 81 provinces since then.

PRIORITIZED RESEARCH AREAS SUGGESTED FOR CONSIDERATION OF THE TAC

Aquaculture, including culture-based fisheries

- Aquaculture of endangered species
- Harmonization and updating of aquaculture legislation
- Best aquaculture practices/Organic aquaculture
- Marketing, Market access and Trade
- Species diversification
- Aquaculture management with ecosystem approach

- Aquaculture certification
- Fish welfare
- Food safety and security
- Integrated coastal management plan
- Institutional capacity building
- Promoting of domestic fish consumption
- Increasing of processing technologies and value-added products
Increasing the quality and quantity of both processing technologies and value-added products

Capture fisheries including recreational fisheries

- Conservation and development of the marine organisms' habitat
- Policy formulation, planning, and programming
- Development of rules and regulations
- Sustainable exploitation and management of capture-based fisheries and fishing resources
- Improvement the efficiency of Monitoring Control and Surveillance (MCS) measures by strengthening fisheries inspections
- Development a comprehensive and operational fisheries data collection system
- Contribution to the food security
- Institutional capacity building

The Fifth Meeting of the Technical Advisory Committee (TAC) was held virtually from 23 to 24 November 2020. The meeting was attended by participants from three of the Central Asian and Caucasus Regional Fisheries and Aquaculture Commission (CACFish) member countries, namely, Azerbaijan, Kyrgyzstan, and Turkey. The following invited countries were present at the Meeting: Georgia, Kazakhstan, Turkmenistan, Ukraine and Uzbekistan. The meeting comprised 52 participants. The TAC discussed scientific recommendations on the following issues of relevance to CACFish: (i) aquatic genetic resources; (ii) restocking and culture-based fisheries; and (iii) post-harvest market measures, rules, and standards for safe, quality fish and fish products. The Meeting noted that limited progress had been made with respect to the delivery of the Second Five-year Regional Work Programme (2016–2020). The TAC also reviewed the Third Five-year Regional Work Programme for 2021–2025. The Committee agreed to abolish, subject to approval of the Commission, the RWP with a view that: (i) a weak, dysfunctional programme creates a negative perception for the Commission; and (ii) the possibility of finding external donor funding for the programme has been particularly difficult as a result of the COVID-19 crisis. The Committee agreed on its work plan for 2021–2022 intersessional period. The TAC described the involvement of non-CACFish Member States in the work plan activities as essential to sustainability and catalysing regional cooperation.