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Report of the

SCOPING WORKSHOP ON REGIONAL COOPERATION PROGRAMME FOR RESPONSIBLE AQUACULTURE AND FISHERIES DEVELOPMENT IN THE CENTRAL ASIAN AND CAUCASIAN COUNTRIES

Urumqi, Xinjiang Urumqi Autonomous Region, China, 4–8 June 2012

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Cover photograph: Participants of the FAO Scoping Workshop on Regional Cooperation Programme for Responsible Aquaculture and Fisheries Development in the Central Asian and the Caucasian Countries, Urumqi, China, 4–8 June 2012 (courtesy of FAO/Mohammad Hasan).

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PREPARATION OF THIS DOCUMENT

This document contains the proceedings and results of the FAO Scoping Workshop on Regional Cooperation Programme for Responsible Aquaculture and Fisheries Development in the Central Asian and Caucasian Countries, 4–8 June 2012. The workshop was jointly organized by the FAO Fisheries and Aquaculture Department (Aquaculture Service [FIRA], Marine and Inland Fisheries Service [FIRF] and the Statistics and Information Service [FIPS]), the FAO Technical Cooperation Department (Integrated Food Security Support Service [TCSF]), the FAO Subregional Office for Central Asia (SEC), the FAO Regional Office for Europe and Central Asia (REU) and the FAO Representation in China in collaboration with the Ministry of Agriculture of the People's Republic of China through the Bureau of Fisheries and the Department of International Cooperation of the Ministry of Agriculture. The report was prepared by Dr Mohammad R. Hasan (Aquaculture Officer, Aquaculture Service, FIRA) and Mr Pedro B. Bueno (FAO Consultant).

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ABSTRACT

This report comprises the workshop proceedings and the strategy for regional cooperation that was developed by the participants; the latter was the principal output of the workshop. The major inputs to the discussions to craft the strategy were the country reports that described their priorities in five areas, namely research and technology development, manpower development, extension and information, management and policy; and their own assessment of their weaknesses and strengths in these areas. The deliberations on regional priorities and technical areas for cooperation and potential co-operators in each area were informed by presentations from institutions, projects and agencies that are working or have associations with either or both the Central Asia and Caucasus regions. A significant result of this process is a matrix that matches potential co-operators (provider country or institution) and hosts (recipient country) for various and specific capacity building needs, which were identified as common regional or subregional priorities. To start the programme, the workshop recommended seven activities that need to be initiated as soon as possible, as follows: (1) development of regional projects, organization of training/workshops, and capacity development on feed production and management on a pilot scale; (2) provision of technologies and equipment for the development and production of specialized fish feeds for different species from local raw materials; (3) training workshop on project development designed to improve project development skills by actually formulating projects that are based on the identified priorities; (3) an action plan for the upgrading of national laboratories in order to comply with international standards for certification of fish and fish products; (4) workshop on harmonization of institutional management structure and legislation in fisheries and aquaculture in accordance with international fisheries and aquaculture laws/policy for responsible fisheries and aquaculture; (5) development of an action plan to identify activities for sharing and providing broodstock and seed material that are of high genetic quality, complemented by training on broodstock management; (6) programmes for increasing and conserving endemic fish stocks in inland water reservoirs; and (7) establishing a working group linked to the TAC (Technical Advisory Committee) of CACFish (Central Asian and Caucasus Regional Commission on Fisheries), to support the follow-up of the scoping workshop recommendations and immediate action plans. This set of recommendations was addressed to the Food and Agricultural Organization (FAO) and China but should also involve concerned government institutions, technical experts of governments and regional institutions in certain areas, and the CACFish.

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ACKNOWLEDGEMENTS

The FAO Fisheries and Aquaculture Department gratefully acknowledge the generous hosting and secretariat services provided by the Ministry of Agriculture of the People's Republic of China and the collaboration of the Fisheries Research Institute of Xinjiang Autonomous Region, Urumqi, People's Republic of China and the Freshwater Fisheries Research Centre, Wuxi, and in particular Mr Qu Sixi of the Department of International Cooperation, Ministry of Agriculture, China, Mr Cui Lifeng, Bureau of Fisheries, Ministry of Agriculture, China and Ms Gulinu Abudurezake, Fisheries Bureau, Xinjiang Uyghur Autonomous Region, Xinjiang Government. In addition, the organizers would like to thank all the participants for their time and effort.

BACKGROUND TO THE WORKSHOP

The issue: effective delivery of technical assistance to developing countries

The need to increase the capacities of developing countries for aquaculture management and development has received renewed impetus from recent global forums such as the meetings of the FAO Committee on Fisheries and the COFI Sub-Committee on Aquaculture. Specific areas of the world were particularly identified for urgent assistance, among which were the Central Asian and Caucasian countries. The organizers (i.e. FAO, the Ministry of Agriculture of China and the Provincial Government of Xinjiang) and the participating countries subsequently agreed that 'assistance' would be best delivered and implemented through technical cooperation. The workshop was thus designed to produce an outcome that would foster and strengthen cooperation in aquaculture and fisheries development among Central Asian (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) and Caucasian (Azerbaijan, Armenia, Georgia) countries and to facilitate the bilateral cooperation between China and its neighbouring countries in central and south Asia.

The context

After their independence in 1990, when the then Soviet Union was dissolved, the fisheries and aquaculture outputs of most of the countries that formed the Union fell steeply and continuously. The capacities for management, education, research, extension and production went into a general decline. Most affected were the countries of Central Asia and a number of those in the Caucasus region such as Armenia, Azerbaijan and Georgia. Not only were their fisheries resources hardly contributing to the production of food and generation of wealth, but the years of neglect and poor management had jeopardized their sustainability. Recent efforts at helping governments to revitalize the fisheries but particularly the aquaculture subsector of Central Asia by FAO in partnership with the Government of Turkey as well as Finland have borne small but promising results. This renewed interest facilitated the formation of a Central Asian and Caucasus Regional Commission on Fisheries (CACFish). All these have fuelled the interest of governments and some technical assistance and donor agencies in investing more into the modernization of the aquaculture subsectors. Assessing the prospects for a broader and more intensified assistance, FAO felt that the proven approach of technical cooperation among developing countries (referred to as Technical Cooperation among Developing Countries [TCDC]) would be a cost-effective strategy. TCDC would foster closer cooperation among the participating countries while they shared their experiences, pooled resources and expertise. China, with its advanced technical, scientific and production capacity for aquaculture and a lengthy experience in cooperating in aquaculture development with developing countries in Asia, Africa, Latin America, the Pacific and Near East, was approached by FAO to participate, as a co-operator in a scheme of regional technical assistance to Central Asian Caucasus and other Asian countries, that will operate under TCDC. The word co-operator is the technical term for a provider country in the language of South-South Cooperation.

SCOPE AND ORGANIZATION OF THE WORKSHOP

The workshop was co-organized by relevant FAO units and offices including the Fisheries and Aquaculture Department (Aquaculture Service [FIRA]/Marine and Inland Fisheries Service [FIRF]/Statistics and Information Service [FIPS]), the Subregional Office for Central Asia SEC, the Regional Office for Europe and Central Asia [REU], the Integrated Food Security Support Service [TCSF] of the Technical Cooperation Department [TC] and the FAO Representation in Beijing in collaboration with the Bureau of Fisheries and Department of International Cooperation of the Ministry of Agriculture, the Fisheries Research Institute of Xinjiang Autonomous Region in Urumqi, China, and the Freshwater Fisheries Research Centre in Wuxi, China.

Objectives

The workshop had the following objectives:

a. Strategic: Develop a strategy to revitalize aquaculture and fisheries development in the region, identifying the development needs that could be better met by regional cooperation among the Central Asian, Caucasian and other Asian countries, and identifying areas for cooperation between China and the countries of the two regions.

b. Operational:
    i. review recent activities and present status of regional, subregional and national aquaculture and fisheries development;
    ii. identify emerging issues, opportunities and challenges and analyse advantages and constraints, including experiences and lessons learnt;
    iii. develop a regional aquaculture and fisheries development strategy that contains programmes, outcomes and activities and areas that require regional cooperation through a matching exercise to identify potential areas of bilateral and multilateral cooperation;[1]
    iv. identify possible development partners, regional and/or international organizations and donors that are active in the region; and
    v. discuss the formation of a regional network without duplicating the initiatives/activities to be undertaken by CACFish, as well as possibly explore the formation of one or more thematic-based networks under the umbrella of CACFish.

Outputs

The major output was a strategy for regional cooperation, which comprised a matrix that matches potential co-operators (provider countries or institutions) and hosts (recipient countries) for various and specific capacity building needs that were identified as common regional or subregional priorities. The meeting formulated a short list of seven activities that need to be initiated as soon as possible, as follows: (1) development of regional projects, organization of training/workshops, and capacity development on feed management and feed production on a pilot scale; (2) provision of technologies and equipment for the development and production of specialized fish feeds for different species from local raw materials; (3) training workshop on project development: designed to improve project development skills by actually formulating projects that are based on the identified priorities; (3) an action plan for upgrading of national laboratories in order to comply with international standards for certification of fish and fish products; (4) workshop on harmonization of institutional management structure and legislation in fisheries and aquaculture in accordance with international fisheries and aquaculture laws/policy for responsible fisheries and aquaculture; (5) development of an action plan to identify activities for sharing and providing broodstock and seed material that are of high genetic quality, complemented by training on broodstock management; (6) programmes for increasing and conserving endemic fish stocks in inland water reservoirs; and (7) establishing a working group linked to the Technical Advisory Committee (TAC) of CACFish to support follow-up of scoping workshop recommendations and immediate action plans.

Participants and workshop venue

The workshop participants consisted of government representatives, mostly from the ministries in charge of fisheries and aquaculture, of the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan), Azerbaijan and Georgia of the Caucasus region, China, the Islamic Republic of Iran, Mongolia, Pakistan and Turkey; representatives of the CACFish, the intergovernmental

[1] The cooperative arrangements would be (i) between China (Fisheries Research Institute, Urumqi, Xinjiang and FFRC, Wuxi, Jiangsu), Central Asian countries (CAC), Caucasus countries and selected Asian countries to include Afghanistan, Iran (Islamic Republic of), Mongolia and Pakistan; (ii) between China and its neighbouring countries; and (iii) among CAC, Caucasus countries and selected Asian countries, and through TCDC (Technical Cooperation among Developing Countries) or south-south cooperation and inter-regional cooperation (CACFish-FAO/China/Government of Turkey-NACEE-NACA, all inclusive) with emphasis on two levels of cooperation, namely regional and between groups of countries.

organization of the Network of Aquaculture Centres in Asia and the Pacific (NACA), the Network of Aquaculture Centres in Central-Eastern Europe (NACEE); the Freshwater Fisheries Research Centre in Wuxi; the Xinjiang Fisheries Research Institute; and officers of the various units of FAO including FIRA (Aquaculture Service), FIPS (Statistics and Information Service), FIRF (Marine and Inland Fisheries Service) from Rome, FAO Subregional Offices in Central Asia (SEC) and FAO Regional Office for Europe and Central Asia (REU), and the Technical Cooperation Department. The workshop was attended by 45 participants. The workshop was hosted by the Ministry of Agriculture of China and held at the Xinjiang Royal International Hotel.

The opening ceremony of the workshop was inaugurated by Mr Cui Lifeng, Deputy Director General of the Bureau of Fisheries of the Ministry of Agriculture, China. Other speakers were Mr Qu Sixi, Deputy Director General of the Department of International Cooperation, Ministry of Agriculture (MoA), China; Ms Gulinu Abudurezake, Director General of the Bureau of Fisheries, Xinjiang Urumqi Autonomous Region, China; Dr Rauf Hajiyev, Deputy Minister for Ecology and Natural Resources of Azerbaijan; and Dr Devin Bartley, Senior Fisheries Officer, on behalf of Mr Jiansan Jia, Chief of the Aquaculture Service, FAO, Rome.

Workshop procedures and materials

The preparatory stage of the workshop consisted of a comprehensive consultation within FAO, which involved the Fisheries and Aquaculture Department, the subregional office Central Asia and the Regional Office for Europe, the Technical Cooperation Department, and the CACFish to agree on the concept and objectives of the workshop, develop the workshop agenda and design the methodology, and identify the country and institutional participants. A guideline for the presentation of the country status and prospects was developed and provided to the national focal points. The workshop agenda was then advised to the institutional participants that were invited to the workshop as their reference in developing their overview presentations.

The country reports of the status and prospects of fisheries and aquaculture[2] followed a standard format that described the natural, physical and manpower resources, institutional capabilities for sector management, policy and regulatory framework, and broad assessments of the priority needs for production, technology development and transfer, manpower training, and institutional strengthening. The format was generally adhered to and the reports were prepared and presented in PowerPoint mode. Some reports were in English, the others in Russian. Simultaneous translation in Chinese, English and Russian was provided by a panel of interpreters.

Overview reports of their initiatives in the areas and countries represented in the scoping workshop were provided by the following institutions: FAO/SEC, FAO/REU, CACFish, NACA, NACEE, the Freshwater Fisheries Research Centre (FFRC) Wuxi and the Xinjiang Fisheries Research Centre. A thematic presentation on the concept, mechanics and experiences in South-South Cooperation was provided by FAO.

The workshop consisted of plenary sessions and working group sessions. The plenary sessions provided the inputs for the working group sessions and the opportunity to present and discuss their results.

There were three group sessions – Caucasus, Central Asia, and other Asia (China, the Islamic Republic of Iran, Mongolia, Pakistan and Turkey). The sessions aimed at producing a series of outputs: the first was the raw material for the second group session, whose output became the raw material for the third session. The outputs of the third group session were compiled into a working table for the final discussion session, which was held in plenary. The working group outputs, produced in progression, were: (1st) a list of

[2] Countries reporting were Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan from Central Asia; Azerbaijan and Georgia ‘from the Caucasus; and China, Iran, Mongolia, Pakistan and Turkey. In the workshop discussions, salient information on Armenia, which was unable to attend, was provided by the Fisheries Officer of FAO Subregional Office for Eastern Europe (FAO/REU).

common subregional priorities[3], (2nd) strategic collaborative actions to address these subregional priorities; (3rd) a matching of prospective providers and beneficiaries of the collaborative actions to meet the identified priority issues, and (4th) a short list of priority actions recommended for immediate implementation, i.e. initiated within 2012 or early in 2013. The fourth and final discussion session also adopted the vision of the programme of cooperation and drafted its strategic goals and specific objectives. The outputs of the Programme are represented by the priority actions recommended for implementation (3rd and 4th outputs).

The workshop agenda and timetable is presented in Appendix 1 and the list of participants in Appendix 2. A Technical Secretariat comprising Mr Jiansan Jia, Chief of FIRA, FAO, Dr Mohammad R. Hasan (FAO/FIRA), Dr Devin Bartley (FAO/FIRF), Mr Zhou Xiaowei (FIPS), Mr Liu Zhongwei (TCA/TCSF), Dr Haydar Fersoy (SEC), Dr Thomas Moth-Poulsen (REU) and Ms Kiyal Guzel (FAO/SEC) was responsible for the technical coordination of the workshop. Appendix 3 presents a summary of statements made during the opening and closing ceremonies. The synthesis of the country presentations focusing on capacities and priority needs in research and technology development, education and training, extension, policy, and production is provided in Appendix 4 and a summary of the presentations of the regional and other organizations is provided in Appendix 5.

STRATEGY FRAMEWORK FOR REGIONAL COOPERATION

Rationale

This Strategy Framework is founded on the principle of TCDC or Technical Cooperation among Developing Countries. The participating countries are at different stages of economic development and fisheries advancement, and possess varying levels and types of technical expertise, experience and assets. Their fisheries sectors have common as well as unique problems even though some of them have already experienced and devised resolutions for some of those problems. Technical cooperation would be an efficient and economical means of solving common issues and enhancing the sharing of experiences and transfer of technology. From the perspective of donor and development agencies, it is a cost-effective means of providing assistance. The Strategy was informed essentially by (a) the country status reports on aquaculture, culture-based fisheries and inland fisheries development presented by the participating countries; (b) the overviews of regional as well as subregional programmes and activities of the regional organizations and institutions in fisheries and aquaculture with operations in Central Asia or Caucasus regions, as well as those in the other Asian countries that took part in the workshop; and (c) reports of the programmes and activities of two freshwater fisheries research and development institutions in China.

Vision of the Programme of cooperation

In line with the agreed mode for delivering development assistance, the workshop adopted a vision statement that is underpinned by technical cooperation in support of national development initiatives:

“Our vision is for the fisheries and aquaculture development efforts of our respective nations to be supported, hastened and sustained by regional and interregional cooperation.”

Strategic goals of the Programme of cooperation

The workshop distilled from its deliberations five strategic goals of the Programme of Cooperation, as follows:

[3] In keeping with the content of the country reports, the seven categories of issues are (1) production; (2) research and technology development; (3) manpower development; (4) information development and exchange; (5) management and institutional strengthening in the aquaculture sector; (6) management and institutional strengthening in the capture fisheries sector; and (7) market access.

a. Assurance of national food and nutritional security through increased and sustainable productivity;
b. Improvement of livelihoods through diversification and generation of more employment opportunities along the value chain;
c. Wealth generation from higher economic returns and improved market access for fisheries products;
d. Sustainability of livelihood assets through environmentally sustainable practices; and
e. Adaptive capacity and resilience to all types of risks.

Specific objectives of the Programme of cooperation

Three specific objectives were defined:

a. To strengthen capacities in all areas that support aquaculture and fisheries development through TCDC;
b. To address cost-effective common regional and subregional issues; and
c. To facilitate access to external technical and funding assistance.

The core of the Programme comprises a set of priority problem areas common to a number of countries and the indicative activities that would address those problems through technical cooperation; one or more countries would have the distinctive capability to provide the solution to those problems faced by the other countries. This indicative programme of cooperation was reached by an analysis of the strengths and weaknesses and identification of the priority needs of each country in the five spheres of fisheries and aquaculture management and development: policy, research and technology development, education and training, extension, and production. The priority needs and strengths were then matched and countries as well as their national institutions were identified as 'donors' and others as 'recipients'. The Programme is envisioned to be facilitated through additional technical assistance from regional and international organizations under whose work programmes most of the activities are included.

The TCDC/South-South Cooperation Programme

This section presents the outputs of three working groups (Tables 1, 2 and 3) and the synthesis of the three outputs into an indicative regional programme (Table 4)

Table 1. Working Group for Caucasus: Azerbaijan, Georgia and Armenia[4] (joined by FIRA and FAO/REU)

Priority issues in the aquaculture and fisheries sectors of the Subregion	**Options to address each priority**	**Countries, institutions (national, regional, international) that are suggested to have the lead and collaborating role**
1. Production (species, inputs, technology, health management, etc.)	1.1. Construction of feed production enterprises for fodder for salmon and carp and sturgeon. 1.2. Organization of workshops on feed formulation, production and management. 1.3. Development of efficient feed formulations on the basis of local and imported ingredients (small-scale production of feed) and culture of live food organisms and seaweed.	1.1.–1.3. China (Chinese Academy of Fisheries Science, CAFS) and Turkey (institute to be identified), FAO (to facilitate and provide technical assistance and training).

[4] Armenia was represented by FAO/REU.

	1.4. In Georgia – enterprises are needed for fish processing. 1.5. Establishment of pilot farms for sturgeon and salmonids based on new private pilot farms (new upgraded equipment). 1.6. Cooperation to share seed material between countries and farms (fish larvae, fingerlings, eyed eggs, etc.).	1.4. Turkey, Azerbaijan (e.g. Caspian Fish Co.). 1.5. Turkey, China, Armenia. 1.6. China, Azerbaijan, Georgia, Kazakhstan, Armenia, Iran (Islamic Republic of), Turkey, Russian Federation: Ministry of Fisheries and private enterprises.
2. Research and technology development	The fisheries sector research institutes of most of the Caucasian countries do not have the financial capacity to undertake the necessary research to assess fisheries resources and support the development and monitoring of fisheries management regimes. Concerning technology, it should be noted that most fishing fleets and hatchery facilities are old, ill-equipped and generally in a poor state. 2.1. Improvement of equipment for fisheries research institutes. 2.2. Introduction of new production technologies (including closed-water recirculation system). 2.3. Introduction of new methods at different production stages. 2.4. Institutional capacity building of research institutes.	2.1. – 2.4. China (CAFS), Iran (Islamic Republic of) (IFRO[5]), Turkey (CFRI[6]), Russian Federation (VNIRO[7]) and FAO (to facilitate and provide technical assistance and training).
3. Manpower (production, technical, scientific, extension)	3.1. Sharing experience with the leading international aquaculture centres. Human resource development (ichthyologists, fisheries technologists, veterinarians/fish disease control). 3.2. Improvement of formal educational capacity (including curricula at the university level) and capacity building for training and extension institutions that address the needs of the fisheries sector and aquaculture.	3.1. – 3.2. China (CAFS), Turkey (CFRI, Trabzon) Russian Federation, Iran (Islamic Republic of) (IFO[8]) and FAO (to facilitate and provide technical assistance and training).

[5] Iranian Fisheries Research Organization.
[6] Central Fisheries Research Institute, Trabzon, Turkey.
[7] Russian Federal Research Institute of Fisheries and Oceanography.
[8] Iranian Fisheries Organization (SHILAT).

4. Information	4.1. Establishing a regional aquaculture website to share information between countries. 4.2. Improve the system for statistical data collection for both government and private sectors as appropriate. 4.3. Training workshop on data collection for aquaculture and fisheries.	4.1. – 4.2. China (CAFS), NACA, Turkey (MARA[9]), Russian Federation (VNIRO) and FAO (to facilitate and provide technical assistance and training). 4.3. FAO.
5. Management of the aquaculture sector (capacity of government agencies, regulations, policy, better practices, organization, etc.)	5.1. Improvement of aquaculture legislation for the aquaculture sector at national level. 5.2. Elaboration of technical instructions for the promotion of the sustainable development of aquaculture. 5.3. Establishment of an agency (National Agency for Aquaculture Management) if appropriate. 5.4. Development of national programmes and strategies for aquaculture development for the period 2013–2020. 5.5. Establishment of associations of fisheries and aquaculture owners/managers. 5.6. Institutional capacity building and preparation and practical training of qualified staff.	5.1. – 5.6. China, Turkey, Russian Federation and FAO (to facilitate and provide technical assistance and training). CACFish (development of regional management frameworks for aquaculture).
6. Management of the fisheries sector (regulations, policy, capacity of government agencies, biodiversity protection, etc.)	6.1. Improvement of fisheries legislation at national level. 6.2. Improvement of the system of fisheries management. 6.3. Development of national programmes and strategies for fisheries and aquaculture development for the period 2013–2020. 6.4. Establishment of an association of fisheries and aquaculture owners/managers. 6.5. Improvement of a system of evaluation of fisheries resources and determination of capture quotas.	6.1. – 6.5. China, Turkey, Russian Federation, Iran (Islamic Republic of) and FAO (to facilitate and provide technical assistance and training). CACFish (development of regional management frameworks).

[9] Ministry of Agriculture and Rural Affairs, Turkey.

	6.6. Institutional capacity building and preparation and practical training of qualified staff. 6.7. Regional cooperation on stock assessment. 6.8. Co-management of lakes (e.g. Lake Sevan in Armenia).	6.6. – 6.8. Russian Federation, Azerbaijan, Iran (Islamic Republic of) and FAO (to facilitate and provide technical assistance and training). Kyrgyzstan (e.g. experiences from the FAO project on the management of Lake Issyk Kul).
7. Market access (food safety, standards, trade terms, etc.)	7.1. Organization of certification systems for aquaculture. Establishment of accredited/reference laboratory(s) to provide certification/ensure product quality. 7.2. Provision of technical assistance to implement the certification scheme for aquaculture and fisheries products.	7.1. – 7.2. FAO (Codex Alimentarius), Eurofish, and CITES[10] (to assist in trade issues) European Union, and Turkey.

[10] CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

Table 2. Working Group for Central Asia: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan (joined by FAO Project in Kyrgyzstan)

Priority issues for aquaculture and fisheries sectors for the Subregion	**Options to address priority issues**	**Countries, institutions (national, regional and international) that are suggested to have the lead and collaborating role**
1. Production (species, inputs, technology, health management, etc.)		
1.1. Improvement of the diversity of species (common carp, silver carp and grass carp, trout, whitefish, peled[11], catfish, sturgeon, paddle fish, and pike-perch)	1.1. Application of innovative technologies for fish production.	1.1 – 1.2. Collaborating countries: Turkey, China, Iran (Islamic Republic of), Hungary, Russian Federation, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; Department for Fisheries of Kyrgyzstan, Fish Enterprise of Tajikistan, MoA[12] of Kazakhstan, MAWR[13] of Uzbekistan, State Committee for Fisheries of Turkmenistan; Turkey, China, Russian Federation and other countries.
1.2. Specialized feeds for fish	1.2. Plant for production of balanced/extruded feeds; development of efficient feed recipes (formulations) based on local and imported ingredients (small-scale production of feed)/production of live organisms (living resources) and seaweed.	
1.3. Good quality seed	1.3. Construction of hatcheries. Development of programme for quality assurance of broodstock in compliance with local legislation. Carrying out a regional hatchery management training programme for staff members of Department of Fisheries.	1.3. China, Turkey, FAO, CACFish, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan.
1.4. Intensification of production systems	1.4. Introduction of intensive methods in aquaculture sector.	1.4. – 1.5. China, Turkey, FAO, CACFish, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan.
1.5. (Anti-)epizootic activities.	1.5. Development of programme for regulation and prophylactic activities for fish safety and health.	

[11] *Coregonus peled*
[12] Ministry of Agriculture.
[13] Ministry of Agriculture and Water Resources.

2. Research and technology development 2.1. R&D to domesticate indigenous fish species for aquaculture 2.2. Introduction of new fish species for aquaculture 2.3. Elaboration of technological mechanisms	2.1. – 2.3. Establishment of cooperation programme on a regional level on capacity building for R&D work. Exchange of scientific and practical experience on a regional level.	2.1. – 2.3. China, Turkey, FAO, CACFish, Ministry of Agriculture of Kazakhstan, Biology and Soil Institute NAS KR[14], National Academy of Science of Tajikistan, Science and Research Institute of Turkmenistan, NRC for Fisheries Development of Uzbekistan.
3. Manpower (production, technical, scientific, extension)	3. Curriculum development for educating and re-training (upgrading) staff on a regional level (seminars, training sessions and conferences). Curriculum development for faculties and courses for re-training staff for fisheries.	3. China, Russian Federation, Turkey, FAO, CACFish, MoA Kazakhstan, Fisheries Department of Kyrgyzstan, Governmental Enterprise 'Tajik Fish', State Committee for Fisheries of Turkmenistan, MAWR Uzbekistan.
4. Information 4.1 Provision of information to the fisheries and aquaculture sector	4.1. Capacity building through sharing information on a regional level. Provision of information and consulting services to fisheries.	4.1. China, Russian Federation, Turkey, FAO, CACFish, MoA of Kazakhstan, MoAM[15] of Kyrgyzstan, MoA of Tajikistan, State Fisheries Committee of Turkmenistan, MAWR Uzbekistan. Specialized research and academic institutions of the collaborating countries.
5. Management of the aquaculture sector (capacity of government agencies, regulations, policy, better practices, organization, etc.) 5.1. Development of regulations on a regional level for improving the policy and development strategy of the fisheries and aquaculture sector	5.1. Review of the legal and regulatory documents on a regional level.	5.1. – 5.2. Russian Federation, Turkey, FAO, CACFish, MoA Kazakhstan, MoAM of Kyrgyzstan, MoA of Tajikistan, State Fisheries

[14] The National Academy of Sciences of the Kyrgyz Republic.
[15] Ministry of Agriculture and Melioration

5.2. Capacity building in the management of the aquaculture and fisheries sector; use of the best sector management method	5.2. Elaboration of guidelines on best practices in management. Elaboration of technical instructions for the promotion of sustainable development of aquaculture.	Committee of Turkmenistan, MAWR Uzbekistan.
5.3. Addressing issues of water resources management in transboundary rivers	5.3. Elaboration of strategy and policy on transboundary rivers and fisheries management on a regional level.	5.3. Russian Federation, Turkey, FAO, CACFish, MoA of Kazakhstan, MoAM of Kyrgyzstan, MoA of Tajikistan, State Committee on Fisheries of Turkmenistan, MAWR Uzbekistan.
6. Management of the fisheries sector (regulations, policy, capacity of government agencies, biodiversity protection, etc.)		Russian Federation, Turkey, FAO, CACFish, MoA of Kazakhstan, MoAM of Kyrgyzstan, MoA of Tajikistan, State Fisheries Committee of Turkmenistan, MAWR of Uzbekistan.
6.1. Reviewing the rules for use of tools for fish capture in accordance with the best practices	6.1. Formulation of regulations on the use of environmentally friendly fishing technologies.	6.1. Competent authorities of collaborating countries in the field of environmental protection.
6.2. Establishing associations and co-management methods	6.2. Creation of federations and associations on a regional level.	6.2. CACFish in collaboration with relevant agencies of collaborating countries.
6.3. Elaboration of regulations on a regional level for policy and strategy improvement in the fisheries system	6.3. Review of the regulations on a regional level.	6.3. Authorities of collaborating countries in the sphere of fisheries and aquaculture.
6.4. Capacity building on fisheries sector management	6.4. Development of guidelines on best management practices. Elaboration of technical instructions for the promotion of the sustainable development of fisheries.	6.4. Kyrgyz Republic, Turkey, FAO, CACFish

7. Market access (food safety, standards, trade terms, etc.)		
7.1. Access to marketing and information system	7.1. Establishment of marketing and price infrastructure system on a regional level.	7.1. – 7.2. FAO (Globefish); Eurofish; CACFish; Turkey; fish trade agencies of the participating countries.
7.2. Improvement of the general fish product supply chain	7.2. Introduction of international standards and rules at a regional level. Increasing the assortment of fish products. Development of regional guiding principles on the best methods in trade on a regional level.	

Table 3: Working Group: Other Asian Countries (China, the Islamic Republic of Iran, Mongolia, Pakistan, Turkey) (joined by FFRC Wuxi, FIRF, FIPS, NACA, and FAO CEC/CACFish)

Priority issues for aquaculture and fisheries sectors for the Subregion	**Options to address issues**	**Countries, institutions (national, regional and international) that are suggested to have the lead and collaborating role**
1. Production (species, inputs, technology, health management, etc.)		
1.1. Seed production, management and distribution.	1.1. Sharing of germplasm and of expertise on selective breeding.	1.1. China and Iran (Islamic Republic of).
1.2. Fish health management.	1.2. Regional workshop on general fish health status and management.	1.2. FAO, OIE, NACA, FishDev (Turkey).
1.3. Feed formulation, production and management	1.3. Regional and country-specific workshop/training on feed formulation, production and management.	1.3. China, Turkey, Iran (Islamic Republic of), NACA.
1.4. Production techniques	1.4. Study and workshop on farming systems. Study tour for farmers and investors.	1.4. Turkey, China, Iran (Islamic Republic of).
1.5. Culture-based fisheries 1.6. Habitat management	1.5. – 1.6. Workshop on all aspects of management and development.	1.5. – 1.6. China, Iran (Islamic Republic of).

2. Research and technology development		
2.1. Development of new species and strains for aquaculture	2.1. Study and identification of suitable coldwater aquaculture species.	2.1. Iran (Islamic Republic of), Pakistan, CACFish, FishDev (Turkey), China.
2.2. Hatchery technology for conservation	2.2. Study and identification of requirements for culturing and re-establishing endangered species. Conducting needs assessment on re-establishing endangered species. Identifying post-release needs and monitoring.	2.2. Iran (Islamic Republic of), China.
2.3. Selective fishing gear and methods	2.3. Regional survey of destructive fishing practices and gear; conducting test fishing in key areas.	2.3. CACFish, China, Iran (Islamic Republic of), Turkey.
2.4. Habitat and carrying capacity for culture-based fisheries	2.4. Conducting inventory of national resources, i.e. water bodies, species, productivity.	2.4. Iran (Islamic Republic of), China, Turkey.
3. Manpower (production, technical, scientific, extension)		
3.1. Capacity building and exchange	3.1.Training session, exchange of experts; university level course development; and curriculum development.	3.1. China, Iran (Islamic Republic of), Turkey.
4. Information		
4.1. Improve data collection generally	4.1. Establishment of a fisheries information system.	4.1. FAO, Turkey, China, Iran (Islamic Republic of).
4.2. Inland fisheries: production, species, number of fishers, vessels/gear	4.2. Clarify fish resources through field sampling of fish species; workshop to establish fishing quotas; establish data collection mechanisms for determining seed stocking for culture-based fisheries. establish data collection mechanisms for determining number of the fishers, boats/gear.	4.2. – 4.4.FAO, Turkey, China, Iran (Islamic Republic of).
4.3. Aquaculture production, species, number of farmers	4.3. Training workshop on data collection for aquaculture and fisheries (on aquaculture inputs/outputs, number of farms, area of farms, production through field surveys; for fisheries fish species, number of fishers, boats/gear).	
4.4. Social and economic data: Fish consumption, value of and income from	4.4. Develop methods for household surveys.	

fishing and/or aquaculture, employment (by gender) 4.5. For inland capture fisheries in Pakistan and China	4.5. Improve or establish institutional arrangement for data collection and dissemination in country.	4.5. FAO to assist Pakistan and China.
5. Management of the aquaculture sector (capacity of government agencies, regulations, policy, better practices, organization, etc.)		
5.1. Aquaculture regulation and development plans, regulations, laws.	5.1.Participation in CACFish. workshops on aquaculture governance; reviewing and updating of existing legislation/regulations.	5.1. China, FAO. CACFish, FishDev (Turkey).
5.2. Standard setting/BMP/food safety	5.2.Workshop on standard setting and food safety to improve standards.	5.2. CACFish, FishDev (Turkey), FAO.
5.3. Ecosystem approach; pollution control	5.3.Training course on EAA.	5.3. FAO.
5.4. Financial aspects of aquaculture management including insurance and privatization, , credit and farmers' organization	5.4. Sharing experience through workshops to include all species, areas, etc. to improve awareness.	5.4. Iran (Islamic Republic of), Turkey, FAO.
6. Management of the fisheries sector (regulations, policy, capacity of government agencies, biodiversity protection, etc.)		
6.1. Fisheries regulation, laws, policies, strategies and management plans	6.1. Participation in a CACFish workshop on fisheries governance; reviewing and updating existing legislation/regulations.	6.1. CACFish, FishDev (Turkey), FAO.
6.2. Enforcement and monitoring	6.2. Stakeholders'/fishers' workshop on legal fishing practices to improve fishing methods.	6.2. China, Iran (Islamic Republic of), CACFish, FishDev (Turkey), FAO.

7. Market access (food safety, standards, trade terms, etc.)		
7.1. Post-harvest, food safety		
7.1.1. Regular and all-year supply of products	7.1.1. Workshop for awareness on options and alternative fishing/storage; joint workshop to link fishers to market.	7.1.1. Turkey, China, CACFish.
7.1.2. Improve food safety and quality	7.1.2. Workshop on food safety, quality and marketing.	7.1.2. FAO, CACFish.
7.2. Markets		
7.2.1. Marketing infrastructure development	7.2.1. Developing market infrastructure; Project to develop model market designs and auction centres.	7.2.1. China.
7.2.2. Improve market access/increase exports	7.2.2. Traceability and certification feasibility project.	7.2.2. Iran (Islamic Republic of), China.

Table 4. Indicative regional programme

Identified priority areas	**High priorities for the region**	**Activities**	**Provider countries (FAO to facilitate)**
1. Production (species, inputs, technology, health management, etc.)	1.1. Feed production and management for each species of commercial importance in each country: • Synthesis of information, • Feed formulation, • Small-scale feed production, and • On-farm feeding and feed Management.	1.1. Training. Technology transfer. Information exchange. Supply of small-scale feed manufacturing plant and training. Training/workshop.	1.1. China and Turkey.
	1.2. Assistance in provision of quality fish seed supply: • Broodstock development, and • Hatchery management and larval rearing.	1.2. Supply of germplasm/ brood stocks. Training on broodstock management and hatchery technology.	1.2. China, Turkey, Iran (Islamic Republic of), Armenia.

2. Research and technology development	2.1. Introduction and/or improvement of new production technologies (e.g. pond, recirculation system, cage culture). 2.2. Identification of research and development needs of each country.	2.1. Technical assistance and training. Information exchange. 2.2. Technical assistance for research needs assessment and development of a research programme (TCDC).	2.1. China, Turkey, Iran (Islamic Republic of) and Azerbaijan. 2.2. China, Turkey, Iran (Islamic Republic of).
3. Manpower (production, technical, scientific, extension)	3.1. Curriculum development and capacity building through practical/vocational training. 3.2. Sharing experience with the leading international aquaculture centres	3.1. Training. Supply of educational materials. 3.2. Exchange of personnel Study tours.	3.1. – 3.2. China, Turkey.
4. Information	4.1. Development/improvement of data collection systems. 4.2. Sharing of information through networking/website.	4.1. Training Technical advice. 4.2. Exchange of information.	4.1. – 4.2. China, Turkey.
5. Management of the aquaculture sector (capacity of government agencies, regulations, policy, better practices, organization, etc.)	5.1. Assistance to develop legislations for aquaculture. 5.2. Institutional capacity building for aquaculture. 5.3. Development of guidelines on best management practice.	5.1. Technical assistance. 5.2. Training and study tours. 5.3. Study tours.	5.1. – 5.3. China, Turkey, CACFish
6. Management of the fisheries sector (regulations, policy, capacity of government agencies, biodiversity protection, etc.)	6.1. Assistance to develop legislations for fisheries. 6.2. Institutional capacity building for fisheries. 6.3. Strategy and policy elaboration on transboundary[16] rivers and fisheries management at regional level. 6.4. Establishment of co-management methods in lakes and reservoirs.	6.1. Technical assistance. 6.2. Training. 6.3. Study tours and exchange of experience. 6.4. Study tour of the Kyrgyz experience under FAO project GCP/KYR/003/FIN.	6.1. – 6.4. China, Turkey, Iran (Islamic Republic of), Kyrgyzstan (on co-management of lakes).

[16] Transboundary issues are only for central Asian countries.

7. Market access (food safety, standards, trade terms, etc.)	7.1. Establishing marketing and price information systems in each country in the region. 7.2. Introduction of international standards (including certification) and rules in each country in the region. 7.3. Regional guiding principles on the best methods in trade in each country in the region.	7.1. – 7.2. Technical Assistance to establish electronic database; Provision of material inputs like computers. Training; study tours; technical advice. 7.3. Technical assistance; training.	7.1. – 7.2. China (for market related information) Turkey for standards and certification. Georgia to share experiences. 7.3. Turkey; CACFish/FAO.

Recommendations

Realizing the strategic value of initiating the Programme soonest, in light of the strong recommendation of COFI, and the importance of maintaining the momentum on fisheries development that has been generated by recent assistance from FAO and other partners in the region, the workshop developed, based on the above outputs, a short list of high-priority activities to be implemented, preferably on a project-based basis, as soon as possible. These are the following:

1. Develop regional projects, organization of training courses, workshops, and capacity development on feed management and feed production on a pilot scale; provide technologies and equipment for the development and production of specialized fish feeds for different species from local raw materials.
2. Training workshop on project development designed to improve project development skills by actually formulating projects that are based on the identified priorities;
3. Develop an action plan for upgrading of national laboratories in order to comply with international standards for certification of fish and fish products;
4. Workshop on harmonization of institutional management structure and legislation in fisheries and aquaculture in accordance with international fisheries and aquaculture laws/policy for responsible fisheries and aquaculture;
5. Develop an action plan to identify activities for sharing and providing broodstock and seed material that are of high genetic quality; complemented by training on broodstock management;
6. Programmes for increasing and conserving endemic fish stocks in inland water reservoirs; and
7. Establish working group linked to TAC of CACFish, to support follow-up of scoping workshop recommendations and immediate action plans:
    a. Establish an e-mail group
    b. Develop a web page for the Programme

The workshop noted that there are examples, as with NACA and NACEE and various cases of South-South Cooperation, which show the effectiveness of implementing technical cooperation among developing countries through a networking mode. In this regard it was suggested that a networking approach through the CACFish mechanism be adopted, when suitable, in the execution of the Programme.

Follow-up actions

The workshop recommended three activities that should be organized for immediate action to maintain the momentum of this initiative: 1) Formation of a working group to develop the plan of action based on the seven priority recommendations; 2) Establishment of an information network (preferably on the CACFish platform) to facilitate communications among the participating countries and to provide a platform for public information; and 3) Launch of promotional activities for commercial aquaculture for prospective investors in the regions.

APPENDIX 1
WORKSHOP AGENDA AND TIMETABLE

Urumqi, China, 4–8 June 2012

Day 1: 4 June 2012

10.00 hours Opening and Welcome Remarks

Welcome remarks: Mr Qu Sixi, Department of International Cooperation, Ministry of Agriculture, China
Inaugural speech: Mr Cui Lifeng, Bureau of Fisheries, Ministry of Agriculture, China
Message: Ms Gulinu Abudurezake, Fisheries Bureau, Xinjiang Uygur Autonomous Region, Xinjiang Government
Message: Dr Rauf Hajiyev, Deputy Minister, Ecology and Natural Resources, Azerbaijan
Message and opening of the workshop: Mr Devin Bartley, FAO, Rome, Italy
Vote of thanks: Fisheries Research Institute, Urumqi

Group photograph

10.30 hours Coffee/tea Break

11.00 hours Introductory session

- Self-introductions – Participants
- Background and rationale of the scoping workshop – Mohammad Hasan, FAO, Rome
- Objectives, Expected outputs, activities, schedule – Pedro B. Bueno, Workshop Facilitator
- Announcements – Secretariat

The purpose of Plenary Sessions I and II is to review recent activities and present status of fisheries and aquaculture development in the region. The status reports shall provide information for identifying and characterizing the emerging issues, opportunities and challenges, constraints, and experiences and lessons from the regional and national development efforts.

12.00 hours Plenary Session I: Regional fisheries and aquaculture status
The presentation highlights the recent efforts at fisheries and aquaculture development in the region. It shall focus on the common regional as well as subregional priority needs, and the mechanisms and initiatives to meet these needs.

- Regional overview: key issues, initiatives to address the issues, status and progress: by FAO SEC (Haydar Fersoy) and REU (Thomas Moth-Poulsen)

12.30 hours Plenary Session II: Country Reports
Country Reports are presented, aided by PowerPoint, by country representatives. Each presentation briefly describes the status of fisheries and aquaculture development and then focuses on the key issues, major problems, and priority needs for developing the fisheries and aquaculture sectors in the country. Fifteen minutes for presentation and five minutes for questions and answers.

- Azerbaijan
- China
- Georgia
- Iran (Islamic Republic of)

14.00 hours Lunch break

15.50 hours Resume Plenary Session II

- Kazakhstan
- Kyrgyzstan
- Mongolia
- Pakistan
- Russian Federation
- Tajikistan
- Turkmenistan
- Turkey
- Uzbekistan

18.30 hours General discussion on the presentations

19.00 hours Break for the Day

20.00 hours Welcome dinner

DAY 2: 5 June 2012

10.00 hours Mechanisms and guidelines for Working Group Sessions and discussions

The purpose of Working Group Session I is to further identify and discuss common regional and subregional priority issues and the options to address them.

10. 30 hours Working Group Session I: Identifying Common Regional and Subregional Issues
The workshop is divided into three Working Groups. Each group shall tackle the same task. A set of working guidelines shall be given to the working groups, which will specify the output required from the group, the activities needed to produce the output, and the information materials to serve as the input for the work.

13.00 hours Each working group shall provide a summary of its outputs and answer questions. Fifteen minutes allowed for reporting and five minutes for Q and A.

14.00 hours Lunch break

The purpose of Working Group Session II is to put together the elements of a regional aquaculture and fisheries strategy to efficiently address the priority issues.

15.30 hours Working Group Session II: Strategies to address regional issues
The three Working Groups, with the same membership, shall discuss and recommend specific collaborative actions to address the priority issues that have been identified in WG Session I. Guidelines for the discussion and presentation of the results of the session shall be provided.

18.30 hours The three groups report the results of their discussion. Fifteen minutes allowed for reporting and five for Q and A.

19.30 hours Break for the Day

Day 3: 6 June 2012

The purpose of Plenary Session III is to obtain information on the programmes and activities of other agencies and organizations operating in the CAC regions. The outcome is to have a list of possible development partners, regional and/or international organizations and donors that are active in the region.

10.00 hours Plenary Session III

The agencies and organizations as well as Projects operating in the regions including the Islamic Republic of Iran and China, and those that have mandates that allow them to collaborate in the regional activities, such as NACA and NACEE, shall be invited to describe their activities focusing on the elements of their programmes that have relevance to the regional priorities.

Technical support and advisory agencies

- CACFish (Haydar Fersoy, FAOSEC)
- NACEE (Peter Lengyel, General Secretary, NACEE)
- NACA (Ambekar E Eknath, DG, NACA)
- FFRC Wuxi (Wang Xinhua, Professor, FFRC)
- FRI Xinjiang (Guo Yan, Director, FRI)
- FAO South-South Cooperation (Liu Zhongwei, TCSF, FAO, Rome)

13.30 hours Lunch break

The purpose of Plenary Session IV and the Working Group Session III that follows the plenary is to list and describe the essential elements and the necessary components of a regional aquaculture and fisheries development strategy that contains programmes, outcomes and activities and areas that require regional cooperation through a matching exercise to identify potential areas of bilateral and multilateral cooperation:

- through TCDC or south-south cooperation and interregional cooperation with emphasis on two levels of cooperation: a) regional and b) between groups of countries; and
- through the Central Asian and Caucasus Regional Fisheries and Aquaculture Commission bilateral and multilateral cooperative projects are envisioned to be supported by collaborative assistance from regional and international development organizations and donor agencies.

15.00 hours: Plenary Session IV. A brief presentation by the facilitator will provide a refresher on the concept of TCDC and the methodology of a TCDC matching exercise. Fifteen minutes presentation and five minutes Q and A. Ten minutes will be to organize the working groups and explain the procedure and expected results

15.20 hours Working Group Session III: Technical cooperation and institutional collaboration

Another set of three working groups, this time with different memberships, shall work on the matching exercise; and recommend the institutional collaborative arrangements and actions to meet the needs identified in the matching exercise. A discussion guideline shall be provided.

18.00 hours Break for the Day

DAY 4: 7 June 2012

10.00 hours Continue Working Group Session III

11.30 hours Working Groups report the results of their sessions in plenary

13.00 hours Lunch break

15.00 hours Plenary Session V: Wrap-up session with the following activities:

- Summary of workshop results
- Highlights of salient recommendations
- Conclusion and way forward – activities, responsibilities, schedules

17.00 hours Closing activities

- Remarks: FAO/SEC and FAO/REU
- Remarks: Representatives of the participating governments

- Remarks: NACA
- Remarks: TCSF
- Remarks: DIC, MoA, China
- Closing remarks: Fisheries Research Institute, Xinjiang/Ministry of Agriculture, China
- Closure of the workshop: FAO/FIRA

19.30 hours Farewell dinner

DAY 5: 8 June 2012

Field visit to two farms, an aquafeed factory and the Xinjiang Fisheries Research Institute.

APPENDIX 2
LIST OF PARTICIPANTS

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APPENDIX 3
OPENING AND CLOSING REMARKS

Opening ceremony

The workshop began at 0900 on 4 June with the Opening Ceremony. Speakers were Mr Qu Sixi, Deputy Director General of the Department of International Cooperation, Ministry of Agriculture (MoA), China; Mr Cui Lifeng, Deputy Director General of the Bureau of Fisheries, MoA, China; Ms Gulinu Abudurezake, Director General of the Bureau of Fisheries, Xinjiang Uyghur Autonomous Region, China; Dr Rauf Hajiyev, Deputy Minister, Ministry of Ecology and Natural Resources of Azerbaijan; and Dr Devin Bartley, Senior Fisheries Officer, on behalf of Mr Jia Jiansan, Chief of the Aquaculture Service, FAO Rome. They welcomed the participants and thanked their governments and organizations for enabling them to take part in the workshop, and looked forward to a fruitful result.

Mr Qu cited that China has been the provider country in, so far, 18 South-South cooperation projects with 23 countries and to support its role it has donated USD30M in a Trust Fund. The assistance is for projects to assure food security. He said that some countries in the Central Asian and Caucasus regions are among the cooperating countries with China.

Mr Cui described the status of China's fisheries and aquaculture development, achievements in technology and science, and various links with all the countries represented in the workshop, to illustrate China's capabilities and experience in technical as well as economic cooperation with other developing countries. He noted that China produced 56 M tonnes of fish products from aquaculture in 2011, which was more than 70 percent of the global output. More than the physical products, he said that aquaculture generates plenty of jobs, is a strong basis for rural livelihoods, and its conduct helps promote a harmonious society.

Ms Gulinu Abudurezake pointed to the location and the agro-ecological and socio-economic characteristics of Xinjiang, and its strengths in fisheries and aquaculture that make it a strategic outpost in China's cooperation with the Central Asian and Caucasus countries. The autonomous region is rich in aquatic diversity with more than 100 species and is the top exporter of fisheries products among all the provinces of China. She said her office has arranged a study tour to farms, projects and facilities that will allow the participants to see the aquaculture and fisheries development status and potential of Xinjiang. She thanked FAO for considering Xinjiang as the workshop venue and her institution as its host.

Dr Hajiyev took the opportunity, as a country participant, to thank FAO and China for organizing the workshop and opening more opportunities for technical cooperation among the countries invited to the meeting. He pointed to various constraints to fisheries and especially aquaculture development in Azerbaijan that more technical assistance through cooperation could help resolve effectively. Azerbaijan has a well-developed fishing industry but the Caspian sea fisheries resources are stagnating. The country has an advanced technology for sturgeon breeding culture that it could share, but needs to increase its technical capacities for the conservation and breeding, hatchery and culture of the important species in its freshwater bodies especially the Kura and Araz rivers, and its two major reservoirs. Azerbaijan has placed priority on reproduction and protection of fish resources and in aquaculture research with the strengthening of these functions under the newly created Ministry of Ecology and Natural Resources. Azerbaijan is keen to intensify its participation in international and regional research programmes and activities to improve the ecological conditions of sensitive species of fish in the Caspian Sea with its participation in programmes of UNEP, UNDP, FAO and the Caspian Environmental Programme. The Deputy Minister looked forward to the technical cooperation programme as an opportunity for further strengthening the capability of his country for fisheries and aquaculture management and development.

Dr Bartley gave the message of FAO on behalf of Mr Jiansan Jia, who was unable to attend the meeting due to health reasons. He thanked the Government of the People's Republic of China through its Ministry of Agriculture for supporting the workshop, the provincial government of Xinjiang for hosting it, and the FAO officers from Central Asia and China as well as Europe for bringing into the workshop their resources and experiences. FAO congratulated the Central Asian Region, the Caucasus Region and Turkey for

successfully forming and initiating the Fisheries Commission of the region. He reiterated that the Workshop was being organized to develop and agree on ways to complement the regional work programme of the Fisheries Commission and expand participation so that the benefits from cooperation are shared more widely. FAO stressed that experiences of groups of nations that have chosen the path of cooperation and networking are rich with lessons that prove the value and efficiency of working together and having a well-designed programme of work.

Closing ceremony

The closing ceremony began with the representatives of the various FAO units (SEC, REU, FIRA, FIPS, FIRF and TCSF) thanking the Government of China and the Bureau of Fisheries of Xinjiang Autonomous Region for the excellent arrangements and their generous hosting and commending the country participants for their enthusiastic participation and valuable inputs to the deliberations.

The representative of the FAO Technical Cooperation Department, Mr Zhongwei Liu, praised the quality of the workshop results and the practicality of the recommendations. He assured the countries that FAO TCD will take the follow-up actions as soon as possible to take advantage of the momentum that has been generated, as recommended by the workshop. He thanked his colleagues from the other FAO units, the officials from Xinjiang Fisheries, and China's Ministry of Fisheries for their valuable inputs and assistance in facilitating the workshop and gave a special commendation to the interpreters and the members of the workshop secretariat for making the proceedings smooth and efficient.

The country representatives responded by appreciating the FAO for its continuing assistance to their countries and the two regions and to the Government of China and the Provincial Government of Xinjiang for making their participation comfortable and meaningful and for their kind hospitality.

Dr Atar Hasan Huseyin, Professor of Ankara University speaking for the representatives of the Government of Turkey, expressed the continuing commitment of the government to partner with FAO in contributing its part to regional cooperation. Professor Hasan also expressed appreciation for the various technical assistance that FAO has extended to the fisheries development of Turkey.

The Director General of NACA, Dr Ambekar Eknath, commended the countries for their commitment to regional cooperation in aquaculture development. He noted that a number of the participating countries are members of NACA and recalled that the experience and expertise of NACA have, through the framework of the FAO technical cooperation programme, helped to inform the discussions that have led to the formation of CACFish. In this regard, Dr Eknath said that NACA stands ready to play a more active role in the programme of cooperation that the workshop had developed.

The representative of the Xinjiang Fisheries Research Institute, Guo Yan, thanked FAO and the participating governments for giving Xinjiang the privilege of hosting the workshop and the opportunity to exchange information and experiences with them. Mr Guo looked forward to an expanded scientific and technical cooperation between Xinjiang and their respective fisheries institutions.

The Director of China's Department of International Cooperation, Mr Liu Xiaobing, reiterated the commitment of China to regional as well as global cooperation and its support to the programme of work that the workshop had developed.

The country delegations thanked FAO and The Government of China for initiating the development of a strategy for regional cooperation and giving the commitment of their governments to actively participate in and support the programme that the workshop had recommended.

The workshop was declared closed by the representative of FAO, Dr Devin Bartley.

APPENDIX 4
SYNTHESIS OF COUNTRY PRESENTATIONS

Capacities and Priority Needs of Countries

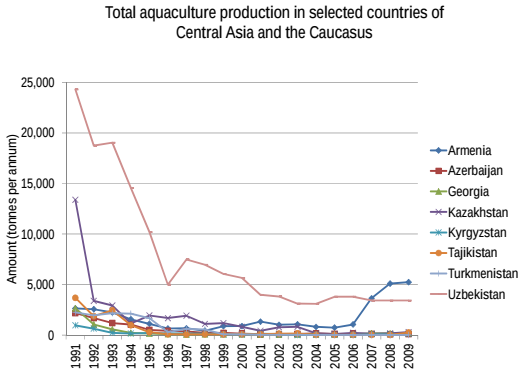
The countries included in this synthesis are those of the Central Asian region, Azerbaijan and Georgia as well as Armenia (which was not represented in the workshop) among the Caucasus countries. The Islamic Republic of Iran, Mongolia and Pakistan, and China and Turkey. The general descriptions of the status of fisheries and the assessments of strengths and weaknesses and priorities are mainly from the PowerPoint presentations prepared by the country representatives, supplemented in some cases with information from other sources including the National Fisheries and Aquaculture Status Reviews and National Aquaculture Sector Overviews (NASOs) in the FAO Fisheries website as well as other written materials.

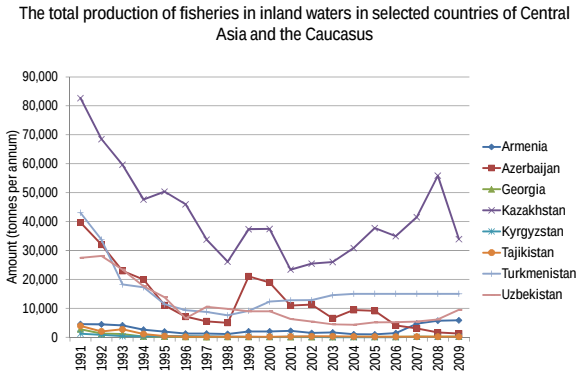
A. Status

1. Central Asia and Caucasus

The general status of the fisheries sector in these two subregions is that recovery has been very slow since its dramatic decline after independence in 1990. The governance of fisheries is marked by undeveloped or still developing regulatory fisheries management frameworks and the lack of specific fisheries law and by-laws, weak or no technical regulations, lack of robust fisheries policies, general lack of institutional and financial capacity, and a great need for capacity building, technology and manpower for research, technology development and extension, and production.

The figures below (courtesy of the report of Azerbaijan) depict the well-known trend – generally of decline – in the aquaculture (left) and inland fisheries (right) of the Central Independent States since their independence in 1989–1990. There were many reasons for the decline, chief among which was the huge drop in state support to the two subsectors. Trade also declined among the countries and with the Russian Federation. The investment climate was not encouraging. The countries plunged into a cycle of lack of recognition in government development policy and programmes – lack of support – low technical basis for production – low incentive for investment – low productivity – and back to the lack of government support.





A break in the cycle was clearly needed. This came in the form of a region-wide realization by governments of the need to revive the fisheries sector. This was driven by the recognition that the fisheries resources – huge water bodies and several indigenous, endemic and introduced species, and a legacy of highly skilled scientific manpower – could be rebuilt better to provide a significant contribution to rural development and national food security. This political impetus received a boost from the technical assistance to the countries that began in the late 2000s when FAO and the Government of Turkey (as the donor country through its Turkish International Cooperation Agency or TICA) under the FAO-Turkey Partnership Framework Programme implemented the Central Asia Regional Programme for Fisheries and

Aquaculture Development (FishDev-Central Asia (2009–2014). The benefits from FISHDEV and other technical cooperation assistance projects of FAO spread to the Caucasus countries when CACFish was formed in 2010. While it is a commission under Article IV, the participating countries adopted a regional work programme that is executed in a networking mode and guided by the principle of technical cooperation. The momentum has been maintained and several regional and subregional activities as well as a number of national projects have come on stream since. Another partnership assistance programme is the FAO-Finland Cooperation Programme: Support to Fisheries and Aquaculture Management in the Kyrgyzstan.

2. Iran (Islamic Republic of), Mongolia and Pakistan

The Islamic Republic of Iran

Its future fisheries development plans aim to increase fish production, improve the welfare of fishers and farmers, promote exports, increase fish consumption and provide a greater food security. The per capita availability and consumption of fish is expected to increase to 10 kg/year and production will have to increase proportionately. Aquaculture is recognized as an important source to meet future fish demand. The private sector has emerged as a major player in aquaculture investment, particularly in trout, shrimp and warm-water farming. Seafood export is now recognized as a major source of non-oil export earnings. The Iranian Fisheries Organization, in line with local governments countrywide, developed its 4th Five-Year Plan for Fisheries, for 2005–2010. This plan expects to follow up on: food security through increased domestic fish production quality improvement and waste reduction in fisheries; fish export promotion; market improvement; fish conservation and enhancement; deep sea fisheries development; improved aquaculture productivity; expansion of applied research; and increased fish consumption. Aquaculture production, from carps, shrimp and trout as the main species, has been steadily growing since 2001 while production from capture fisheries has been stagnant. Sturgeon remains a major aquaculture species. The production target for all fisheries in 2016 is 695 000 tonnes.

Mongolia

The fisheries resources are based on three lakes. The latest available annual catch figure is 400 tonnes of fish. The largest lake, Lake Buir, straddles the Chinese-Mongolian border and has been suffering from overfishing. Per capita consumption is 0.3 kg a year. Aquaculture has only recently started with the approval in 2008 of the 'National Program on the Protection of Fish-culture and Breeding'. Sport fishing is being promoted as part of the tourism industry. The largest trout species in the world (*Hucho taimen*) is known to thrive in Mongolia (www.nationalgeographic.com/news, accessed 5 October 2010). The government has placed a priority on breeding and conservation of rare and endangered species. A total of 76 native fish species are reliably recorded in Mongolia’s waters. Five of them are possibly new to science and unnamed.

Pakistan

The fisheries sector contributes about 1 percent to its GDP. Capture fisheries production in 2010–11 was 925 755 tonnes, marine fisheries contributing 667 782 tonnes and inland fisheries 257 973 tonnes. Aquaculture production in the same year was 517 600 tonnes. More than 471 000 fishers, including 287 000 inland fishers, find employment in the sector, while the secondary sector (fisheries products processing, input provision and marketing) provides employment and income to more than 110 000 households. Capture fisheries and aquaculture together provide employment for around 1 percent of the total labour force available in the country. There was very little increase in per capita fish consumption (from 1.0 kg in 1961 to 2.3 kg in 2001). Pakistan is endowed with vast aquatic resources. Most of the freshwater aquaculture production comes from the farming of carps. Aquaculture systems primarily comprise ponds, cages, culture-based fisheries, tanks, coastal areas. The total area covered by fish ponds across all provinces is about 60 470 ha. Cage culture is still at a trial stage in inland lakes and reservoirs. Regarding culture-based freshwater fisheries, it is mostly major and Chinese carps and trout that are stocked in streams, rivers, reservoirs and other natural water bodies by provincial directorates of fisheries. Trout culture is developing and is carried out in tanks in KPK and Northern Areas. Some shrimp is produced; otherwise the coastal areas are hardly exploited.

3. China and Turkey

China

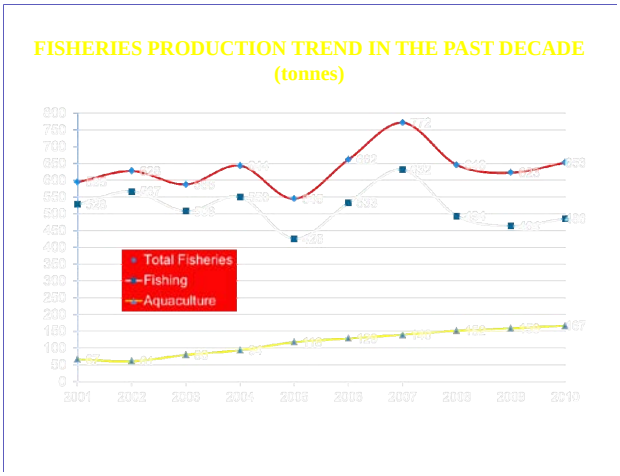
China has set a number of production targets. 10 million tonnes is the target from marine capture fisheries by 2020 (or a reduction of 2 million tonnes from the 2011 level which was 12.42 million tonnes excluding the catch of Distant Water Fisheries). Stock enhancement in inland fisheries will continue; and it is expected that the production will increase from the 2011 level of 2.23 million tonnes.

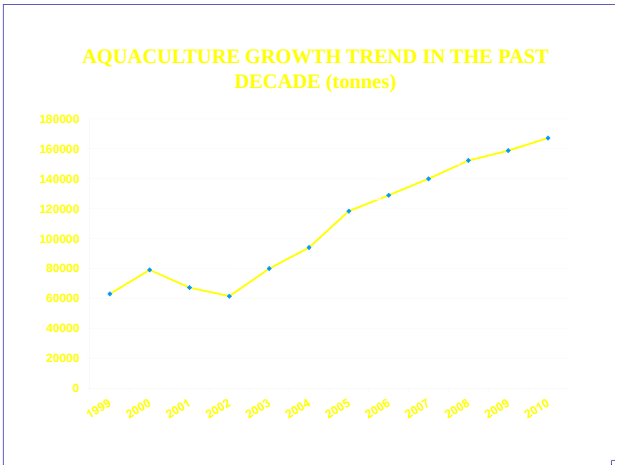
For aquaculture the target is 45 million tonnes by 2015 (4.77 million tonnes more than output in 2011). In order to achieve the target, 1.33 million ha of ponds with low productivity shall be renovated and improved, deep water cage culture and other forms of offshore marine culture shall be expanded, and efforts to develop low-lying salt-alkali lands and rice fields for fish farming intensified. There were no records for leisure fisheries in the past but the production value of this subsector was US$4 billion in 2011, a 21 percent increase from 2010.

China has 4.73 million km^2 of sea area, and 2 800 lakes with a size of over 1 km^2 as well as more than 1 500 rivers with basin area of over 1 000 km^2. The area under marine culture in 2011 was 2.11 million ha, of which the coastal area was 1.15 million ha and mud flats 680 000 ha. The freshwater culture area was 5.72 million ha in 2011, of which ponds comprised 2.45 million ha, lakes 1.02 million ha, reservoirs 1.85 ha, and rivers 270 000 ha. Some 1.21 million ha of rice field were used for rice-fish production.

Turkey

Turkey was the third fastest growing country in global aquaculture between 2002 and 2004. It has a significant fishing industry and aims to be a top aquaculture producer in the region. It produced more than 167 000 metric tonnes from aquaculture in 2010 and has set a target of 500 000 tonnes for 2023. Its export from aquaculture was valued at US$313 million in 2010 and it has a target of US$ 1Bn for 2023. Per capita consumption of fish is now 8 kg per year; its target is 10.3 kg by 2023. Turkey has a 25 percent share of the gilthead seabream and European seabass market and tops the trout production among European countries. The tables below show the trends in capture and culture production in 2001–10 and the trend in aquaculture production from 1999 to 2010.





B. National policy goals in fisheries

1. Caucasus countries

Azerbaijan

The Fisheries Law of 1998 determines the legal bases of the organization and management of fisheries, an increase of fish stocks, and their use and conservation in the area of the Caspian Sea pertaining to the Republic of Azerbaijan. The fisheries of Azerbaijan are of particular importance because of the sturgeon of

the Caspian Sea. Its aquaculture sector is small but growing. In recent years, farmers in rural areas have begun to invest in establishing and expanding fisheries. They face technological and practical challenges to make their operations profitable and sustainable.

Armenia

A draft policy version for fisheries and aquaculture sets out the principles of the objectives of policies and planning as follows:

- Support and contribute to the introduction of modern technologies of intensive fish production to promote an improved and more economic utilization of water resources. Collaborate with international organizations and recognized leading international fish producers on the introduction of new technologies.
- Support and contribute to the economic utilization of the fish fauna of natural waters and the creation of new fish farms.
- Simplify the existing complicated process of import and export, including the trade in trout eggs and fish fry. Foster initiatives of importing brood fish for reproduction.
- Support specialists and their technical updating with grants and seminars in order to increase their competences.

Georgia

A national fisheries sector policy with objectives or goals for the sector is currently non-existent in Georgia. However, the MoA was preparing a Master Plan for Fisheries Sector Development in Georgia, 2005–2020. Fisheries have not been recognized as priority sector in the national Economic Development and Poverty Reduction Program (EDPRP), which provides an established overall framework of national economic policy. The agency that carries out the policy of management and usage of natural resources, including fisheries, is the Ministry of Energy and Natural Resources. Among its functions are issuing fishing licenses; control of the conditions of fishing licenses; approving management plans, and approving catch quotas. Aquaculture in Georgia is weakly developed (in certain cases). Maintenance of fish farms in the ponds of private ownership is not subject to licensing or issuance of permit. Fish farms are maintained in artificial ponds such as trout farms, fish reproduction farms and pond farms. These are only subject to environmental technical regulations on extraction of water.

2. Central Asia

Kazakhstan

The Fishery Sector Development Concept of the Republic of Kazakhstan for 2007–2015 (Government Decree No. 963, 6 October 2006) identifies a number of goals and objectives related to the formation, protection, and rational use of national fisheries and aquaculture resources – with an emphasis on the increased deployment of modern technologies and techniques for accelerated fisheries development. The intention of the programme is to systematize state regulation and control over water resources, facilitate the maintenance and development of fisheries facilities, improve the legislative base of the sector (particularly aquaculture regulation), and assist in developing information systems and analytical techniques to support fisheries management processes. The concept shapes the main goals and objectives aimed at increasing the competitive ability of this industry through the conservation, reproduction and sustainable use of fish resources and the development of commercial fisheries. Another decree proposes the introduction of high value fish into various water bodies and reservoirs.

The Medium-Term Plan of Social and Economic Development for 2008–2010 sought to (i) increase fisheries competitiveness based on sustainable development of the sector through the protection, reproduction and rational use of the aquatic bio-resources of natural reservoirs; (ii) enhance conditions for fish culture – in terms of fish reproduction, the organization of fish farming (including sturgeon farming) and developing the sector; and (iii) [further] improve the fisheries management system – specifically reforming legislation relating to the protection, reproduction and rational and efficient use of fisheries resources.

Kyrgyzstan

The long-term vision for the fisheries and aquaculture sector in Kyrgyzstan is to develop a diverse, competitive, economically viable and environmentally sustainable fisheries and aquaculture sector. Its aim is to develop a sector that will (i) deliver high-quality, healthy food to consumers at home and abroad, and social and economic benefits to communities (particularly alternative employment opportunities in rural and remote areas); (ii) use, wherever possible, scientific evidence to operate responsibly, working within the carrying capacity of the environment, both locally and nationally; and (iii) use a supply chain approach[1].

The overall goals for fisheries and aquaculture sector development and management in Kyrgyzstan are:

- Use the aquatic resources of Kyrgyzstan to contribute to the national economy, poverty alleviation and food security.
- Augment the contribution of fisheries and aquaculture in generating socio-economic benefits and improving the well-being of the rural population.
- Improve the economic viability of aquaculture farms through diversification of production in accordance with the market demand.
- Increase the availability of high-quality fisheries products for the domestic market, including increased production of low-priced fish for popular consumption.

Tajikistan

The long-term vision for the fisheries and aquaculture sector in Tajikistan is 'To develop sustainable fisheries and aquaculture in Tajikistan which contributes to poverty alleviation, provides social and economic benefits to rural and mountain communities, will be able to meet growing consumer demands for aquatic foods and products that are of high quality, safe, competitively priced and are produced in an environmentally responsible manner, using the existing water resources potential, and with maximum opportunity for profitability in all stages of the product chain.'

The overall goals for the fisheries and aquaculture sector in Tajikistan are the following:[2]

Social: Alleviate poverty and ensure food security; increase employment while improving gender equity and generate higher incomes and better livelihoods in rural and mountain areas; improve the health and nutrition of the population.

Economic: Increase the production under market economy conditions; increase economic viability in the capture fisheries and aquaculture sector, including the profitability of fish farming, fishing, fish processing, fish marketing and trade and supporting the generation of export earnings.

Ecological: Improve protection, conservation and rehabilitation of aquatic biodiversity and the aquatic environment in general; maintain and enhance the productivity of land, water and available genetic resources.

Institutional: Improve the research, educational and management capacity of the national institutions and stakeholders involved in capture fisheries and aquaculture; strengthen linkages, cooperation and coherence of approaches with other sectors.

Uzbekistan

The state policy is guided by the Millennium Development Goals, particularly:

- Increasing cultivation and fishing through the effective use of available resources.
- Ensuring food security and improved nutrition through the production of high-quality and low-cost fish products.
- Creating new jobs in rural areas.

[1] Sarieva, M., Alpiev, M., Van Anrooy, R., Jørgensen, J., Thorpe, A. and Mena Millar, A. 2008. Capture fisheries and aquaculture in the Kyrgyz Republic: current status and planning. FAO Fisheries Circular. No. 1030. Rome, FAO. 108 pp.

[2] State Unitary Enterprise. 2010. Policy and Strategy for Fisheries and Aquaculture Development for Poverty Alleviation in Tajikistan (2010–2025). Ministry of Agriculture. Dushanbe, Tajikistan. 38 pp.

The fisheries sector will help achieve these through:

- Aquaculture development.
- Fisheries development.
- Environmental sustainability.
- Trade in fish products.
- Food safety.

Turkmenistan

The policy goal is to achieve sustainability of the fishing industry based on the preservation, reproduction and rational use of biological resources, aquaculture for satisfying the domestic demand for fish products, food independence, socio-economic development of regions whose economies are dependent on coastal fisheries.

This is to be achieved with the following strategies:

- Creating an integrated approach to public management of fisheries development and an efficient management system through the design and development of the international legal framework for the formation and implementation of a long-term and effective management of aquatic biological resources, ensuring transparency of their enforcement;
- Ensuring the conservation and sustainable use of marine biological resources;
- Ensuring that the production capacity of the fishing fleet corresponds to the volumes of aquatic biological resources;
- Conducting research and development in the field of fisheries, seeking improved methods for determining the total allowable catches of aquatic biological resources, improving the scientific and technological capacities of educational institutions that serve the fishing industry;
- Improving the protection of aquatic resources and their habitat, providing an effective state control over the use and protection of aquatic resources in order to prevent and combat the poaching and violation of the fishing rules, and the possibility of illegal export of fish products abroad;
- Developing comprehensive measures to develop aquaculture;
- Developing the coastal fishing industry infrastructure;
- Providing an alternative source of income to local people in the region by supporting entrepreneurship in the commercial breeding of fish; and
- Technical re-equipment of the fishing fleet.

3. Iran (Islamic Republic of), Mongolia and Pakistan

Iran (Islamic Republic of)

The development goals for fisheries are

- Food safety;
- Environment (all activities of aquaculture is under supervision of environment organization); and
- Sustainable and responsible use of aquatic resources.

Mongolia

Two programmes:

- 'Fish' sub program of the 'National Food Security Program' in order to develop aquaculture, and establishment of fish processing plants; and
- 'Protection of Fish-culture and Breeding' National Program, approved through Government Resolution number 267 of the year 2008.

Pakistan

The three policy goals for fisheries and aquaculture are:

- Increasing the contribution of the fisheries and aquaculture sectors to national economic growth;

- Increasing the contribution of the fisheries and aquaculture sectors to poverty alleviation; and
- Increasing the contribution of the fisheries and aquaculture sectors to food security.

4. China and Turkey

China

Briefly, the goals for the fisheries sector are:

- Fisheries development: capping the total number and power of fishing vessels, ensuring safety on the sea;
- Aquaculture development: top priority of development; healthy development;
- Leisure fisheries: extending the scope of the subsector;
- Trade in aquatic products: ensuring that the export value reaches US$1.8 billion by 2015 (USD1.78 billion in 2011); and
- Food safety: ensuring that 98 percent of the products comply with standards by 2015 (the percentage was 97.9 percent in 2010).

Turkey

The country has set these policy goals for its fisheries and aquaculture sector:

- Determine and promote the main principles of sustainable fisheries and aquaculture in the seas and inland waters;
- Protect fisheries and aquaculture resources;
- Carry out research and development projects related to fisheries and aquaculture;
- Develop an information system for fisheries and aquaculture;
- Increase and diversify added-value products; and
- Improve schemes for the traceability and certification for seafood.

C. Strengths and weaknesses

The assessment of strengths and weaknesses are in the areas of research and technology development, education and training, extension, policy and regulation, and production. Some countries were unable to provide all or some assessments. These are shown in Table Attachment A.

The general situation among the **Caucasus countries** is that the fisheries and aquaculture sector is not usually given high priority in national development plans; there is no specific law for aquaculture; the administration of the fisheries and aquaculture sector falls under the responsibility of different ministries (as in **Georgia** and **Armenia**); there are weak research and educational capacities for fisheries but even more so for aquaculture; and there are no extension services dedicated to fisheries and aquaculture. However, the fish farms of **Armenia** are now in private hands. **Azerbaijan** has a good capacity for sturgeon breeding and **Georgia** has started a programme on fisheries product certification to improve quality and standards so that it can access export markets, especially the EU.

In **Central Asia**, inland fisheries and aquaculture lack or have weak policy and legal frameworks; limited capital investment; outdated technical know-how; and limited institutional capacity. The sector has weak support and national budget allocation for research and development as well as education and training capacities are poor. There is an emerging need to strengthen the institutional capacity in relation to R&D, education and training as part of the call for a more sustainable management of fisheries and aquaculture. There is no functional cooperation between the private and public sectors in terms of fisheries and aquaculture research and technology, education and training. Some of the Central Asian countries do not have specialized research institutions for fisheries and/or aquaculture, with the exception of **Kazakhstan** for lake and reservoir research. In all Central Asian countries there exist university programmes that provide higher education in fisheries and fisheries-related science (e.g. ichthyology, aquatic biology); however, often these programmes are not complete, or universities lack expert teachers in certain relevant

subjects. **Kazakhstan**, **Uzbekistan** and **Tajikistan** are currently trying to increase their institutional capacity in fisheries and aquaculture education and training[3].

The Islamic Republic of Iran has a strong Iranian Fisheries Research and Training Organization as well as a network of research centres and universities. However, scientific research institutes receive very limited funding for research in fisheries and aquaculture. Its research and production capacities for sturgeon are very strong and it has a well-developed and expanding trout culture sector. A local feed industry for trout is growing. The capacity for fisheries and aquaculture in **Mongolia** is at a very early stage of development. It does have a well-supported biodiversity conservation programme driven by many (and some unique) indigenous fish species that have tourism value. **Turkey** has a well-developed and large fishing industry and a strong aquaculture sector. Its 16 Fisheries faculties, 2 Marine Science faculties and 4 departments at agriculture faculties give Turkey a strong functional institutional, technical and scientific R&D capacity and academic programmes for fisheries and aquaculture. These provide the manpower and know-how for a high-technology aquaculture. **China** has a national network of institutions under the Chinese Academy of Fisheries Science for formal education, innovative, applied and adaptive research and practical training in various fields and skills.

D. Priorities

The **Caucasus countries** have an orientation towards export, mainly to the EU market, for their aquatic products so technology in processing and certification for food quality and safety are priorities. Better and sustainable use of open water bodies for culture-based fisheries and aquaculture is a high priority in the three Caucasus countries. Use of the open waters needs technology, regulations for resource allocation and user rights and resource management. The need of **Armenia** for Lake Sevan is a co-management regime. **Georgia** is looking to improve its system of evaluating fisheries resources and setting of capture quotas, which requires capacity building for research to assess fisheries resources and support the development and monitoring of fisheries management regimes. **Azerbaijan** has placed a high priority in conservation as well as the breeding and culture of the many indigenous species in its two major rivers.

Amongst the countries of **Central Asia, Kyrgyzstan** would like to have the management and technology to maintain sustainable fisheries yields in its main lakes and reservoirs, which would include fisheries-specific stock enhancement/restocking strategies and use of fishing gear. Another set of priorities – on seed and feed – includes the development of genetic quality broodstock, a decentralised fish seed supply network, and nutritionally balanced fish feed formulation and production based on locally available feed ingredients. It is also seeking to develop or adapt innovative aquaculture techniques to use irrigation and small water bodies for aquaculture. The general priority areas for **Kazakhstan** are improved governance in fisheries, the development of aquaculture and genetic studies. Its specific priorities include creating a legal framework for commercial fisheries, the development of lake and commercial farms, rehabilitation and development of fish ponds, the development of mariculture and coastal fish farms, feed production, the manufacture of fish cages, processing, and the development of an efficient fish supply chain. Training and research will underpin all these priorities. The priorities of **Tajikistan** are to update the regulatory framework and management plans for fish farming, capture and culture-based fisheries; and to improve the current fisheries and aquaculture capacity building and education programme for scientific, managerial, technical and production skills in support of the development of aquaculture. It also wishes to produce commercial aquafeeds. **Uzbekistan** has adopted a national policy and strategy and has placed a high priority in education and research on the establishment of intensive aquaculture systems, the adaptation of new species for cultivation, the production of fish feeds, fish processing and marketing, the protection of fish biodiversity, and water quality assessment and monitoring.

The priorities of the **Islamic Republic of Iran** include the genetic development of trout; stock enhancement assessment; shrimp economics and the development of specific pathogen-free shrimp; marine cage farming; increasing the mesopelagic catch; and increasing the production of shrimp, warmwater fish

[3] FAO. 2011. Report of the Regional Workshop to Assess the Fisheries and Aquaculture Sector Education, Training and Research Needs in Central Asia, Part I, Tashkent, Uzbekistan, 12-14 January 2010, Ankara, 63 pp.

and trout in ponds. The important policy goals of **Mongolia** are to reduce the imports of fish and fish products and support national producers, diversify food sources, and increase the rate of industrial processed food in domestic consumption through aquaculture. An emerging priority in **Pakistan** is the exploitation of marine and brackishwater aquaculture. It has also set its sights on the intensification of freshwater fish culture with the installation of an extruded fish feed mill. A feed mill would also eventually support mariculture development.

The priorities of **China** include tackling the environmental issues from aquaculture, food safety and fish health. The most important priorities for **Turkey** for assistance are institutional capacity building, stock assessment, the diversification of culture species, and sustainable exploitation and management of fisheries resources.

E. Assets for and Scope of Technical Cooperation

The brief synthesis of the strengths, weaknesses and priorities of the various countries indicates that there is an opportunity for the strengths of a number of them to be harnessed for meeting the priority needs of the others through technical cooperation. China and Turkey have institutions that can serve as providers for most of the training and technology needs of the other countries. There are also some specific technical strengths that every country can offer to the others. Policy development is usually specific to individual countries but the capacity for policy formulation can be assisted through inter-country exchanges of experts, information and experiences. Several of the capacity building needs, as well as the R&D and training priorities of the Central Asian countries are being met now by FISHDEV. The participation of China will further strengthen linkages, enrich the content and expand the scope and nature of issues (technology development, environmental, policy, educational, and market access) that regional cooperation will be able to address.

Attachment A: Strengths and Weaknesses

Countries	Research and Technology Development	
	Strengths	Weaknesses
Azerbaijan	The presence of institutions that have a long experience in conducting research in three fundamental areas: (i) stock estimation and distribution and the projections for commercially valuable fish species; (ii) artificial reproduction and commercial aquaculture techniques; and (iii) natural food supplies and fish nutrition The availability of inland fish producing ponds, fish hatcheries for artificial breeding (of sturgeon, salmonids and cyprinids) and the scientific capacity available in fisheries	Efforts to develop freshwater aquaculture and marine aquaculture do not match the available potential of the country
Kyrgyzstan	Existence of an Institute of Biology Developed research programme Three MSc students being trained in Fisheries and Aquaculture Management in Finland Some experienced staff in DoF Some interest in the Agrarian university in fisheries and aquaculture research Fisheries research laboratory	Non-existence of a fisheries related research institute Lack of interest in fisheries research in tertiary education institutions Lack of government funds allocated for research Lack of personnel trained in fisheries research Low priority for fisheries research
Uzbekistan	The institute of water resources has capability and experience in water resource management for aquaculture	Lack of financial resources allocated by the state Lack of practical knowledge in the field of advanced technologies for researchers Lack of international cooperation in the field of scientific research Lack of interest from major manufacturers in the development of technology
Kazakhstan	Research institute with good capacity for enhancement and culture-based fisheries	Insufficient funding available for scientific research in fisheries and aquaculture Limited facilities for fisheries and aquaculture experiments at research institutes
Tajikistan	Strong historical basis and valuable experience obtained during the Soviet era, especially in cultivation of carp and sturgeon varieties Resources made available to the sector as is increasingly required Information exchange between Tajikistan and other countries in the region Availability of abundant water resources for aquaculture and culture-based fisheries development	Research institutes receive very limited funding for research in fisheries and aquaculture The system of collecting and processing of statistical data on the activity of fisheries enterprises is poor Because of the low level of fishers' education and qualifications, the balance between herbivorous and carnivorous species in various water bodies has been destroyed
Turkmenistan	Not indicated in the country report	Progressive obsolescence of the technologies of processing of fisheries products Lack of national research institutions to study fisheries of the Caspian Sea

Iran (Islamic Republic of)	A strong Iranian Fisheries Research and Training Organization	Insufficient information from experts Inadequate knowledge/skills of personnel Lack of cooperation between countries for research Scientific research institutes receive very limited funding for research in fisheries and aquaculture The system of collecting and processing of statistical data on the activity of fisheries enterprises is weak Because of the low level of fishers' education and qualifications, the balance between herbivorous and carnivorous species in various water bodies has been destroyed
Mongolia	Leisure or recreational fisheries associated with tourism have large potential A conservation programme is in place and well supported	Capacities for fisheries and aquaculture are at a very early developmental stage A number of indigenous species are endangered Lakes are overfished
Pakistan	Huge potential area both for inland and marine for research Different agro-ecological zones Climatic variation with four different seasons Biodiversity Availability of coldwater	Lack of utilization of resources Low priority in the agriculture sector Lack of coastal and marine aquaculture Limited foreign assistance Lack of human resource development
China	Fish farming in variety of water types Reproduction of different aquatic animals and plants Fishing vessel design and construction Processing technology for various products	Lack of low-impact energy-efficient fishing methods Poor knowledge on aquafeed and nutrition; Inadequate development of new varieties Poor fish disease control
Turkey	16 Fisheries faculties, 2 Marine Science faculties and 4 departments at agriculture faculties High technology in aquaculture of current species	Insufficient research on stock assessment Insufficient data on fisheries economics Insufficient research regarding aquaculture of new species

Countries	**Formal Education and Practical Training**	
	Strengths	Weaknesses
Azerbaijan	Presence of academic institutions in the field of fisheries and aquaculture, Baku State University and Azerbaijan Pedagogical University, teaching hydrobiology and ichthyology Availability of professional education (non-scientific, focusing more on practical knowledge in fishing techniques and processing) through the Technical School of the Fish Industry	Not indicated in the country report
Armenia	Not indicated in the country report	No state-organized or coordinated research on fisheries and aquaculture

Kyrgyzstan	Technical education in agriculture Tertiary education in biological sciences where fisheries/aquaculture can be integrated Potential staff can be trained Existence of government hatcheries/farms for practical training Government recognition to develop the fisheries sector	Absence of curricula in fisheries Lack of trained staff Lack of tertiary institutions in fisheries Neglected government hatcheries/farms Not regarded as a priority Fewer opportunities for employment
Uzbekistan	Not indicated in the country report	*Short-term training:* -Lack of interest among students -Formal selection of participants *Practical training:* -Time-consuming -Higher cost -Possibility of teaching a smaller number of people
Kazakhstan	Current personnel have a wide experience regarding the functioning of state structures: The existence of fisheries education/training programmes within universities and colleges Fish production and capture specialists are employed at an enterprise level	Insufficient practical training is available for specialists at higher educational institutions Insufficient number of highly-qualified scientific/pedagogical personnel with experience in fisheries and aquaculture in the higher educational institutions Absence of experience exchange with leading scientific centres from neighbouring states and other countries; the poor command of foreign languages in Kazakhstan is a main cause of this
Tajikistan	Formal education is offered for courses related to fisheries and aquaculture; the important role of the TAU staff and students is to monitor operations and identify problems for on-farm research and for subsequent applied research Practical training: participating farmers in the cases of the stock enhancement and management project Selection of water bodies Rules to protect the water bodies developed Well-organized fishers and developed work programme	Lack of structure in extension Lack of media for extension Genetic management is poor: lack of training and promotion of people's awareness on stock enhancement
Iran (Islamic Republic of)	Established fisheries and aquaculture professional organization	Low level of cooperation between university and fisheries department Lack of applied research from academic institutions Insufficient training in economics of fisheries and aquaculture Insufficient training in capture fisheries technology Insufficient training in fish genetics
Mongolia	Not indicated in the country report	Not indicated in the country report

Pakistan	Network of provincial directorates of fisheries Short-term training courses in inland aquaculture Support to farmers at their farms	No formal/informal education in coastal and marine aquaculture No curriculum for fisheries and aquaculture No degree-awarding institute in the field of fisheries and aquaculture Lack of coordination between fisheries institutes Lack of know-how in marine and coastal aquaculture Weak interaction between stakeholders
China	Formal education – completed networks; qualified teachers and good infrastructure Practical training – completed networks; qualified teachers and good training facilities	Formal education – current subjects to be updated; cooperation with industry to be promoted and education methods to be diversified Practical training – needs more channels of training; the training of practical people with ability needs to be enhanced and there should be more focus on improving the innovative ability of fishers
Turkey	16 Fisheries faculties, 2 Marine Science faculties and 4 departments at agriculture faculties Availability of sophisticated technology for common aquaculture of species	Not indicated in the country report

Countries	**Fisheries and Aquaculture Extension**	
	Strengths	Weaknesses
Kyrgyzstan	Existence of some training manuals Existence of fish farmers/fisheries associations Demand from fishers and farmers for extension Opportunities for farmer-field school approach for extension Existence of external agents (JICA[4], USAID[5])	Total absence of an extension programme/mechanism Lack of trained persons to provide extension Lack of government funding for extension Lack of NGOs interested in fisheries/aquaculture extension No arm in the MoAM devoted to agriculture extension Lack of coordination between DoF and regional administration
Uzbekistan	Not indicated in the country report	*Short-time training*: -Lack of interest among students -Formal selection of the participants *Practical training:* -Time-consuming -Higher costs -Possibility of teaching a smaller number of people
Kazakhstan	Not indicated in the country report	Not indicated in the country report

[4] Japan International Cooperation Agency
[5] United States Agency for International Development

Tajikistan	Strong historical basis and valuable experience obtained during the Soviet era, especially in cultivation of carp and sturgeon varieties provides an opportunity to support fish farmers	Weak levels of support services in the sector at national and local levels System of collecting and processing of statistical data on the activity of fisheries enterprises is poor Because of an inadequate understanding the fishermen and fish processing workers act as competitors rather than counterparts Collaboration through cooperatives and associations is not well developed in many places
Turkmenistan	Not indicated in the country report	Not indicated in the country report
Iran (Islamic Republic of)	Aquaculture nutrition Fish reproduction Aeration and oxygenation Shrimp production Shrimp reproduction	Lack of structure in extension Lack of media for extension Genetic management is poor and there is lack of training and promotion of people's awareness on stock enhancement
Mongolia	Not indicated in the country report	Not indicated in the country report
Pakistan	Established directorate of extension at provincial level in inland aquaculture Fish seed multiplication centres for inland seed production and dissemination to farmers On-farm extension and support services to farmers	Limited number of trained manpower for extension services No commercial-scale fish production technology Poor capacity building of fisheries staff in the public sector Weak interaction between the public and private sectors No foreign assistance for capacity building for extension services
China	Completed networks Qualified technicians Emphasis by government on extension Acceptance that knowledge level of farmers needs to be enhanced	Conditions needs to be improved and responsibilities need to be set up Knowledge of technicians needs to be updated More cooperation with research institutes needed Need for enhancing the ability of the extension agencies in terms of disease control, food quality monitoring and control, as well as public information service
Turkey	16 Fisheries faculties, 2 Marine Science faculties and 4 departments at agriculture faculties Availability of sophisticated technology for common aquaculture of species	Not indicated in the country report

Countries	Policy and Regulation	
	Strengths	Weaknesses
Azerbaijan	Not indicated in the country report	Lack of a legal and policy framework for aquaculture development and management in the country Weakening control over the quality of fish in all stages of the supply chain causes health risks General lack of an integrated approach in fisheries management
Kyrgyzstan	State recognition of the potential for development of the fisheries sector Existence of laws and regulatory framework, although there is a need for improvement Functional Department of Fisheries (DoF) Existence of a draft strategy to develop aquaculture Presence of an Fisheries Advisory Council	Lack of a fisheries and aquaculture policy Overlaps and conflicts in legal instruments in related laws Insufficient responsibilities vested in DoF Lack of coordination between main institutions Inadequate monitoring and surveillance
Uzbekistan	Not indicated in the country report	Not indicated in the country report
Kazakhstan	Not indicated in the country report	Absence of a legal framework (no Law on Aquaculture)
Tajikistan	Reforming and strengthening the basic state instruments for governance and delivery of services, including institutions and legal systems, are being planned or carried out by the government A programme for agricultural reform has been articulated and set into motion A policy and strategy for fisheries has been adopted in the programme for agricultural development The law on fisheries is being modernized, specifically to provide a better governance instrument to address issues of poverty alleviation and food security	The national fisheries policy, development strategy and long-term programme to stimulate growth of the sector not yet fully developed Funding of the department responsible for fisheries within the Ministry of Agriculture is very limited; this limits its manpower complement and its management and operational capabilities Low level of financing for the sector by private banks, other financial institutions, and the Government; access to credit is poor because of high interest rates Insurance for the fisheries sector is not developed in comparison with the insurance of agricultural businesses
Turkmenistan	Not indicated in the country report	Not indicated in the country report
Iran (Islamic Republic of)	Regulation approved by Parliament in 1995 Any activity needs permission of IFO Fishing licence restriction	Lack of regulations for illegal catch Many organizations control the issuance of catch permissions Lack of standards for aquaculture and fisheries Lack of standard gears and fishing devices No demarcation of fishing zones and nursery grounds Lack of information dissemination and promotion of public awareness on protection of the sea and endangered species
Mongolia	Not indicated in the country report	Not indicated in the country report

Pakistan	Developed fisheries policy Recognition of the role of fish and fisheries at a national level Allocation of funds for fisheries development in the public sector	Lack of implementation of the fisheries policy Lack of rules and regulations on capture fisheries No proper implementation of the deep sea fisheries policy
China	It is a general requirement that manages the fisheries by law Complete system established Law enforcement groups located national wide Law enforcement condition is on the way for improvement and public awareness	Detailed regulations are needed to protect the fisheries development space More linkage with property law required Improvements in the system of compensation caused by occupation of fisheries areas needed Establishment of a system of pollutant discharge reduction needed Strengthening law enforcement in the field of aquaculture required
Turkey	First Fisheries Law in 1882 Internationally and regionally adopted fisheries management measures and fishing capacity reduction schemes FAO Agreement on Port State Measures Aquaculture regulation in line with EU regulations	Lack of a new and updated fisheries law No clear resource-use policy for fisheries management

Countries	**Fisheries and Aquaculture Production**	
	Strengths	Weaknesses
Azerbaijan	The part of the Caspian Sea coastal zone under the authority of Azerbaijan is a productive area Devechi Port and Qizilagac Gulf are of great importance for many commercial fish species The Kura River, which has maintained its value in terms of being a freshwater source, provides a habitat for many fish species, as well as a preserved natural spawning area for sturgeon Capture fisheries is the basis for the development of many coastal areas of the country and includes a wide range of activities, ranging from assessing the resources to trading of fish and fisheries products in the domestic and export markets The fisheries sector encompasses more than 60 enterprises with different forms of ownership	The sharp decline in stocks of aquatic bioresources, particularly valuable species (primarily sturgeon) in the Caspian Sea but also inland waterbodies of Azerbaijan, which has outstripped efforts by the Government to conserve and rehabilitate the aquatic bioresources A significant discrepancy between the stocks of individual species of aquatic biological resources and fishing fleet capacity – the latter being too large for many fish species – which causes a structural imbalance in the sectoral struggle for sustainability
Kyrgyzstan	Existence of irrigation and small water bodies for culture-based fisheries (CBF) Existence of water resources to diversify aquaculture systems Suitable water resources for coldwater species Opportunities for integrated/livestock aquaculture Existence of ponds and suitable land to expand	Fisheries depend on oligotrophic lakes Ad-hoc fish restocking/enhancement strategies Inconsistent, inadequate fish seed and feed supplies for aquaculture Lack of species and system diversity Lack of quality broodstock No state incentives and services

Uzbekistan	Demand for products at low cost Preferential use of land and water resources Basic material resources of domestic production	Strong influence of climate Extensive production requires large amounts of land and water resources Limited products Lack of demand for the products of the country on the world market
Kazakhstan	A large number of professional fishers Abundant natural water bodies for fishing and fish culture Established culture systems – lake aquaculture, pond culture, cage culture, recirculation, and culture-based fisheries	Need to import feed (no feed manufacturing facility) Production technology needs improvement Old hatcheries need renovation
Tajikistan	Presence of water resources: rivers, natural ponds and reservoirs that have a potential for more efficient use for fisheries and aquaculture Strong historical basis and valuable experience obtained during the Soviet era, especially in cultivation of carp and sturgeon varieties The large young population in the demographic structure provides a good opportunity to involve more human resources into the sector as is increasingly required Long-term rent/lease (minimum 10 years) of fish farms and reservoirs is possible in most of the cases	The majority of hatchery facilities are not being used or have fallen into disuse, which does not allow effective restocking of the ponds and natural water bodies The country has no production of formulated feeds with balanced nutritional value There is a limited effort to restock water bodies The productive efficiency of fish ponds and water bodies is low Low and weak levels of support services in the sector at the national and local levels
Turkmenistan	Not indicated in the country report	No aquaculture production at any scale at present
Iran (Islamic Republic of)	Four seasons Competent manpower Seed production in warmwater, coldwater, shrimp and sturgeon Availability of feed Insurance Investment from the private sector	Lack of quality seed Lack of quality feed Low production in ponds Low quality of educated manpower in the sector
Mongolia	Not indicated in the country report	Not indicated in the country report
Pakistan	Huge water resources Growing season Climatic variation Warmwater and coldwater resources Fish faunal biodiversity	No coastal and marine aquaculture No semi-intensive and intensive inland/freshwater aquaculture Lack of extruded artificial diets Low production from culture-based fisheries
China	Prioritization of agriculture (including fisheries and aquaculture) sector by the government Strong market demand More space can be developed Industry has a solid basis to support further development and new opportunities for diversified development (such as low-carbon economy, green economy and blue agriculture)	Resource and environmental problems caused by urbanization and industrialization Extreme weather events and natural disasters caused by climate change Disease and quality issues caused by intensive farming Farming facilities need to be improved and more efforts needed to protect the fisheries areas from occupation or low compensation

Turkey	Powerful fishing fleet Rich aquatic/geographical coastal resources Turkey is the third fastest growing country in global aquaculture with applied policy and regulations Good growing conditions and a potential to expand the production substantially Innovative aquaculture sector Availability of sophisticated technology for common aquaculture species	No fishing activities in open seas No powerful organization of fishermen Aquaculture competes with other resource users for available sites; this is considered a constraint to future expansion of the sector The low species, product and system diversity are constraints to improving management and rational resource utilization Low domestic fish consumption

Attachment Table B: Priorities

Research and technology development	
Azerbaijan	Sturgeon breeding and culture, stock enhancement. Salmon trials in cages and stock enhancement. Reconstruction and rehabilitation of outdated and technically obsolete fishing enterprises for artificial breeding (hatcheries) and improvement of the biotechnical knowledge for artificial reproduction of sturgeon and Caspian salmon in support of the restocking programmes. Restoration of the natural spawning areas of sturgeon, including rehabilitation and reclamation of spawning areas in the Araz and Kura Rivers, to improve conditions for natural reproduction. Improved schemes and methods used for spawner harvesting and applying reuse methodologies of spawners to reduce pressure on marine stocks.
Armenia	Fisheries and aquaculture utilization of water resources. Supporting and contributing to the introduction of modern technologies of intensive fish production to provide an improved and more economic utilization of water resources.
Georgia	Improvement of system for evaluation of fisheries resources and determination of capture quotas.
Kyrgyzstan	Sustainable fisheries yields in main lakes and reservoirs. Fisheries-specific stock enhancement/restocking strategies and use of fishing gear. Development of high genetic quality broodstocks and a decentralised fish seed supply network. Nutritionally balanced fish feed formulation and production based on locally available feed ingredients. Innovative aquaculture techniques to use irrigation and small water bodies.
Kazakhstan	Selection and breeding work, scientific and technological support.
Tajikistan	Develop and implement a joint fisheries and aquaculture research and development (R&D) programme in support of sectoral development and management. Train researchers, specialists, and technicians and improve their professional and technical skills for research, extension and the management of the fisheries (aquaculture, culture-based fisheries, and capture fisheries) sector. Strengthen collaboration between national and foreign educational and research institutions to reinforce educational programmes, support research capacities and develop technology transfer. Establish a fisheries statistical system that compiles fisheries, aquaculture, fisheries employment and fish and fisheries products trade data and information.
Turkmenistan	Aquaculture research, broadly.

Uzbekistan	Feed development, health management, breeding and hatchery of carps, trout and other introduced and indigenous species. Species diversification – introduction of new species in aquaculture.
Iran (Islamic Republic of)	Genetic development of trout. Stock enhancement assessment in southern and northern Iran (Islamic Republic of). Shrimp economics and Specific Pathogen-Free shrimp. Marine cage farming (south and north). Increase mesopelagic catch. Increase production of shrimp, warmwater fish and trout in ponds.
Mongolia	Establishment of laboratory for fish breeding Research work on treatment of diseases and production technology. Expert training on hygiene and disease control.
Pakistan	Institutional capacity building. Technical and economic assistance in the field of aquaculture and fisheries. Multiple or multilateral arrangements for education in the field of aquaculture and fisheries at university level. Strengthening of fisheries and aquaculture research organizations. Introduction of coastal and brackishwater aquaculture and intensification of fish culture in inland aquaculture.
China	Introduction new species in aquaculture. Fish health. Food safety. Low environmental impact and energy efficient fishing methods.
Turkey	Improvement of stock assessment methodologies. Improvement of methodologies for determination of the carrying capacity of water bodies. Development of a comprehensive and operational fisheries data collection system. Introduction of new and endangered species in aquaculture.

Education and training	
Azerbaijan	Strengthening the educational and training capacity in the fisheries sector by establishing a training institute for the sector.
Armenia	Not indicated in the country report
Georgia	Institutional capacity building and preparation and practical training of qualified staff for the Agency of Natural Resources – as the responsible governmental agency for management of the fisheries sector.
Kyrgyzstan	Fish stock assessment and assessment of potential fisheries yields. Inland fisheries management techniques and fishing gear technology. Post-harvest quality control and value addition. Aquaculture systems, species and management and entrepreneurship. Aquafeed development and on-farm feed management. Broodstock management and hatchery technologies.
Kazakhstan	Institutional capacity building for academic and research institutions.
Tajikistan	Improve the current fisheries and aquaculture capacity building and education programme. The national research and development (R&D) and educational programmes will aim to promote fisheries and fish farming related activities, strengthen innovation, develop technical skills and enhance human capacities in general in support of the management of the sector. The programmes will include all necessary aspects (such as biology, ecology, technology, traditional knowledge, environmental, economic, social and nutritional science). Identify gaps that the current research and educational system cannot fulfil to further develop the necessary human and technical capacities.

Turkmenistan	Skilled manpower for research, extension and production.
Uzbekistan	Establishment of intensive aquaculture systems,. Adaptation of new species for cultivation. Production of fish feeds Fish processing and marketing. Protection of fish biodiversity. Water quality assessment and monitoring.
Iran (Islamic Republic of)	Aquaculture economics. Aquaculture engineering. Genetics in aquaculture. Aquatic animal diseases. Fisheries management.
Mongolia	Train experts in rearing and breeding and for fisheries and aquaculture in the provincial training and production centres. Train experts and involve them in Master and Doctorate programmes in the field of 'fish breeding technology', 'fish production technology' and 'fish diseases and their treatment'.
Pakistan	Curriculum development. Establishment of degree awarding universities in the field of fisheries and aquaculture. Human resource development. Establishment of aquaculture and fisheries training institutes for formal/informal training. Collaboration with international universities and various agencies related to aquaculture and fisheries.
China	Update fisheries and aquaculture curricula. Academic-industry alliance in education and training.
Turkey	Improvement of institutional capacity. Sturgeon culture techniques. Habitat assessment for sturgeons. Fisheries and aquaculture management. Environmental impact assessment.

Extension	
Azerbaijan	Organization and training of fisheries enterprises. Increasing public awareness on the state of sturgeon stocks and the fisheries sector activities in general through making use of specialized non-governmental organizations, the local media, and creating brochures and information materials on 'the life of sturgeon' for secondary schools.
Armenia	Secondary utilization of irrigation water for aquaculture.
Georgia	Not indicated in the country report
Kyrgyzstan	Development of extension materials/manuals and management tools. Training of personnel in extension approaches, particularly participatory approaches. Organisation of community based extension (e.g. farmer-field schools). Development of demand-led extension programme/s. Development of regional/local resource-based fisheries and aquaculture development plans including extension needs.
Kazakhstan	Farmer training to extend better techniques and management practices.
Tajikistan	Develop an extension and technical advisory service in support of the private sector fisheries and aquaculture needs. This extension and technical advisory service should be able to assist farmers with advice on reproduction of fish, growth and feeding of larvae, fry and fingerlings, maintenance of broodstock, fish farming and culture-based fisheries activities in general, fish health management and water quality management, access to financial services, etc.

	This extension and technical advisory service will be established within a collaboration between Mohii Tajikistan, the Tajik Agrarian University and IZP of the Academy of Science, taking advantage of the strengths of each of these partners; it will collaborate and integrate its services as much as possible in the wider agriculture and rural extension services that exist in the country. It is foreseen that the specific extension services given to poor farmers/fishers will be delivered on a cost-recovery basis, while private entrepreneurs will be charged market rates.
Turkmenistan	Technical assistance to develop the marine fisheries sector.
Uzbekistan	Organization of aquaculture farmers; market access capability – food safety, quality certification and promotion.
Iran (Islamic Republic of)	Integrated agriculture-aquaculture. Rice-fish culture. Genetics and breeding for trout. Production planning in farms. Increase carrying capacity in ponds. Aquatic diseases. Marketing.
Mongolia	Establishment of a training and production centre relying on model farms.
Pakistan	Interaction of the public and private fisheries sectors. Assistance to new fish producers. Development of new commercial-scale fish production technologies. Support to youth education in the field of aquaculture and fisheries. Capacity building of fisheries staff in the public sector.
China	Food safety and quality certification standards.
Turkey	Sustainable exploitation and management of fisheries resources. Improvement of the efficiency of monitoring control and surveillance (MCS) measures. Conservation and development of the habitat of living marine organisms. Diversification of aquaculture species. Encouraging an increase in fish consumption.

Policy and regulation	
Azerbaijan	Management of indigenous species. Protection of sturgeon and other Caspian Sea resources. Management of river and reservoir fisheries resources. Development of an updated policy and strategic plan for fisheries and aquaculture as a guideline for better governance and management of the sector.
Armenia	Regulations and management guidelines for exploitation of water bodies for aquaculture. Simplifying the existing complicated process for imports and exports, including the trade in trout eggs and fish fry.
Georgia	Not indicated in the country report
Kyrgyzstan	Development of a fisheries and aquaculture policy and a sound strategy to develop the sector with financial support. Streamlining conflicts and overlaps in related laws to provide conducive legal environment for development. Updating fishing gear regulations aimed at maintaining fisheries and biodiversity. Providing a regulatory base to adopt fisheries co-management approaches. Building institutional capacity.
Kazakhstan	Improved governance in fisheries. Development of a national strategy and plan for aquaculture. Creation of a law on aquaculture.

Tajikistan	Enhance and update the regulatory framework (rules and regulations) as the national management strategy evolves, and management plans for fish farming, capture and culture-based fisheries are developed and tested and norms and standards for the functioning of stakeholders in the sector are introduced. Support the participation of Tajikistan in relevant international agreements, conventions and voluntary guidelines on fisheries and aquaculture and work towards amendment (when necessary) of the national laws and regulations on fisheries and aquaculture to bring these in line with international best-practices. Modernize, review, amend and keep up-to-date this Policy and Strategy and the various implementation programmes and plans under it. Ensure effective collaboration among the members of the National Fisheries and Aquaculture Committee (NFAC), which is essential in the implementation of the Policy and Strategy. Increase regional and international cooperation on fisheries and aquaculture issues through membership of the Central Asian and Caucasus Fisheries and Aquaculture Commission, the FAO Committee on Fisheries and its sub-committees and other relevant international and regional commissions.
Turkmenistan	Establish an integrated approach to public management of fisheries development and an efficient management system to: • design and develop an international legal framework for the formation and implementation of a long-term and effective management of aquatic biological resources, ensuring transparency of their distribution; • conserve marine biological resources; • ensure that the production capacity of the fishing fleet matches the sustainable yield of aquatic resources; • conduct research and development in the field of fisheries that will improve methods for determining the total allowable catches of fish; • improve the scientific and technological potential of educational institutions; and • improve the protection of aquatic resources and their habitat, providing an effective state control over the use and protection of aquatic resources in order to prevent and combat illegal fishing as well as the illegal export of fish products.
Uzbekistan	Support the implementation of the fisheries and aquaculture policy and strategy. Enhance enforcement of regulations on recreational fisheries.
Iran (Islamic Republic of)	Sustainable fisheries. Illegal catch for sturgeon.
Mongolia	Reduce the number of imported fish and fish products and support national producers. Diversify food for daily consumption. Increase the rate of industrial processed food in daily consumption through developing fish production. Improve statistics on fisheries production.
Pakistan	Pakistan has formulated and adopted a national policy and strategy for fisheries and aquaculture development. Its priorities are now to develop various implementation guidelines to support the policy goal and to identify key issues and problems.
China	Regulations to protect fisheries development space. More linkage with the property law. Improving the system of compensation caused by occupation of fisheries areas. Discharge reduction. Strengthening enforcement of aquaculture regulations.

Turkey	Sustainable exploitation and management of capture-based fisheries and fishing resources. Improvement of the efficiency of Monitoring Control and Surveillance (MCS) measures through strengthening fisheries inspections. Conservation and development of the habitat of living marine organisms. Contribution to food security. Policy formulation and programme planning. Development of rules and regulations. Institutional capacity building. Aquaculture including culture-based fisheries. Species diversification. Aquaculture of endangered species. Ecosystem approach aquaculture management. Good aquaculture practices/Organic aquaculture. Aquaculture certification. Fish welfare. Food safety and security. Integrated coastal management plan. Harmonization and updating of aquaculture legislation. Institutional capacity building.

Production	
Azerbaijan	Sturgeon hatchery and salmon culture in cages. Indigenous species – breeding and hatchery techniques.
Armenia	Fostering initiatives for importing broodfish for reproduction. Entry to EU markets is one of the top priorities of most fish farmers of Armenia; for this reason, an overall certification system should be established and measures initiated to obtain EU acceptance for national fish and fisheries products.
Georgia	Pond culture of trout. Introduction of other cultured species.
Kyrgyzstan	Development of quality broodstock and a decentralised fish seed supply mechanism. Formulation and production of quality aquafeed based on locally feed ingredients. Adoption of good aquaculture management practices. Development of culture-based capture fisheries in irrigation and small water bodies. Development of fisheries-specific fish restocking or stock enhancement programmes.
Kazakhstan	Development of lake and commercial farms. Rehabilitation and development of pond fish culture. Development of mariculture and coastal fish farms. Feed production and management. Creation of production cages. Development of the processing of raw fish. Development of the supply chain and retailing of fish products to the public.
Tajikistan	Formulation of appropriate rules and regulations to improve the environmental performance of farms, increase motivation to produce more and better-quality products with market-based incentives, and secure investments by producers and entrepreneurs. Development of better management practices for aquaculture with special emphasis on carp, understanding the value chain for the commodity being produced. Identification of key and critical researchable and manpower issues along the value chain to improve processes, enhance technology and management practices, and strengthen support services. Development and conduct of research and training programmes to address the identified critical research and manpower issues.
Turkmenistan	Upgrading of hatchery skills and facilities.

Uzbekistan	Higher priority for aquaculture in water use; more productive use of water with appropriate aquaculture systems.
Iran (Islamic Republic of)	Sturgeon. Shrimp. Cage culture.
Mongolia	Processing technology. Breeding, hatchery and culture techniques.
Pakistan	Development of marine and brackishwater aquaculture. Intensification of freshwater fish culture. Production of extruded aquafeeds. Technical and economic assistance for the installation of extruded fish feed mill. Capacity building in the field of marine, brackish and inland aquaculture and fisheries. Technical assistance in these areas will greatly help in the utilization of brackish and marine aquatic resources.
China	Food safety and quality, pollution and fish health.
Turkey	Marketing, market access and trade. Increase in domestic fish consumption. Increase in processing technologies and value-added products. Introduction of new species in aquaculture. Allocation of new aquaculture areas for future investments.

APPENDIX 5
SUMMARIES OF THE PRESENTATIONS OF REGIONAL AND NATIONAL ORGANIZATIONS

The workshop deliberations were also informed by the programmes and activities in or relevant to the Caucasus and Central Asian regions of organizations with regional membership or mandates. These include the Central Asia and Caucasus Fisheries Commission (CACFish), Freshwater Fisheries Research Centre (FFRC) in Wuxi China whose Asian Regional Integrated Fish Farming Research and Training Centre is the Regional Lead Centre of NACA in China, the Network of Aquaculture Centres in Asia and the Pacific (NACA), the Network of Aquaculture Centres in Central and Eastern Europe, and the Xinjiang Uygur Autonomous Region Fisheries Research Institute. A presentation by the FAO Integrated Food Security Support Service (TCSF) explained the concept and mechanics of FAO South-South Cooperation, which essentially means cooperation among developing countries with facilitation by a donor agency.

CACFish

Formed in 2010 and inaugurated in 2011, the **Central Asia and Caucasus Fisheries Commission (CACFish)** is a Regional Fisheries Management Organization established under Article XIV of the FAO Constitution. Its mandate is to promote the development, conservation, rational management and best utilization of living aquatic resources, as well as the sustainable development of aquaculture in the region. To pursue this, it has adopted a set of priority work areas that was developed and approved by the member and participating governments:

- Improvement of regional governance of the inland fisheries and aquaculture sector for a more orderly, rapid and sustainable development and increased economic opportunities
- Improvement of production technology and systems and better management practices for the aquaculture sector
- Improvement of inland fisheries management practices in the region
- Increasing the quality and safety of fisheries and aquaculture products
- Improvement of capacities for research and technology development, extension, education and training in fisheries and aquaculture
- Keeping under review the state of fisheries and aquaculture development, and the abundance and the level of exploitation of their fisheries resources
- Promotion of programmes for aquaculture and fisheries enhancement
- Promotion of the participation of women in aquaculture and capture fisheries development
- Promoting liaison and cooperation among and within governmental organizations and with nongovernmental organizations

The Commission has a subsidiary body, the Technical Advisory Committee. Its secretariat is in FAO/SEC, Ankara.

FFRC

The Freshwater Fisheries Research Centre (FFRC) in Wuxi, Jiangsu Province was established in 1978 as a non-profit organization of the Chinese Academy of Fishery Sciences of the Ministry of Agriculture. It also operates two institutions, the Asia-Pacific Regional and Training Centre for Integrated Fish Farming and the Wuxi Fisheries College of Nanjing Agricultural University.

It conducts research on:

- Germplasm conservation and genetic improvement
- Biology and technology for aquaculture
- Inland fisheries resource conservation
- Monitoring and assessment of fisheries eco-environment

- Early warning and control of fisheries epidemics
- Capacity study and aquatic animal heath
- Nutrition and feed for aquatic animals
- Fisheries economics and information technology
- Breeding of new strains, i.e. all-male tilapia suited to the farming systems of China
- Integrated fish farming
- Lake fisheries, particularly on stock enhancement, pen culture and crab culture
- Lake environment rehabilitation

The Centre offers a variety of international training programmes, usually in collaboration with international bodies like UNDP and IDRC as well as NACA. These include:

- Integrated fish farming
- Induced breeding and fish seed production
- Hatchery management
- Teaching methodology in fisheries training

The Government has supported these programmes:

- A seminar programme on fisheries development and management aimed for senior government officials that has been attended by officers from countries in Africa, Oceania, Latin America, and other countries in Asia
- Technical training programs in Integrated Fish Farming, Aquaculture, Inland Open Water Fisheries Management, Aquaculture Health Management and Aquaculture Business Management for Aquaculture (2010)
- Regional training courses on Rice-fish farming for Cambodia (beneficiaries are Lao People's Democratic Republic and Myanmar, Sustainable fisheries management for ASEAN countries, Aquaculture for GMS countries and for ASEAN+1 countries.

Training contents include these technical and management skills:

- Pond fish culture techniques
- Induced breeding and seed nursery
- Nutrition and feed
- Disease prevention and treatment
- Integrated fish farming
- Aquatic product processing
- Mariculture
- Climate change
- Inland fisheries resource assessment and stock enhancement
- Aquaculture extension
- Fisheries information technology
- Safety and quality control
- Fish farm management and economics
- Fisheries project development and management

The Centre has carried out international cooperation and exchange programmes with the International Development Research Centre of Canada on integrated fish farming; the Research Institute for Fisheries, Centre of Aquaculture and Irrigation (HAKI) in Hungary on environment friendly aquaculture, immunology, and herbs; SEAFDEC-Aquaculture Department on aqua environment, fish health management, and social economics; CLAR of Egypt on tilapia breeding and aquaculture; UTC of Chile on integrated fish farming, immunology and herbs; Deakin University, Australia on shrimp culture, nutrition and reservoir fisheries; and the WorldFish Center on carp, tilapia breeding, and rural aquaculture.

NACA

The Network of Aquaculture Centres in Asia and the Pacific (NACA) is an Intergovernmental Organisation that began as a project of FAO/UNDP in 1980 and evolved into an intergovernmental organization in 1990. Its membership currently consists of 18 governments, with NACEE and the Secretariat of the Pacific Community as associate members.

Its programme focus is Regional Aquaculture Development through networking, sharing and communication, implemented with a variety of partner organizations and institutions. The thematic areas of its current work programme are:

- Sustainable farming systems
- Aquatic animal health
- Genetics and biodiversity
- Food safety, quality and certification
- Response to climate change

Its crosscutting programmes are Education and training, Information and communications and Gender issues. These are all aimed at promoting capacity building, human resource development and technical exchange and are conducted in partnership with many organizations and NACA Regional Lead Centres and National Centres. The activities are research, assessments, information and training.

NACEE

The Network of Aquaculture Centres in Central and Eastern Europe (NACEE) is a non-governmental organization (although its members are academic and research and development centres/institutions of governments). Established in 2004, it currently has 28 members from 9 countries of Central and Eastern Europe. It is also an associate member of NACA. The institutions that are now formally members are in Belarus, Hungary, Latvia, Lithuania, Moldova, Poland, Russian Federation, Ukraine, and the Czech Republic. Those that are in the process of being confirmed are in Bulgaria, Romania and Croatia.

NACEE aims to:

- Promote joint programmes of cooperation between members
- Promote cooperation with European organizations
- Improve cooperation between stakeholders
- Promote better participation in EU projects and initiatives for the development of sustainable aquaculture in the CEE region

NACEE has taken part in the implementation of several European projects, including EUROCARP; SUSTAINAQUA, AQUAMAX, PESCALEX, AQUASEM and ARRAINA. Its links with Central Asia and Caucasus has been through participation in workshops of CACFish and in the water genetic resources programme of FAO for the region.

The areas of research and development as well as information are coldwater and warmwater aquaculture pond systems and recirculating aquaculture systems (RAS), traditional and new facilities, processing, marketing, economics, nutrition, fish health, food safety and genetics.

It carries out exchange of information, exchange of experts (including fish farmers), internship, joint preparation and implementation of projects, supply of high quality seed, and assistance in the implementation of new technologies.

Xinjiang Uygur Autonomous Region Fisheries Research Institute (Xinjiang Fisheries Technical Extension Station)

The Xinjiang Uygur Autonomous Region Fisheries Research Institute has forged international cooperation relations with Pakistan, Kazakhstan, Turkey, Japan and other countries. Established in 1988 it is the only comprehensive aquaculture research unit in Xinjiang. Its areas of research, extension and scientific services include

- Basic science of fisheries
- Breeding of new varieties
- Promotion of new technologies
- Control of fisheries diseases
- Monitoring of water quality and environment
- Testing of quality and safety of aquatic products
- Breeding of improved varieties of fish and crustaceans

It has five units: the Xinjiang Fisheries Research Institute, the Xinjiang Fisheries Technology Extension Centre, the Xinjiang Fisheries Disease Control Centre, the Xinjiang Fisheries Environment Monitoring Centre and the Xinjiang Aquatic Product Quality Testing Centre. The institute has 76 formal staff members: professional technicians, research fellows, and senior engineers and engineers.

Breeding programmes are carried out on carp, tilapia and sturgeon as well as artificial propagation of indigenous fishes such as *Aspiorhynchus laticeps*, *Schizothorax biddulphi*, *Esox lucius* and *Perca fluviatilis*. Over the past 23 years, it has undertaken more than 100 research projects. Extensive research is conducted on indigenous fishes to breed them in captivity and conserve them.

FAO – Technical Cooperation Department, Integrated Food Security Support Service (TCSF), South-South Cooperation (SSC) in support of Food Security and Nutrition Programmes.

Purposes: SSC aims to support the National Programme for Food Security (NPFS) or other equivalent national agricultural plans or programmes in the host country. The arrangement provides practical assistance with easily adaptable methods and technologies. Under the scheme, technicians usually work directly with rural communities and farmers and experts provide practical support to national agricultural extension or other services. The scope of the SSC programme has been extended from simple know-how transfer to meeting the demand for information and knowledge exchange on other salient scientific, policy and institutional issues related to agriculture, food and nutrition security.

Legal requirements. Three parties are involved in the **SSC**, namely the cooperating government (which provides the expert or experts), the host or beneficiary government, and a donor agency. They share the costs:

- The cooperating government provides experts and technicians, continues to pay the salaries of the experts and technicians in their home country, provides life and disability insurance, and prepares the selected expert with the required vaccinations prior to his/her departure, provides inception training, especially adequate language courses (if needed), and provides local travel costs of expert(s) before departure.
- The Host or recipient government approves the candidates and provides the local counterparts, covers their local travel expenses as well as inception training, provides office space and accommodation, monitors and reports on performance, provides free access to public medical facilities to all the SSC experts.
- The Donor agency covers the operational costs, pays for monthly subsistence allowances, and provides travel plus installation allowances.

Characteristics: Technical assistance is jointly formulated according to the specific development needs and potentials of the host country. **SSC** activities are based on the substance of the national food security programme or other equivalent programmes through learning by doing and field demonstrations to transfer expertise for improving agricultural productivity. By having the SSC Project Document formulated jointly

by FAO, the cooperating country and the host, the SSC project targets the direct needs and interest of the host country. Technical know-how transferred through the **SSC** is practical and easy to apply. A large number of practical technologies in various technical areas are extended to local farms and households through the experts, who are usually based in the rural communities. This allow s them to provide technical consultations on the problems at any time.

The responsibilities of all parties are described in the Tripartite Agreement so as to facilitate each party to perform its duties. FAO has developed a systematic mechanism for the **SSC** programme management including the joint formulation mission to identify project areas and main tasks and a series of comprehensive, standard and legal documents in support of the programme implementation. The Tripartite Agreement outlines responsibilities of the three parties and the Personal Services Agreement between FAO and the expert(s) reflects their entitlements and the scope of their duties and responsibilities. The duration of the experts' assignments could be adjusted to fit different needs for short, medium and long term assistance.

The comparative advantages of the providing the institutions of the country in education, training and research would be further exploited and utilized to meet the increasing requirements from other developing countries.

SSC can also be applied to establish or strengthen new or existing national and regional training centres in other developing countries to better develop and share knowledge and technologies. It is also envisioned that the private sector and civil society organizations shall be involved in the SSC programme of FAO.

The FAO Scoping Workshop on "Regional Cooperation Programme for Responsible Aquaculture and Fisheries Development in the Central Asian and Caucasian Countries" was convened in Urumqi, China, 4–8 June 2012. The workshop report comprises the workshop proceedings and the strategy for regional cooperation that was developed by the participants; the latter was the principal output of the workshop. The major inputs to the discussions to craft the strategy were the country reports that described their priorities in five areas, namely research and technology development, manpower development, extension and information, management and policy; and their own assessment of their weaknesses and strengths in these areas. The workshop recommended seven activities that need to be initiated as soon as possible, as follows: (1) development of regional projects, organization of training/workshops, and capacity development on feed production and management on a pilot scale; (2) provision of technologies and equipment for the development and production of specialized fish feeds for different species from local raw materials; (3) training workshop on project development designed to improve project development skills by actually formulating projects that are based on the identified priorities; (3) an action plan for the upgrading of national laboratories in order to comply with international standards for certification of fish and fish products; (4) workshop on harmonization of institutional management structure and legislation in fisheries and aquaculture in accordance with international fisheries and aquaculture laws/policy for responsible fisheries and aquaculture; (5) development of an action plan to identify activities for sharing and providing broodstock and seed material that are of high genetic quality, complemented by training on broodstock management; (6) programmes for increasing and conserving endemic fish stocks in inland water reservoirs; and (7) establishing a working group linked to the TAC (Technical Advisory Committee) of CACFish (Central Asian and Caucasus Regional Commission on Fisheries), to support the follow-up of the scoping workshop recommendations and immediate action plans.

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