

Part II

Conception of aquaculture and capture fisheries development of the Republic of Uzbekistan, 2008–2016

(Aquaculture and capture fisheries development policy and
strategy of the Republic of Uzbekistan, 2008-2016)

Tashkent, 2009

Chapter I INTRODUCTION

THE NATIONAL DEVELOPMENT CONTEXT

The Republic of Uzbekistan (or Uzbekistan) has a population in 26.5 million people, a total land area of 447 000 km² and a combined water area from its numerous lakes, reservoirs and irrigation channels, except the now virtually dead Aral Sea, of more than 800 000 ha, and a total pond culture area of 10 200 ha. It had a relatively good production of fish before and immediately after independence in 1991 (Table A). In 1991 the total fish production was 27 200 tonnes. This has declined to 7 200 tonnes in 2006.

TABLE A
Fish production, 1980–2006 ('000 tonnes)

Year	Total fish production	Fish production in:	
		Pond fish farms	Natural waterbodies
1980	16.7	11.5	5.2
1990	26.5	20.4	6.1
2000	8.7	5.3	3.4
2001	8.8	5.4	3.4
2002	7.8	5.2	2.6
2003	5.4	3.3	2.1
2004	4.3	2.4	1.9
2005	6.1	3.2	2.9
2006	7.2	3.8	3.4

Source: Authors.

Various factors contributed to this decline: institutional constraints include the lack of governmental and non-governmental structures to promote the use of irrigation systems for fish production, and the absence of legislation to ensure the rights of private fish farmers to guaranteed water supply. Economic reasons include a lack of government financing and private investments in the industry and absence of specialized credit lines for aquaculture and culture-based fishery enterprises. A socially related factor is poaching. And there are many technical reasons among which are the insufficient supply of good quality fry and lack of quality feed⁴.

The formulation of the “Conception of Aquaculture and Capture Fisheries Development of the Republic of Uzbekistan, 2008–2016” (hereafter referred to as “Aquaculture and Capture Fisheries Development Policy and Strategy of the Republic of Uzbekistan, 2008–2016” or Policy and Strategic Plan) drew guidance from Uzbekistan’s national social and economic development policy. The policy envisions “maximum self-sufficiency and economic independence under a socially oriented market economy”.

The national social and economic development policy⁵ provides that the economy shall have paramount priority, the state is the main reformer, the law is superior in all aspects of life and business activity, the reforms cannot be separated from social protection, and market principles shall be consistently observed. The legal principles to support the policy are liberty and equality of all forms of ownership and liberty of entrepreneurship. These complement the economic principles, which are the promotion of a competitive environment and increased use of economic tools for regulation.

⁴ The constraints are described in detail in the document “Report of the National Participatory Workshop on Fisheries and Aquaculture Development and Management in Uzbekistan” as well as in this report “Review of the Current Status of Inland Capture Fisheries and Aquaculture in Uzbekistan”.

⁵ “Uzbekistan: Economy”, Government Portal www.gov.uz accessed 24 September 2007.

In brief, the government has made privatization, market economy, and social welfare the three cornerstones of its social and economic development policy.

PROJECT FAO UN TCP/UZB/3103(D)

In line with this national direction, the Ministry of Agriculture and Water Resources requested assistance from the Food and Agriculture Organization of the United Nations (FAO), through its Technical Cooperation Programme (TCP). The TCP project “Development of strategic partnerships in support of responsible fisheries and aquaculture development in Uzbekistan” was formulated in July 2007 and started implementation in August 2007.

The project aimed to develop strategic partnerships with the government of Uzbekistan for the rehabilitation of the national capture fishery sector and aquaculture sector in a structured and responsible manner. Its emphasis is on achieving food security and alleviation of poverty in rural areas in which aquaculture and fisheries could play a more prominent role. In this regard, the purpose of the Partnership Programme was to formulate and adopt a policy and a comprehensive strategic plan that will guide the government, the private sector, the financial institutions, and the international community to:

- develop and modernize the fisheries/aquaculture sectors in the context of a market economy;
- utilize effectively and in a sustainable manner the nation’s water resources for fish production;
- enable fishers and aquaculturists to develop and manage their businesses profitably in accordance with the government’s goal of promoting a market economy;
- increase the national supply and per capita consumption of quality fish;
- strengthen collaboration among government, academia, research and development, and private sectors; and
- strengthen state support for and increase international collaboration in aquaculture and fisheries development.

Using a participatory process by involving all main fisheries and aquaculture sector stakeholders and representatives from related sectors, the Ministry of Agriculture and Water Resources (with support from the FAO project) organized various stakeholder consultations and two participatory workshops. Two national planning workshops were held in Tashkent on 9–10 October and on 19–20 November 2007⁶.

The participants drafted a national Policy and Strategic Plan for the fisheries and aquaculture sector. The Policy and Strategic Plan balances the paramount role of government and the important role of the private sector in the development of aquaculture and fisheries. It recognizes the government’s roles of (i) stimulating fisheries and aquaculture development by providing the leadership and direction for achieving sustainable development, (ii) regulating the sector to require responsible behaviour, and (iii) actively providing the incentives, facilities and other necessary means to encourage and make it easy to start or expand a business in fish farming and fishing as well as in other enterprises based on fish production, processing and marketing.

The Policy and Strategic Plan also recognizes the important role of associations of producers and the private industry sector in the management of the sector by adopting best practices and codes of

⁶ Participants included senior managerial and technical personnel from government and various academic and research institutes, representatives of fishing and fish farming groups, private industry, and financial institutions, and regional and international organizations. The entire process of formulating the Policy and Strategic Plan was designed to actively involve the principal stakeholders in the fisheries sector. Pre-workshop activities included obtaining relevant information on the status of the sector through interviews with fishers and aquaculturists, technical workers, retailers and wholesalers, and other stakeholders. This information was presented for discussion at the workshops, during which the SWOT analysis was conducted. The workshop procedure was also highly participatory with participants discussing the issues and developing recommendations in intensive working group sessions. Post-workshop activities included obtaining comments on the draft Policy and Strategic Plan from the same workshop participants and other persons who have an interest in the sector.

conduct, and the need for them to be strong and independent so that they can be an effective partner of government in developing and managing the sector.

The Policy and Strategic Plan recognizes the regional variations in agro-ecological and socio-economic conditions in the country and will address equitably these regional differences in the formulation of development programmes and projects. While it will be necessary and wise to place higher priorities on the development of the more environmentally degraded and socio-economically disadvantaged areas or regions, there shall be due attention to the concerns and development aspirations of all areas. Special efforts shall be made to ensure that policy decisions and programme development will enhance national unity, cooperation among stakeholders and mutually beneficial exchanges among the provinces and regions.

In support of the policy of privatization and shift to a market economy, capacity building and further government support is needed to enable the sector to fully adjust to this economic regime. Facilities, infrastructure, research and technology development, and manpower training are extremely important public investments.

The first workshop highlighted the need to develop projects to show that aquaculture and culture-based fisheries are worth supporting and are credit-worthy. The strategy would be providing proofs that will persuade the government to allocate resources for the sector's development, and the banks to financially support business projects. From experiences in Asia-Pacific, the most convincing proof is a noticeable and measurable increase in farm or enterprise yields and profitability and an increase in total national production. This strategy would also give time for researchers to further develop new technology as well as test and adapt introduced technology. Successful outcomes from the application of the improved or new technology will likewise provide arguments for more support to research and technology development.

A special and perhaps unique feature of Uzbekistan's aquaculture and fishery sector is that it is a secondary user of already relatively scarce freshwater. Apart from this, it can sometimes unwittingly receive water that comes from residual irrigation discharges, i.e. water that may be contaminated with chemicals from run-offs from crop farms. This raises the problems of fish health and food safety. It will be necessary to tackle this issue by interagency and intersectoral cooperation, which is facilitated by the fact that the fishery sector is also under the Ministry of Agriculture and Water Resources. In this regard, water is not a sectoral issue.

It was acknowledged that while there are now a growing number of young entrepreneurial fish farmers, there remains a residual, centrally-planned-economy mentality in the sector. This will need to be addressed by activities that infuse business and market orientation in entrepreneurs and workers, the importance of being technically and economically efficient, the need for the sector to be competitive while fostering cooperation among farmers, suppliers, wholesalers and retailers, and the need to provide the climate and environment for private enterprise to flourish.

Finally, the commitment and support of the Ministry of Agriculture and Water Resources is deemed the key to the successful implementation of the Policy and Strategic Plan.

Chapter II

THE POLICY

JUSTIFICATION FOR THE POLICY

The primary justification for the policy from the point of view of sector governance is the need to strengthen the management and regulation of the aquaculture and capture fishery sector, define the institutional responsibilities and provide the basis for coordination among numerous agencies and institutions involved in regulating the sector, such as in leasing land and water, environmental control, nature protection, disease control, food safety and sanitary measures, and marketing and trade. Therefore, the workshop has strongly recommended the following measures for government to implement:

- (a) the establishment and strengthening of a national Aquaculture and Fisheries Department within the Ministry of Agriculture and Water Resources;
- (b) establishment and strengthening of Fish Producers Associations (FPA), which in turn suggests the creation of a responsible unit in the fisheries department to provide assistance to the associations;
- (c) creation of a multisector strategy monitoring and evaluation committee to monitor and assess the status of the implementation of the strategic plan and recommend to government necessary measures to improve implementation; this committee will stop its activity after establishment and strengthening of FPA; and
- (d) increasing collaboration with relevant international and regional organizations.

The other important justifications for the policy, but which cannot proceed effectively without a strong national development agency responsible for the sector, are the need to: provide a favourable condition for investments in aquaculture and fisheries, which requires the formulation of clear rules and regulations for investors, facilitating and providing support to the development of aquaculture and fisheries, and encouraging the establishment or expansion of enterprises. Specifically, to:

- establish fishery and aquaculture as legitimate users of water, land and other resources;
- provide environmental safeguards and ensure safety and quality of fish products;
- develop the management and technical skills to develop the sector;
- strengthen the education, research, technology development and technical services to support the modernization of the sector;
- define clearly the roles of the public and private sectors to provide clear signals to investors;
- establish a basis for public-private partnerships;
- develop links with other sectors so that producers can benefit from infrastructure development, gain access to credit, and enable them to profitably sell their products in domestic and export markets; and
- develop competitiveness in the regional and world markets.

LONG-TERM VISION

The vision statement adopted by the National Participatory Planning Workshop is geared towards greater societal benefits supported by economic development and carried the responsible and sustainable use of resources:

“Aquaculture and fishery shall be a sustainable, responsible and economically viable economic sector that will meet the demand for quality, diverse and affordable fish products, creating more employment and economic opportunities in rural and urban areas, offering alternative and viable livelihoods for the poor and generating income for the nation.”

DEFINITIONS

The following definitions for aquaculture, culture-based fisheries and fishery are adopted⁷:

- **Aquaculture:** The farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants with well-planned technical interventions in the rearing process to enhance production, such as planned stocking, feeding, water quality maintenance and protection from disease and predators. Farming also implies individual or corporate ownership of the stock being cultivated.
- **Culture-based fisheries:** Activities aimed at supplementing or sustaining the recruitment of one or more aquatic species and raising the total production or the production of selected elements of a fishery beyond a level which is sustainable through natural processes. In this sense, culture-based fisheries include enhancement measures which may take the form of: introduction of new species; stocking natural and artificial waterbodies; fertilization; environmental engineering, including habitat improvements and modification of waterbodies; alteration of species composition, including elimination of undesirable species or constituting an artificial fauna of selected species; and genetic modification of introduced species.
- **Capture Fisheries:** The sum or range of all the activities to harvest a given fish resource. It may refer to the location (e.g. a lake or a reservoir along the Amudarya), the target resource (e.g. carp, wels), the technology used (e.g. cast net, trap), the social characteristics (e.g. artisanal, industrial), the purpose (e.g. commercial, subsistence, or recreational) as well as the season.

MISSION OF THE MINISTRY OF AGRICULTURE AND WATER RESOURCES

This statement of Policy and Strategy emphasizes the need to strengthen the fisheries arm of the ministry by elevating it to a department and providing the resources (manpower, facilities and funds) to operate effectively. The strategy will include capacity building. Capacity building will include defining and establishing its institutional mandate, training the personnel, and establishing the necessary facilities that will enable it to manage aquaculture and fisheries effectively.

In line with the vision for the sector, the mission of the department shall be to support the development of sustainable economic opportunities for aquaculture and fisheries in a manner that is environmentally sound and consistent with applicable laws and government policy (Annex 2).

GUIDING PRINCIPLES

The implementation of the strategic plan will be guided by these principles:

- Aquaculture and fisheries are important for economic, social, development and public resource purposes. Collaboration among all stakeholders, including governments, public institutions, and the private sector and existing aquaculture and fishing industries is important to achieve sustainability and growth.
- The “Aquaculture and Capture Fisheries Development Policy and Strategy of the Republic of Uzbekistan, 2008–2016” and related programmes and procedures will adhere to international and regional standards and be harmonized as closely as possible.
- Management measures will be practical, cost-effective and utilize readily available resources. These resources will allow the development of appropriate national and regional policies and regulatory frameworks required to increase investments and reduce the risks in fishing, aquaculture, reproduction and movement of aquatic animals.
- Access to relevant national fisheries and aquaculture capacity (including infrastructure and expertise) is crucial to the development and management of the sector. Collaboration with international organizations and other countries will be sought wherever possible to further increase the country’s capacity to develop its fisheries and aquaculture in a sustainable manner.
- The activities carried out under the strategy shall be based on scientific evidence about the status of hydro-biological, economic and social information on the resources and the

⁷ Definitions adopted are those applied commonly at the international level and recommended by FAO.

communities that depend on them. In the absence of such information, the precautionary principle will be applied to management of the resources.

The above principles shall be operationalized by:

- compliance with all relevant international agreements and protocols that the government has ratified, including the FAO Code of Conduct for Responsible Fisheries;
- compliance with obligations and standards as provided by national laws, resolutions and regulations;
- assurance of equitable access to land and water resources;
- protection of property rights;
- development of the sector in harmony with local traditions, culture and values;
- participation in relevant regional and international organizations; and
- science-based risk management and decision-making.

Chapter III

STRATEGIC PLAN

The strategic plan contains the time frame for the practical implementation of the priority overall goals of the policy, a mechanism for supporting the implementation of the strategy, a mechanism for monitoring and evaluating the status of implementation, and the logical planning framework. The logical framework specifies the overall goals of the policy and strategy, the development objectives under each goal, and the specific objectives of the strategy required to attain each development objective⁸.

TIME FRAME

- The Strategic Plan shall be for a nine-year period from 2008 to 2016, subject to a national review and adjustments every three years.
- The implementation plans will be for shorter periods. The first implementation programme (or action plan) will run from 2008 to 2011.
- Plans shall be “rolling” plans rather than discrete plans that have a definite lifespan.

IMPLEMENTATION MECHANISM

The daily implementation of the Strategic Plan will be carried out by the Department of Aquaculture and Fisheries, as the leading executive agency at national level for fisheries and aquaculture development and management under the Ministry of Agriculture and Water Resources. The department will work closely with all relevant stakeholders, including research and education institutes, fishers and fish-farmers associations and donors in order to carry out the Strategic Plan. The department will report annually to the monitoring and evaluation committee (as discussed below). The Strategic Plan progress report should be reviewed and endorsed by the committee, indicating the changes and corrective measures needed to ensure the successful implementation of the Strategic Plan.

The Terms of Reference of the Department of Aquaculture and Fisheries (hereinafter referred to as the DAF) will be developed and reviewed when necessary; in addition, the budget allocation from the ministry towards the sector will be improved in order to enable the sector to carry out satisfactory work regarding fishery and aquaculture research and fishery statistical data collection, processing and dissemination.

The DAF will be properly staffed with at least the following persons in support of the implementation of the Strategic Plan:

- statistician
- socio-economist
- biologist
- management expert
- legal expert

MONITORING MECHANISM

A Multisector Monitoring and Evaluation Committee (MMEC) will be established on which all relevant stakeholders of the sector and related sectors are represented (ministries, associations, research institutions, universities, investors). It will be supported by but independent of the Ministry of Agriculture and Water Resources. Support would include providing a secretariat to the committee.

The committee will conduct periodic review meetings (i.e. annual for projects and every three years for a medium-term assessment) to adjust specific objectives for achieving the overall goals in

⁸ The activities to achieve the specific objectives were identified in the second national planning workshop held 19-20 November 2007.

the light of new, revised or additional information. Such adjustments have to be made through the participatory approach and by consensus.

The terms of reference of the committee and its membership appear in Annex 3.

OVERALL GOALS

The goals are classified into economic, social and ecological in order to highlight the three types of desired results from aquaculture and fishery development. The workshop emphasized that the goals are interlinked and complementary. Moreover, the workshop recognized that in implementing the Policy and Strategic Plan, efforts should be balanced to achieve economic, social and ecological objectives rather than maximize any single result. These overall goals were adopted:

- 1) economic: increase profitability of producers and enterprises; generate more export earnings;
- 2) social: alleviation of poverty and assurance of food security; more economic opportunities and employment in the rural areas, better nutrition of the population; and
- 3) ecological: protection, maintenance and enhancement of the productivity of land, water and genetic resources.

Below is the hierarchy of objectives developed through a logical framework exercise.

DEVELOPMENT OBJECTIVES

- 1) **Economic Goal: Increase profitability of fish producers, farms and fishing enterprises, and generate more export earnings.**

Rationale: Profit is a major objective and one of many business and environmental objectives that contribute to long-term sector sustainability.

- 1.1. Train researchers, specialists, and technicians and improve their professional and technical skills for research, extension and the management of the fishery (aquaculture, culture-based fisheries and capture fisheries) sector.
- 1.2. Develop the technical support services for production of larvae, fry and fingerlings, and feed, and for extension, disease prevention and control, credit, transport, processing, and marketing and trade
- 1.3. Improve knowledge and technologies in all aspects of capture fishery, culture-based fishery and aquaculture development and management.
- 1.4. Develop appropriate economic incentives for producers and enterprises, processors and wholesalers and retailers in the fishery sector.

- 2) **Social Goal: Alleviation of poverty and assurance of food security; more economic employment and higher incomes in the rural areas, improvement of health and nutrition of the citizens.**

Rationale: Social development improves the climate for economic growth.

- 2.1. Develop more economic activities and provide opportunities for business based on fisheries and aquaculture in the countryside and urban centres.
- 2.2. Expand the number of culture species and develop model technologies for their production in different types of waterbodies in order to create new jobs, meet the demand for fish products in local, national and export markets.
- 2.3. Produce sufficient quantity of fish that are of high quality and affordable to the citizens.

3) **Ecological Goal: Protection, maintenance and improvement of the productivity of land, water and genetic resources.**

Rationale: Economic and social development cannot be sustained if economic growth results in degraded resources.

3.1. Strengthen the management skills to implement national laws, international codes of responsible fisheries and conservation of biodiversity, and develop and apply better management practices (BMPs) on the conservation of fish and aquatic ecosystem biodiversity.

3.2. Ensure the protection and management of fishery resources by strengthening the control and implementation of environmental regulations on the use of natural bodies for fishery.

SPECIFIC OBJECTIVES

1) Economic Goal: Increase profitability of fish producers, farms and fishing enterprises, and generate more export earnings

Development Objective 1.1. Train researchers, specialists, and technicians and improve their professional and technical skills for research, extension and the management of the fishery (aquaculture, culture-based fisheries, and capture fisheries) sector.

Specific objective 1.1.1. Formulate and implement a comprehensive national human capacity development programme for aquaculture and fishery technical personnel, extension personnel and researchers.

Specific objective 1.1.2. Develop and conduct farmers training courses and study tours in various fish-farming technologies and in farm- and fishing enterprise management.

Development Objective 1.2. Develop the technical support services for production of larvae, fry and fingerlings, and feed, and for extension, disease prevention and control, financial services, transport, processing, and marketing and trade

Specific objective 1.2.1. Improve the existing broodstock farms and develop appropriate breeding programmes to produce quality broodstock and fry/fingerlings for culture and stocking in lakes, rivers and reservoirs.

Specific objective 1.2.2. Provide technical and financial assistance and incentives to the private sector in establishing and operating commercial hatcheries.

Specific objective 1.2.3. Strengthen the implementation of quarantine and regulations on the introduction and movement of live fish.

Specific objective 1.2.4. Develop and implement a national aquaculture feed and nutrition programme with emphasis on low-cost and practical feed formulation that the private sector will manufacture.

Development Objective 1.3. Improve knowledge and technologies in all aspects of capture fishery, culture-based fishery and aquaculture development and management.

Specific objective 1.3.1. Develop and demonstrate diversified and multipurpose aquaculture and culture-based fishery models.

Specific objective 1.3.2. Strengthen the information and technology exchange mechanism for fisheries and aquaculture.

Specific objective 1.3.3. Strengthen collaboration among research and educational institutions and the private sector in developing solutions to various sector problems.

Development Objective 1.4. Develop appropriate economic incentives for producers and enterprises, processors and wholesalers and retailers in the fishery sector.

Specific objective 1.4.1. Develop and implement a nationwide programme to improve market facilities, refrigeration, processing, and diversify and improve product forms and quality.

Specific objective 1.4.2. Facilitate access to micro-finance, credit, savings, subsidy schemes, insurance and investment sources.

Specific objective 1.4.3. Review and amend, as necessary, the licensing, leasing and tax regulations to encourage investments in aquaculture, culture-based fishery, capture fishery, fish processing and marketing.

2) Social Goal: Alleviation of poverty and assurance of food security; more economic employment and higher incomes in the rural areas, improvement of health and nutrition of the citizens.

Development Objective 2.1. Develop more economic activities and provide opportunities for business based on fisheries and aquaculture in the countryside and urban centres.

Specific objective 2.1.1. Promote a programme that creates more employment in aquaculture and culture-based fishery through segmentation and specializations in the various stages of production (i.e. hatchery, nursery, grow-out), supply of quality and inexpensive feed and fry/fingerlings, processing, transportation and product marketing.

Specific objective 2.1.2. Develop better marketing and processing techniques and train women and others in these techniques.

Specific objective 2.1.3. Promote the supply of aquaculture products to institutional buyers such as hotels, restaurants, cafeterias and canteens of enterprises and guest houses.

Specific objective 2.1.4. Promote collaboration among primary fish producers (aquaculturists and fishers), fish processors, wholesalers and retailers.

Development Objective 2.2. Expand the number of culture species and develop model technologies for their production in different types of waterbodies in order to create new jobs, meet the demand for fish products in local, national and export markets.

Specific objective 2.2.1. Demonstrate that aquaculture enterprises are “bankable” (i.e. lending to aquaculture is profitable for banks) and develop with the banks a credit and insurance scheme for aquaculture and culture-based fishery.

Specific objective 2.2.2. Formulate and implement a careful introduction of new species, establish pilot demonstration projects for the culture of these introduced species and develop and train personnel in the technology to breed and culture these new species.

Specific objective 2.2.3. Implement (together with the Ministry of Health and nutritional institutes under it) a campaign to promote more consumption of fish for health reasons.

Development Objective 2.3. Produce sufficient quantities of fish that are of high quality and affordable to the Uzbek population.

Specific objective 2.3.1. Develop low-cost production and processing technologies.

Specific objective 2.3.2. Study ways to improve the economic efficiencies of fish production and marketing of fish products.

Specific objective 2.3.3. Develop a nationwide restocking, stock-enhancement and culture-based fishery programme with emphasis on provision of technological support and development of the expertise of the private sector.

3) Ecological Goal: Protection, maintenance and improvement of the productivity of land, water and genetic resources.

Development Objective 3.1. Improve the management capacities and skills to implement codes, and develop and apply better management practices (BMPs), disease control and environmental protection measures.

Specific objective 3.1.1. Unify the system of fishery inspection, quarantine and control of introduction or movement of species with the Fisheries Department as the leading institution.

Specific objective 3.1.2. Produce and disseminate better management practice manuals and guidelines for various problems and train personnel, fishers and associations in their implementation.

Specific objective 3.1.3. Improve the statistical and fishery information system.

Development Objective 3.2. Ensure the protection and management of fishery resources.

Specific objective 3.2.1. Establish community management schemes for lakes, reservoirs and other waterbodies.

Specific objective 3.2.2. Combat illegal, unregulated and unreported fishing in lakes, rivers and reservoirs and increase the capacity of fishery inspection and nature protection units.

Specific objective 3.2.3. Conduct nature conservation awareness campaigns.

The above specific objectives are restated in statements of Outputs in Annex 1, which is the Logical Framework Analysis for the Strategic Plan.

ACTIVITIES

The activities were identified and developed at the second participatory planning workshop on 19–20 November. “Activities” included priority projects meant to implement the strategic plan. The second workshop confirmed the indications from the first planning workshop that the top priority set of activities will include defining and establishing an institutional arrangement to implement the Policy and Strategic Plan, as follows:

- i. establishing and strengthening an Aquaculture and Fisheries Department which will be the lead and responsible agency for sector management and development;
- ii. defining the responsibilities and roles of the various other agencies and institutes in the implementation of the Policy and Strategic Plan;
- iii. forming a multisectoral monitoring committee;
- iv. organizing producers’ associations and subsequently forming a federation of these associations; and

- v. developing linkages with regional and international organizations for technical and other assistance.

To address systematically the above and other issues, the second participatory planning workshop developed a phased implementation programme for the development of the fisheries sector in the Uzbekistani economy. The programme is based on the fish-farming policy and aimed at the implementation of the strategy of the development of aquaculture and capture fisheries elaborated within the framework of the project TCP/UZB/3103(D) and workshops involving leading experts and workers in the fisheries sector in October–November 2007.

According to the recommendations of the workshop participants, the implementation programme for the Strategy of Development is elaborated for a nine-year period from 2008 to 2016. The period is divided into three phases or stages:

Stage 1: Establishing the requisites for sector development

Goal: Create a technological and infrastructure basis for overcoming the development gap between this sector and world trends. It aims at the qualitative development of fishery, culture-based fishery and capture fishery. Development will encourage private capital and further support of the state.

Duration: 3 years (Years 1–3)

The concept of this stage: At this stage, mechanisms providing the sector development will be developed and strengthened. A state body responsible for the development of the sector – the DAF will be established. Under DAF supervision, modern technologies of fish cultivation will be adapted and their high effect and productivity will be demonstrated in order to encourage private capital and state bodies *en situ*, as well as various agencies, for their large-scale development. Some 75 percent of the specified goals will be implemented during the first stage.

The key elements of the sector development are the following:

- creation (rehabilitation with new functions) of the DAF, within the Ministry of Agriculture and Water Resources of Uzbekistan, responsible for the development of the fisheries sector;
- development of one or two pilot demonstration projects aimed at capacity building for the development of basic fishery technologies and culture-based fishery in such aspects as fish reproduction and cultivation. In addition, within these projects, **demonstration-research** capacities will be created for production of feeds based on local materials, storage, processing and marketing of fish products. Integrated groups of experts from the fisheries sector, the Academy of Sciences, the Ministry of Higher Education and other institutions will be involved in the development of technologies;
- The Ministry of Agriculture and Water Resources will take a lead role in sector development efforts. The results of the technology development work will be propagated and disseminated for government, private capital, and local administration and farmer associations. The creation of highly profitable technologies will form the basis of these developments; and
- creation of integrated groups of specialists for the development of programmes indicated in the strategy and covering various aspects of the fisheries sector.

Measures (main part of project)

Year 1	<p>1. Create the DAF in this or that form (administration or department) within the Ministry of Agriculture and Water Resources; determine its function as the responsibility for the implementation of the current fishery development policy and strategy in Uzbekistan.</p> <p>2. The DAF will develop a programme of stock culture in Uzbekistan for such objects as the carp, the silver carp and the big head carp, trout, channel catfish, European catfish and the sturgeon, for the period until 2016. The state and private hatcheries will be involved in the programme, inclusive for the culture-based fishery.</p> <p>3. The DAF will develop a programme of information and technology exchange in the sphere of aquaculture and capture fishery in common with the international fishery community and start its implementation.</p> <p>4. The DAF will develop, in compliance with the FAO requirements, a system of statistical reporting for fishery enterprises of various forms of property (production of fish, storage, processing and marketing) and introduce it.</p> <p>5. The DAF will analyse and develop the procedure of licensing of fishery enterprises, leasing and taxation for encouragement of investments in aquaculture, culture-based fishery, capture fishery, fish processing and marketing.</p> <p>6. Establish a multisectoral committee for the implementation of the national programme of staff training for fisheries, including researchers, technical personnel, teachers and consultants; the commission will develop a programme and start its implementation.</p> <p>7. Establish a multisectoral committee for the development of the programme of the improvement of cooperation among research and educational institutions and the private sector in various aspects of fisheries.</p> <p>8. Establish a multisectoral committee for the development of an improved capture fishery, stocking, enhancement of fish stocks, and culture-based fishery with the emphasis on the technological support of and development of expertise in private sector.</p> <p>9. The DAF will identify the location for two pilot projects for the development of modern technologies of production, storage and processing of fish (aquaculture and culture-based fishery) in the foothills (cold-water fishery) and flat-land (warm-water fishery) zones of Tashkent province; develop the feasibility plan and requirements specification, and construct those demonstration farms. Envisage the creation of small-sized fishery waterbodies (flow-through tanks, cages, earthen ponds with the area of 0.05 ha) and corresponding infrastructure; establish pilot farms.</p> <p>10. Develop a programme of production of feeds and feeding fish on the basis of local ingredients (a study of the nutritional value of local ingredients, development of formulations containing protein of more than 28 percent and the feeding coefficient below 3; creation of the technology of production of feeds for small farms and mixed-feed factories of various forms). The programmes should be associated with pilot projects as experimental bases. Start implementation of the programme from year 2.</p> <p>11. Develop a programme of development of technologies of practical and affordable production of fish in semi-intensive and intensive conditions by using various systems of cultivation (cages, tanks, ponds, enclosures, culture-based fishery and aquaculture) with the association to pilot projects as the experimental basis; start its implementation. The programme should be orientated to small, private enterprises as producers and processors of fish.</p> <p>12. The State Committee for Nature Protection in common with the DAF will develop a programme of popularization of the importance of nature protection among residents in respect to waterbodies and biodiversity of fishes in the region and start its implementation.</p>
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Year 2	13. The DAF will develop a programme in compliance with the world expertise in fishery management in inland waterbodies to achieve productivity of 10–15 kg/ha in foothill waterbodies and 15–30 kg/ha in plain-land waterbodies; develop and carry out the programmes of publication of respective manuals, guidelines and monographs; and carry out the training of specialists of fishery enterprises, associations, educational and research institutions.
	14. The DAF will develop and carry out a programme of improving skills (training courses of varying time frames, workshops, presentations) of the sector specialists (technical personnel, managers and farmers) on the basis of pilot projects.
Year 3	15. Create a multisectoral committee for the elaboration of the programme of development of the culture-based fishery on state waterbodies (monitoring, improved methods of management, selection of objects and stocking) with the emphasis on the implementation of the research, consultative and technological support of the private sector.
	16. Researchers from pilot projects together with the DAF will demonstrate to financial institutions (banks and development foundations) that modern technologies of aquaculture, fish processing and marketing are attractive for crediting or other forms of investments; together with the banks develop a scheme of preferential/stimulating crediting and ensuring of investments in the sector.
	17. Together with the financial institutions and agencies, the DAF will develop the rationale and programme of access to credits for the development of aquaculture, fishery, fish processing and marketing. In this rationale, the emphasis will be laid on the highly profitable technologies developed within the frames of the pilot projects and adapted to socio-economic conditions of Uzbekistan.
	18. Together with fishery associations and other stakeholders, a programme of the stimulation of segmentation and specialization of enterprises in the sector (hatcheries, fattening farms and extension, including suppliers of feeds, equipment, consultations, transportation and marketing) through the application of developed technologies for creation of more jobs will be developed.
	19. The DAF will facilitate access of private entrepreneurs involved in fish production, its processing and marketing to credits (preferential credits) for the development of highly profitable credits in this sector.
	20. The DAF will develop a programme of technological and economic support of private enterprises involved in the production of fish, its processing and marketing.
	21. Together with concerned fishery associations, the DAF will develop and carry out the programme of the capacity building of markets for storage and processing of fish for the expansion of the number of products, improving their quality and the quality of services rendered to the population.
	22. The fishery associations will carry out programmes of cooperation among fish producers, processors and sellers.

Stage 2: Intensification of development and dissemination of new technologies

Goal: Popularize the highly productive, profitable and mature or stable technologies in aquaculture, culture-based fishery, processing and marketing, as well as the support services for the sector that have been developed during the first stage among a wide range of entrepreneurs, agencies and local administrations; attract investments to the sector and begin the development of private enterprises, as well as various associations of fishery enterprises; encourage segmentation and structuring in the sector.

Duration: 3 years (Years 4–6)

Concept of this stage. At this stage, technologies developed during the first stage and specific programmes will be disseminated among farmers, private entrepreneurs of small and large businesses, local administration and financial and insurance agencies. To that end, presentations, training courses, educational aids and advertisements will be carried out on the basis of the ongoing projects for demonstration. The private capital will come to the sector resulting in establishing enterprises of various sizes and specializations. The DAF and associations of fishery enterprises established voluntarily at the regional and national levels and involving researchers, consultants and teachers, will in every possible way assist in developing private business in the sector, promoting application of new technologies, crediting, insurance, and searches for partners both inside and outside the state. New or reconstructed enterprises will be developing in favourable conditions, providing the market with production and obtaining profits from their activities, which will attract new participants to the sector, as well as new investments and development.

The programme envisages the production of fish to reach 15 000–25000 tonnes of fish per annum by the end of the stage.

Besides measures initiated at the first stage and carried out on a constant basis, steps aimed at reaching new specific goals will be carried out in stages as shown below:

Year 4	23. The DAF, in common with respective agencies, will develop and carry out the programme of popularization of consumption of fish as the high-quality product for people to increase its consumption.
	24. The DAF will provide technical and financial support for and encourage the development of private fish nurseries for supplies of fish stocking material for the needs of the developing fisheries sector.
	25. Set up a multisectoral committee for the creation of the effective quarantine and regulation of the introduction of new fish species and the movement of fish across the state. This committee will develop main requirements and regulations providing the conservation of fish biodiversity in the basin of the Aral Sea region on the one hand and development of aquaculture through the expansion of the number of cultivated objects by introducing new promising species into our region on the other.
Year 5	26. The DAF, in common with respective agencies and organizations, will elaborate a programme of development of profitable, small technologies of production, processing and marketing of fish, and involve women and other groups of the population in these activities.
Year 6	27. The State Committee for Nature Protection, in common with DAF, will develop a system of effective protection of state natural fishery water resources with the aim of introduction of an improved fishery sector management and rational use of fish resources by private capital.

Stage 3: The quantitative development of the sector

Goal: The quantitative growth of enterprises in the sector, volumes of production of fish and fish products; expansion of services through the application of various technologies and the use of established structures and systems in the sector.

Duration of Stage: 3 years (Years 7–9)

Concept of this stage: New enterprises will be developed. Technologies of fish cultivation and processing will be constantly improved; private hatcheries will be put into operation to meet the demand for stockfish; the sphere of services will be expanded, which will provide the development of

the sector with equipment and facilities, feed, stock material, engineering, financial and other services; the system of the training of personnel and raising of skills will be developed; the mechanism to carry out constant development of technologies corresponding to the world levels will be operating.

By this stage, all programmes within this strategy shall have been implemented. By the end of this stage, the production of fish will have exceeded 25 000 tonnes (production can reach potentially 50 000 tonnes).

THE PROGNOSIS OF THE DEVELOPMENT OF THE FISHERIES SECTOR IN UZBEKISTAN IN LIGHT OF THE SUGGESTED STRATEGY (2008–2016)

The production of fish in Uzbekistan is less than 10 000 tonnes/year or less than 0.5 kg/per capita/year. The technologies show a low productivity both in aquaculture (less than 5 000 tonnes of fish; productivity is less than 2 tonnes/ha or less than 130 g/m³ of water) and in capture fishery (the factual fish productivity in waterbodies is 1–7 kg/ha at the potential minimum of 20–25 kg/ha). Meanwhile, the world level of aquaculture productivity enables fish production of 50–200 kg/m³ of water; the average consumption of fish in the world reaches 16.6 kg/per capita/year (live weight equivalent, FAO), while the minimum level recommended by the medical profession is 12 kg/per capita/year. This implies that Uzbekistan needs about 200 000 tonnes of additional fish per year in the domestic market.

It is impossible to achieve a significant increase in fish production based on the available technologies alone. They are outdated, fall short of market relations, require significant land and water resources and show a low productivity. The development of the fisheries sector must be based only on modern, intensive technologies (see Table B). The main emphasis should be placed on the following:

- aquaculture in order to increase fish yields;
- aquaculture using available water resources;
- culture-based fishery; and
- recreational fishery and ecotourism.

TABLE B

Main characteristics of the proposed aquaculture development concepts

Aquaculture systems	Flow-through systems alongside irrigation and drainage canals, cage culture on all waterbodies, small earthen ponds, integrated and recirculating aquaculture systems
Main fish species for aquaculture	Rainbow trout, canal catfish, wels, Siberian sturgeon, tilapia, pike-perch
Waterbodies and watercourses for aquaculture development	Ponds on fish farms, water reservoirs, irrigation and drainage canals, rivers
Fish productivity	On average 40–50 kg/m ³ in all stated systems

Source: Authors.

The development of new technologies requires a respective fishery policy, strategy and programmes. Uzbekistan, with its century-old experience in agriculture, can significantly improve the production of fish by requiring its fisheries sector to use a small amount of water so that it will not only provide the local market with this most valuable food, but also significantly develop its export. The principle of private interest will be used with the creation of favourable conditions by the state. In fact, if private entrepreneurs are provided with fish-cultivating technologies with the capacity to produce only 50 kg/m², less than 400 ha of ponds will be needed for the production of 200 000 tonnes (!) of fish per year. Currently, the country uses about 10 000 ha for aquaculture and produces about 3 500 tonnes of fish.

The proposed policy and strategy of fishery development set the goal of adapting the worldwide expertise to Uzbekistani conditions in the following ten years, creating a respective infrastructure, research and educational potential and equipping private entrepreneurs with attractive technologies

that will stimulate their involvement in the sector (aquaculture is one of the most beneficial kinds of rural business in all regions of the world). Highly profitable technologies are in demand both for individual small-sized family farms and for large enterprises.

It is suggested to establish a department of fisheries within the Ministry of Agriculture and Water Resources (as an independent administration or a department), which will carry out the adopted strategy, stimulate the development of the fisheries sector and create favourable conditions for private investments in the development of industries, infrastructure and extension in this sector. Permanent, experimental fishery stations (both for the cold-water and warm-water fisheries, since these cannot be combined in the same territory) are suggested as mechanisms for the development of technologies and targeted, integrated programmes aimed at individual aspects. The establishment of a targeted credit programme is proposed alongside the development of highly profitable technologies during the first three years (the profitability level is at least 30–40 percent).

The minimal result of implementation of the development strategy in the six-year period will be the production of 15 000 tonnes of fish and in the nine-year period the production of 30 000 tonnes of fish by the private sector alone (see Table C).

It is noteworthy that the policy of the development of the fisheries sector, as well as the strategic plan, are rather general, basic plans. The adopted Development Programme will be developed as the next stage during the first year after the adoption of the “Aquaculture and Capture Fisheries Development Policy and Strategy of the Republic of Uzbekistan, 2008–2016” (to be approved by the Ministry of Agriculture and Water Resources as the “Conception of Aquaculture and Capture Fisheries Development of the Republic of Uzbekistan, 2008–2016”).

It is noteworthy that the main directions of the development are clearly defined in the strategy.

TABLE C
**The prognosis of the development of the fisheries sector in Uzbekistan
in light of the suggested strategy, 2008–2016**

Indicator	Unit	Year								
		2008	2009	2010	2011	2012	2013	2014	2015	2016
Production of fish using existing technologies										
Total:	Tonne	8 815	9 600	10 000	11 000	11 600	12 800	13 500	14 500	16 000
Including:										
Pond fish farms	tonne	4 739	5 500	5 800	6 750	7 300	8 500	9 100	10 000	11 500
Natural waterbodies	tonne	4 076	4 100	4 200	4 250	4 300	4 300	4 400	4 500	4 500
Production of fish seeds										
Total:	bln. fry	34.3	38.8	40.8	46.5	49.9	57.1	60.7	66.3	75.3
Including:										
Stocking of fish ponds	bln. fry	28.4	32.9	34.7	40.4	43.7	50.9	54.4	59.8	68.8
Natural waterbodies	bln. fry	5.9	5.9	6.1	6.1	6.2	6.2	6.3	6.5	6.5
Combined fish feeds	tonne	7 108.5	8 250	8 700	10 125	10 950	12 750	13 650	15 000	17 250
Fertilizers	tonne	3 838.6	4 400.0	4 582.0	5 265.0	5 621.0	6 460.0	6 734.0	7 300.0	8 280.0
Production of fish by introduction of intensive new technologies										
Total:	tonne	0	0	50	95	160	1 000	6 100	11 000	17 000
Including:										
Trout	tonne	0	0	50	70	100	800	5 000	8 000	10 000
Catfish	tonne	0	0	0	20	50	100	900	2 500	6 000
Sturgeon, tilapia, etc.	tonne	0	0	0	5	10	100	200	500	1 000
In the Republic in future										
Total:	tonne	8 816	9 600	10 050	11 095	11 760	13 800	19 600	25 500	33 000

Source: Authors.

Annex 1

LOGICAL FRAMEWORK FOR THE STRATEGIC PLAN**1. Logical framework: overall goals**

Overall goals	Indicators	Means of verification (sources of data)	Assumptions and risks
<u>Economic</u> Increase profitability of fish producers, farms and fishing enterprises, and generate more export earnings.	More farms being established, more fish being produced and marketed, higher farm incomes and national revenues.	Economic survey reports, export volumes and earnings from exports.	Well-managed aquaculture and fisheries projects are needed to demonstrate profitability. Risks include market failures, inadequate support to sector, inappropriate technology, poor farming and management skills, and high costs of inputs (labour, feed, fry).
<u>Social</u> Alleviation of poverty and assurance of food security; more economic employment and higher incomes in the rural areas, improvement of health and nutrition of the citizens.	More people employed in fishery sector, more fish consumption per capita, higher household incomes.	Household survey reports, employment figures in the sector, the Department of Health reports.	More jobs are generated and wages are attractive in the sector; quality and affordable fish products are sold. Risks include lack of incentives for expansion and entrepreneurship, poor quality and high-priced fish.
<u>Ecological</u> Protection, maintenance and improvement of the productivity of land, water and genetic resources.	Water resources are not polluted and remain suitable for fisheries and aquaculture; native fish species are not threatened.	Reports of analyses of soil and water quality of different waterbodies; reports of the Nature Protection Unit.	Poaching, over-harvesting and indiscriminate discharge of irrigation residual water, and a low priority to fisheries and aquaculture in development planning.

2. Logical framework: development objectives

1. Development objectives of the Economic goal	Indicators	Means of verification (sources of data)	Assumptions and risks
1.1 Train researchers, specialists and technicians and improve their	Number and types of training and study tours carried out, number and	Training reports and training manuals	Lack of or inappropriate training materials and capable trainers; lack of

professional and technical skills for research, extension and management of the fisheries (aquaculture, culture-based fishery and capture fishery) sector.	type of personnel trained.	produced.	support for training. A training needs assessment is required and high quality training manuals need to be developed.
1.2 Develop the technical support services for production of larvae, fry and fingerlings, and feed, and for extension, disease prevention and control, credit, transport, processing, and marketing and trade.	Facilities developed and technical advisory teams formed to provide technical services to farmers; a “one-stop shop” programme to streamline provision of information, technology and credit services in place by Year 3.	Number of inquiries and requests for technical advice as contained in reports.	Difficulty in obtaining advice on different problems from different sources. A one-stop source would make it easy and less time consuming for farmers and others to obtain advice, information and technical services.
1.3 Improve knowledge and technologies in all aspects of capture fishery, culture-based fishery and aquaculture development and management.	New or improved technology being adopted, more research results published, more information on innovations disseminated.	Reports and feedback from fish farmers and producers.	Adaptation of borrowed technology would be a cheap and fast way to provide better technology to fish farmers.
1.4 Develop appropriate economic incentives for producers and enterprises, processors and wholesalers and retailers in the fisheries sector.	Increased number of businesses related to fish processing, handling and selling established in urban and rural areas.	Surveys and reports from Ministry of Commerce.	Coordination among concerned ministries will facilitate the formulation of appropriate incentives.
2. Development objectives of the social goal	Indicators	Means of verification (sources of data)	Assumptions and risks
2.1 Develop more economic activities and provide opportunities for business based on fisheries and aquaculture in the countryside and urban centres.	Business enterprises established, more employment.	Economic surveys and reports from the Ministry of Commerce.	A lack of proper incentives will be a deterrent to entrepreneurs.
2.2 Expand the number of culture species and develop model technologies for their production in different types of waterbodies in order to create new jobs; meet the demand for fish products in local, national and export markets.	Number and species introduced successfully; new species being cultured and sold in the markets.	Surveys and reports.	A huge risk is the indiscriminate or illegal introduction of alien species. Risk assessment measures will be needed. Strict quarantine and observance of protocols on responsible movement of species are required.
2.3 Produce sufficient quantity of fish that are of high quality and affordable to the citizens.	Higher volumes of fish sold; higher per capita consumption; by Year 5 total production will be double that of current level; by Year 10	Consumer surveys; production and market statistics.	All the risks and assumptions for the other objectives apply to this objective.

	production will have exceeded the level attained before independence, i.e. 27 000 tonnes.		
3. Development objectives of the ecological goal	Indicators	Means of verification (sources of data)	Assumptions and risks
3.1 Strengthen the management skills to implement national laws, international codes of responsible fisheries and conservation of biodiversity; develop and apply better management practices (BMPs) on the conservation of fish and aquatic ecosystem biodiversity.	Best practice guidelines produced and personnel trained in their implementation.	BMP manuals published, report on training activities conducted and number of trained personnel.	There would be need for cooperation among agencies and users/communities in developing guidelines and complying with the codes and better practices.
3.2 Ensure the protection and management of fishery resources by strengthening the control and implementation of environmental regulations on the use of natural bodies for fisheries.	Rules and regulations are adequate and clearly understood by the users; surveys of the status of the waterbodies and surrounding communities of users will provide a clear understanding of the problems.	A compendium and published sets of relevant rules and regulations; survey and analytical reports of waterbody and community issues.	A surveillance and monitoring system is crucial to the achievement of this objective.

3. Logical framework: specific objectives (outputs)

a. Economic goals

Specific objectives (Outputs)	Indicators	Means of verification (sources of data)	Assumptions and risks
1.1.1 A comprehensive national manpower development programme for aquaculture and fishery technical personnel, extension personnel and researchers formulated in Year 1 and initiated by Year 2.	Training programme approved and courses organized and carried out.	Reports of training held; training manuals produced.	A study to determine training needs is important to match courses with the skills needed by the sector. Risks include irrelevant and poorly designed courses.
1.1.2 Fifteen farmer study tours and training courses in various fish-farming technologies and in enterprise management implemented during Years 1–5.	Training course and study tours actually carried out; actual application of the techniques and skills learned from the training and study tours.	Reports of training and study tours; feedback from trained people.	Two risks: poor or irrelevant training programmes and the wrong participants chosen to participate in training and study tours.

1.2.1 Existing broodstock farms improved and breeding programmes for different species to produce quality broodstock and fry/fingerlings for culture and stocking in lakes, rivers and reservoirs implemented.	Broodstock farms and hatcheries produce enough/healthy fingerlings in a timely manner to meet national demand.	Report of broodstock and fry/fingerling production; feedback from farmers.	Lack of support to the existing farms to enable them to renovate and improve capacities.
1.2.2 The private sector received technical assistance and incentives to improve or establish private commercial hatcheries.	Private hatcheries established by Year 3 and producing fry and fingerlings to meet 80 percent of demand by Year 6.	Report of Fisheries Department; actual count and report from the hatchery operators.	Government hatcheries should not compete with the private hatcheries.
1.2.3 Quarantine protocols and regulations on the introduction and movement of live fish reviewed, strengthened and enforced.	A unified national regulation to govern introduction and movement of live fish species formulated.	Government resolution.	Effective enforcement will depend much on a strong surveillance mechanism.
1.2.4 A national aquaculture fish feed and nutrition programme with emphasis on low-cost and practical feed formulation developed and taken up by the private sector.	Feed for small-scale trials produced in the country by Year 2; farm-made feed produced by farmers; commercial feed manufacture established by Year 5.	A pilot feed farm is established; commercial feed mills established; report from Ministry of Commerce.	Raw materials supply must be assured; locally made feed must be competitive with imported feeds in price and quality; incentives are needed for feed manufacturers.
1.3.1 Pilot demonstration projects on diversified and multipurpose aquaculture and culture-based fishery models established.	Five demonstration projects will be established by Year 3 and another five by Year 6.	Actual count and inspection of the demonstration sites; reports of the Department of Fisheries.	Poor choice of technology and system to be demonstrated and too much subsidy so that the demonstration is unrealistic are risks.
1.3.2 The information and technology exchange mechanism for fisheries and aquaculture established and strengthened.	Information and Communications Technology Unit established in Department of Fisheries by Year 3; a programme for information and technology screening and exchange established.	ICT Unit actually operating.	There will be need to recruit a capable staff and provide adequate ICT facilities and equipment. The ICT office needs to be the hub of a national network and a participant in regional and global information exchange activities.
1.3.3 Collaborative programmes in research and education developed among research and educational institutes, private sector and farmer associations.	A national programme to integrate research, education and technology dissemination is formulated.	Report on the programme to government and/or to donor agencies.	The programme should be formulated by the participating agencies and groups and "owned" by them. The process should be facilitated and supported by government and a collaborating international organization or organizations.

1.4.1 A nationwide programme to improve and modernize market facilities, refrigeration and processing and to diversify and improve product forms and quality implemented.	A support infrastructure and facilities modernization programme developed in Year 2 and implemented during the first six-year period.	An approved plan detailing activities and budget allocation; reports from government.	The plan should also be developed with the participation of all concerned sectors; assistance from donors and international agencies would facilitate the development and implementation of the programme.
1.4.2 A loan programme from at least one bank for aquaculture and culture-based fishery enterprises developed and implemented.	Pilot loan programme developed by Year 2; a wider loan programme implemented by Year 4.	Bank and Ministry of Finance reports; bank portfolio includes loans to aquaculture and culture-based fishery enterprises.	A demonstration project and study to show credit worthiness and profitability of aquaculture and culture-based fishery projects would strengthen the case for the loan programme. Output 1.4.3 will facilitate this objective.
1.4.3 Licensing, leasing and tax regulations meant to encourage investments in aquaculture, culture-based fishery, capture fishery, feed manufacture, fish processing, and marketing reviewed and amended.	An interagency group reviews and recommends improvement in the regulations by Year 1, to be completed in Year 2.	Published compendium of revised or amended regulations and incentives; report of Department of Fisheries	A multistakeholder review that includes government agencies and the representatives of fishers, fish farmers, sellers, and hatchery and feed suppliers and processors will result in appropriate amendments.

b. Social goals

2.1.1 A programme to promote segmentation and specializations in specific activities from production, supply, processing, handling and transporting, and marketing formulated and implemented.	Enterprises specializing in hatchery, nursery, feed supply, transporting, processing, wholesaling and retailing are established; more employment created.	Reports of the Department of Fisheries and the Ministry of Commerce.	Lack of incentives for the business enterprises is a barrier. Cooperation will be needed among the hatchery operators, nursery farms, suppliers of feed, farmers, and the ones engaged in post-harvest activities (handling, processing, transport, and marketing) to foster trust and efficient flow of goods and services among them.
2.1.2 Better marketing and processing techniques developed and women trained in the techniques.	Technology guides developed; training conducted using these technology guides.	Published technology guides, report of training, feedback from trained people.	There will be need to provide the opportunity for the trained women to apply profitably the techniques they learned; credit is needed for them to start small-scale businesses.

2.1.3 A programme to promote the supply of aquaculture products to institutional buyers (hotels, restaurants and guest houses) implemented.	Increasing volume of fish sold to institutional buyers.	Market reports; feedback from hotels, restaurants, and guest house operators.	This will require a high quality and reliable supply of fish products. A market survey is needed to assess demand from institutional buyers and promote fish products to them.
2.1.4 Collaboration among aquaculture producers, fish processors and wholesalers encouraged and promoted.	Codes of practices for producers, processors and sellers developed and promoted from Years 2–6.	Published codes of practices in fish farming, fish processing, and marketing.	Promoting farmers' associations, processors' associations and sellers' associations will increase the chances of better cooperation among these sectors.
2.2.1 Pilot demonstration projects established and success stories in fish farming and culture-based fishery documented and published.	At least six projects established by Year 2 and results at the end of Year 3. At least three success stories published by Year 3.	Project interim and final reports; published success stories.	Integrating this project with 1.1.2, 1.3.1, 1.4.2 and 2.1.4 will increase its chances of success and value. It will also require the results from 1.3.2.
2.2.2 A programme for introduction, screening and testing of new species developed and fishery personnel and farmers trained in their culture and breeding.	The programme formulated in Year 1 and implemented from Years 2–6.	Report of the programme; report from trials.	A strict biosafety measure is needed to ensure that introduced species do not escape.
2.2.3 A nationwide campaign launched to promote health benefits of consuming more fish.	A programme formulated in Year 1 and started in Year 2. (It will be a continuing programme).	Reports about the campaign, feedback from the public, reports of agencies involved.	Cooperation with health and nutrition experts and with the schools and mass media will increase the impact of the campaign.
2.3.1 Low-cost production and processing technologies developed, tested and promoted for adoption.	Technology packages developed by Year 2 and tested on-farm starting Year 3.	Technical reports, reports of the trials.	Integrating this objective with 2.2.1 and 2.3.2 will increase relevance and success.
2.3.2 Economic studies to improve profitability of producing and marketing fish products increased.	Cost and return studies of various practices to be conducted from Year 1 to Year 6.	Reports of studies.	Studies will be more useful and relevant if they were integrated with 2.3.1.
2.3.3 A nationwide restocking, stock-enhancement and culture-based fishery programme that includes training of private-sector personnel implemented.	An R and D programme formulated following the TCP training activities on stocking and stock enhancement.	Programme report; subsequent reports on production, landings, catches from Statistics and Information Unit.	The training activities under the current TCP should immediately be followed up by a national programme to carry on the momentum created by the TCP.

c. Ecological goals

3.1.1 A unified system of fishery inspection, quarantine and control of	Systematically compiled and published sets of laws, rules and	Publication.	Lack of interest in the review is a risk. Expertise in epidemiology will be
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introduction or movement of species, with specific institutional roles, developed.	regulations; gaps in the regulations to be studied and filled.		needed to inform the development of the output.
3.1.2 Better management practice manuals and guidelines on various issues produced; fishery personnel, fishers and farmers' associations trained in their application.	Better practice guidelines to be produced and personnel trained in their application.	Manuals published; reports of training conducted; feedback from participants.	There is need for a group of experts to develop the BMP manuals and it is important to involve the users in the manual development and testing.
3.1.3 The fishery statistical and information system developed and strengthened.	A well-staffed and well-resourced fishery statistical and information system (with funds and information management facilities and equipment) is operating by Year 3.	A fishery information and statistical office is established; up-to-date statistical and information reports.	Lack of support and interest and lack of cooperation among agencies would jeopardize this objective.
3.2.1 Pilot community management schemes for lakes, reservoirs and other waterbodies established.	Organized pilot projects by Year 3; 80 percent of all lakes and reservoirs with community management schemes by Year 6.	Report of user groups, report of Department of Fisheries.	Poor managerial skills, ill-conceived management schemes and "free-riding" by some irresponsible members of the users' group are risks. Lessons from the International Water Management Institute (IWMI) management scheme for irrigation users would benefit fisheries.
3.2.2 Measures to combat illegal, unregulated and unreported fishing in lakes, rivers and reservoirs enforced and fishery inspection and nature protection personnel trained.	Captured gears, arrests and fines imposed; training activities conducted.	Reports from Nature Protection Unit and other concerned agencies.	Lax enforcement as well as excessive enforcement are risks; inadequate personnel and resources are weaknesses.
3.2.3 Public awareness campaigns on nature conservation conducted.	Mass media announcements, and public education and information programmes.	Press, radio and TV releases, materials used for the campaign (posters, billboards).	Need to enlist the cooperation of mass media, schools and other institutions. There is also need to sustain the campaign.

Annex 2

TERMS OF REFERENCE: Department of Aquaculture and Fisheries, Uzbekistan**A. Duties and Responsibilities**

The Department of Aquaculture and Fisheries (DAF), as part of the Ministry of Agriculture and Water Resources, shall have the following duties and responsibilities:

- elaborate a comprehensive government development strategy on aquaculture and capture fishery and set priorities for all types of fisheries;
- elaborate draft normative acts within the competence of the DAF and present them for approval in accordance with regulations;
- prepare a fishery investment programme and support its implementation;
- promote the employment of qualified fishery specialists in fishery and fish-processing enterprises;
- promote the production, processing and marketing of fish products to satisfy domestic needs;
- make optimal use of the export potential of fish and fish products originating from all types of fishery resources; and
- encourage the formation of farmers' and producers' organizations, including a national federation of associations.

B. Management and Development Functions

In line with the Policy and Strategic Plan for aquaculture and capture fisheries sector, the DAF shall have the following management and development functions:

Policy and regulatory

- formulate fisheries policies, strategy and management plans and support the implementation of fisheries development projects;
- issue licences and permits for capture fisheries and aquaculture activities;
- ensure the implementation of fisheries and aquaculture regulations through MCS;
- liaise and negotiate with those involved in activities that have an impact on capture fisheries and aquaculture resources; and
- liaise, discuss and make joint decisions with all fisheries stakeholders.

Research, training and information

- coordinate, collect, analyse and disseminate data and information related to fishery activities;
- promote capture fisheries and aquaculture research;
- provide accessibility of necessary information on the fisheries sector for the state and local institutions as well as other legal entities and individuals;
- provide consultations and relevant information services on the issues related to the fisheries sector;
- organize expert advice and training for the research and development of the fisheries sector and qualification upgrading of manpower; and
- deal with issues related to fisheries science and enhancement of fish stocks through restocking.

C. Rights and Privileges

In order to perform its duties and responsibilities effectively, the DAF shall be granted the following rights:

- to demand and receive necessary information from the state and local institutions, enterprises and organizations operating in fisheries as well as from legal entities and individuals;

- to invite experts and enter into contracts for specific tasks related to the accomplishment of the objectives of the fisheries policy and strategic plan; and
- to constitute special expert committees in order to solve specific issues and to ensure better coordination of activities with other parties.

D. Organization Structure and Staffing

Director

Technical Divisions:

Aquaculture Development, Regulatory and Information Sections

Capture Fishery Development, Regulatory and Information Sections

Administrative Support Section

Field Centres and Stations

Mechanism of Organization

The DAF will be organized within the Ministry of Agriculture and Water Resources after approval of the developed “Aquaculture and Capture Fisheries Development Policy and Strategy of Uzbekistan, 2008-2016” by the ministry and government. The organizational structure of DAF will be developed by a group of national and international FAO experts who have developed the above-stated document according to the directive of the ministry or government. The financial support of FAO during Year 2 and Year 3 at the initial stage is required to speed up the process.

Annex 3

TERMS OF REFERENCE: the Multisectoral Monitoring and Evaluation Committee**Terms of reference**

- Provide scientific technical advice to the government (i.e. to the agency responsible for the Strategic Plan such as the Aquaculture and Fisheries Department) in the implementation of the strategy.
- Evaluate the progress in the implementation of the strategy and recommend to the government necessary adjustments in the strategy or implementation measures.
- Assist regional/district structures to implement development at the local level and hold discussions with rural communities to gauge local constraints to the implementation of the strategy.
- Assist in compiling the necessary socio-economic, financial and resource information related to fisheries and aquaculture development activities in Uzbekistan.

Membership

1. Prof A.A. Khanazarov, Chair (Deputy Minister for Agriculture and Water Resources)
2. Dr B.K. Karimov (Institute of Water Problems, UzAS/Coordination Committee on Science and Technologies Development)
3. Dr B.G. Kamilov (Institute of Water Problems/National Consultant)
4. Mr R. Kurbanov (Center for Fisheries Development, Director)
5. Dr I.M. Joldasova (Institute of Bioecology KB of UzAS, Head of Laboratory)
6. Dr U. Mirzaev (Institute of Zoology, UzAS)
7. Prof R. Tillaev (Ministry of Agriculture and Water Resources)
8. Dr V.A. Talskikh (Hydrometeorological Service)
9. Mr A.A. Grigoryanz (State Committee for Nature Protection)
10. Mr F. Becknazarov, Director of Balikchi, a joint-stock company (JSC)
11. Mr F. Berdiev (Ministry of Finance)
12. Mr N.N. Murodillaev (Uzagrosugurta Insurance Company)
13. State Statistical Agency
14. World Bank Country
15. Ministry of Economics
16. Uzbeksavdo Trading Company

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