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INLAND CAPTURE FISHERIES AND AQUACULTURE IN THE REPUBLIC OF UZBEKISTAN: CURRENT STATUS AND PLANNING

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INLAND CAPTURE FISHERIES AND AQUACULTURE IN THE REPUBLIC OF UZBEKISTAN: CURRENT STATUS AND PLANNING

by
Bakhtiyor Karimov
Head of the Laboratory of Hydroecology and Fisheries
Institute of Water Problems
Uzbekistan Academy of Sciences
Tashkent, Uzbekistan

Bakhtiyor Kamilov
Senior Researcher
Uzbekistan Research Center for the Development of Fisheries
Ministry of Agriculture and Water Resources
Tashkent, the Republic of Uzbekistan

Maroti Upare
FAO Consultant

Raymon van Anrooy
Fishery Officer
FAO Subregional Office for Central Asia
Ankara, Turkey

Pedro Bueno
International Consultant

Dilmurod Shokhimardonov
Deputy Director
Uzbekistan Research Center for the Development of Fisheries
Ministry of Agriculture and Water Resources
Tashkent, the Republic of Uzbekistan

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PREPARATION OF THIS DOCUMENT

This circular contains two main documents: the "Review of the current status of inland capture fisheries and aquaculture in the Republic of Uzbekistan" in Part I; and the "Conception of aquaculture and capture fisheries development of the Republic of Uzbekistan, 2008–2016" in Part II. Both documents were prepared at the request of the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan. Their preparation was realized with the support of the Food and Agriculture Organization of the United Nations (FAO) under the Technical Cooperation Programme (TCP) project "Development of strategic partnerships in support of responsible fisheries and aquaculture development in Uzbekistan", TCP/UZB/3103 (D).

The "Conception of aquaculture and capture fisheries development of the Republic of Uzbekistan, 2008–2016" was prepared by Mr Maroti Upare (international consultant), Mr Bakhtiyor Karimov (Institute of Water Problems), Mr Bakhtiyar Kamilov and Mr Dilmurod Shokhimardonov (Uzbekistan Research Center for the Development of Fisheries) and Mr Raymon van Anrooy (FAO). Deputy Minister A.A. Khanazarov (Ministry of Agriculture and Water Resources of the Republic of Uzbekistan), with technical and policy assistance from Mr Pedro Bueno (international consultant) and Mr Raymon van Anrooy (FAO), supervised the preparation.

The "Conception of aquaculture and capture fisheries development of the Republic of Uzbekistan, 2008–2016" outlines the aquaculture and capture fisheries development policy and strategy of the Republic of Uzbekistan, 2008–2016, and should be considered a framework of policy guidance prepared by a wide range of Uzbek aquaculture and inland capture fisheries experts, with inputs from national workshops held in Tashkent on 9–10 October 2007 and 19–20 November 2007.

A draft of the "Conception of Aquaculture and Capture Fisheries Development of the Republic of Uzbekistan, 2008–2016" was distributed at various stages of its development to all stakeholders concerned, including those involved in aquaculture and inland capture fisheries in the Republic of Uzbekistan (i.e. ministries of agriculture, economy and finance, the State Committee for Nature Protection), and additional comments were received from a wide range of officials, experts and producers involved in the aquaculture and inland capture fisheries sector. These comments were taken into consideration, discussed and (where relevant) incorporated in the final draft document.

A draft of the "Conception of aquaculture and capture fisheries development of the Republic of Uzbekistan, 2008–2016" was also discussed in detail at the "Conference on Fisheries in Uzbekistan: problems and the ways to their solution" held on 29 September 2008 and organized by the Committee on Agriculture, Water Economy and Ecology of the Uzbekistan Parliament (Oliy Madjlis). The conference recommended to relevant ministries and authorities the urgent approval of this document as well as the development of implementation measures.

Following the above-mentioned intensive consultation with all fisheries-sector stakeholders, the "Conception of aquaculture and capture fisheries development of the Republic of Uzbekistan, 2008–2016" awaits approval by the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan.

Karimov, B.; Kamilov, B.; Upare, M.; van Anrooy, R.; Bueno, P.; Shokhimardonov, D.
Inland capture fisheries and aquaculture in the Republic of Uzbekistan: current status and planning.
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ABSTRACT

The fisheries sector in the Republic of Uzbekistan (or Uzbekistan), composed of inland capture fisheries and aquaculture sectors, has a potentially important role in the development of the rural economy of the country. However, in recent years the sector's contribution to the gross domestic product (GDP) was less than 0.1 percent. In spite of vast water resources available for fisheries-sector development (ponds, reservoirs, lakes, rivers, irrigation canals), fish production declined significantly from 27 200 tonnes in 1991, the year of independence of Uzbekistan from the former Union of the Soviet Socialist Republics, to 7 200 tonnes in 2006. Imports of fish and fish products decreased as well. As a consequence, per capita consumption of fish and fish products decreased to less than 500 g in 2006, which means a reduction of over 90 percent in comparison with the 5–6 kg per capita consumption of fish in the late 1980s.

In July 2007 the Government of Uzbekistan, through its Ministry of Agriculture and Water Resources of the Republic of Uzbekistan, requested assistance from the Food and Agriculture Organization of the United Nations (FAO), under its Technical Cooperation Programme (TCP), for the sustainable development and management of the fisheries sector in the country. FAO approved the project "Development of strategic partnerships in support of responsible fisheries and aquaculture development in Uzbekistan", TCP/UZB/3103 (D), in August 2007.

This FAO Fisheries and Aquaculture Circular has two main aims. First, it intends to inform those interested in inland capture fisheries and aquaculture in Uzbekistan about the current situation with regard to fishery resources and their utilization in the country. Second, it attempts to provide the results of a participatory policy and strategy framework development process, which might be of use also for other countries in transition in the Central Asian region.

The two documents presented in this Fisheries and Aquaculture Circular are considered final versions and cleared as such by the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan. They are also available in the Russian language from the ministry. The document entitled "Review of the current status of inland capture fisheries and aquaculture in the Republic of Uzbekistan" is presented in Part I of this circular. The document entitled the "Conception of aquaculture and capture fisheries development of the Republic of Uzbekistan, 2008–2016" is contained in Part II.

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The authors would also like to thank the workshop participants and the experts who were involved in the project for their important contributions to the drafting of the two documents contained in this circular, the "Review of the current status of inland capture fisheries and aquaculture in Uzbekistan" and the "Conception of aquaculture and capture fisheries development of the Republic of Uzbekistan, 2008–2016", and their active participation in various working groups. Editorial assistance on this document by Ms Linda Mitchell (FAO consultant) and publication support from Ms Françoise Schatto (FAO) and Ms Tina Farmer (FAO) are also much appreciated.

LIST OF ACRONYMS

ADB	Asian Development Bank
AECTD	Agency for Technical Cooperation and Development (France, NGO)
BMP	better management practices
CDW	collector-drainage waters
DFID	Department for International Development (United Kingdom)
EBRD	European Bank for Reconstruction and Development
EC	European Commission
FAO	Food and Agriculture Organization of the United Nations
FPA	Fish Producers Associations
IFAS	International Fund for saving the Aral Sea
INTAS	International Association for the Promotion of Cooperation with Scientists from the New Independent States of the Former Soviet Union
JFPR	Japan Fund for Poverty Reduction
MAWR	Ministry of Agriculture and Water Resources
MCS	monitoring, control and surveillance
MFI	Microfinance Institution
MMEC	Multisector Monitoring and Evaluation Committee
NGO	non-governmental organization
NOVIB	Netherlands Agency for Technical Cooperation and Development
SWOT	strengths, weaknesses, opportunities, threats
UNDP	United Nations Development Programme
UzAS	Uzbekistan Academy of Sciences

Exchange rate
The average exchange rate applied throughout this document is: US$1 = som1 280.

Part I

Review of the current status of inland capture fisheries and aquaculture in the Republic of Uzbekistan

EXECUTIVE SUMMARY

The fisheries sector in the Republic of Uzbekistan (or Uzbekistan), composed of inland capture fisheries and aquaculture sectors, has a potentially important role in the development of the rural economy of the country. However, in recent years the sector's contribution to the gross domestic product (GDP) was less than 0.1 percent. In spite of vast water resources available for fisheries-sector development (ponds, reservoirs, lakes, rivers, irrigation canals), fish production declined significantly from 27 200 tonnes in 1991, the year of independence from the former Union of the Soviet Socialist Republics (the former USSR), to 7 200 tonnes in 2006. Imports of fish and fish products decreased as well. As a consequence, per capita consumption of fish and fish products decreased to less than 500 g in 2006, which represents a reduction of over 90 percent in comparison with the 5–6 kg per capita consumption of fish in the late 1980s.

Before 1961, fish were captured mainly in the Aral Sea. This landlocked lake was rich in fish species and Uzbekistan captured on average 25 000 tonnes of valuable fish per year. In the basin of the Aral Sea, the irrigated area increased from 2.0 million ha to 7.2 million ha between 1925 and 1980. A huge and extensive network of irrigation and drainage canals was created. This network has become the main cause of the ecological crisis in the basin. The Aral Sea has dwindled and now has an extremely high salinity (74–90 g/litre^{-1} compared with 10–11 g/litre^{-1} during the years of a more favourable ecohydrological regime). As a result, the lake has only minor fishery importance today.

Because of the deterioration of the Aral Sea for fisheries purposes, the fish industry in Uzbekistan had to find new water sources for producing fresh fish. In the 1970s, a large part of the fish-capture activities was transferred from the Aral Sea to newly created inland reservoirs and lakes intended for residual water storage. In the 1970s and 1980s, up to 6 000 tonnes of fish were caught in those reservoirs and lakes. However, specialists understood as early as the 1960s that fish capture in those reservoirs and lakes could not provide enough fish to meet the demand of the Uzbek population. The attention of sectoral specialists (together with that of the policy-makers), therefore, moved slowly towards aquaculture development. In the early 1960s, the government managed a large-scale programme of fish-culture development with the establishment of about 20 fish-culture farms (with total pond area of about 20 000 ha) located throughout all regions of Uzbekistan. Development of new technologies and the establishment of research centres and educational programmes in fisheries and fish culture were other key components of the programme. The main technology promoted was polyculture of cyprinids in earthen ponds under semi-intensive conditions. Cultured species were common carp, *Cyprinus carpio*, silver carp, *Hypophthalmichthys molitrix*, bighead carp, *H. nobilis*, and grass carp, *Ctenopharyngodon idella*. The growing season lasted from late March–early April to October–November. Market-sized fish were produced in two-year cycles: during the first year, fish were raised in fingerling ponds (each 10–50 ha) to the weight of 25 g; and after the winter season, they were cultured in grow-out ponds referred to as "fattening ponds" (70–150 ha) to market-sized fish weighing between 500 g and 1 000 g. The average productivity of ponds in Uzbekistan was between 3 tonnes/ha and 3.3 tonnes/ha and in the Tashkent region between 4 tonnes/ha and 4.5 tonnes/ha in the 1970s and 1980s. These productivity rates were high in comparison with the rates of between 1.5 tonnes/ha and 1.7 tonnes/ha on average in the former USSR during those years. The Uzbek aquaculture sector produced between 20 000 tonnes and 25 000 tonnes of fish per year in the 1970s and 1980s.

Aquaculture also served as the basis for the development of culture-based fisheries. Local ichthyofauna in inland waters in Uzbekistan is generally rather poor with commercial fish species. The ecological niche for herbivorous fish was not fully occupied according to scientists; this is why artificially reproduced fry of Chinese carp (silver carp, bighead carp and grass carp) were stocked annually in lakes used for residual water storage, in reservoirs and in drainage channels in all regions of Uzbekistan. The cycle between stocking and capture was two or three years. Waterbodies were also stocked with the cultured fry of common carp. As a result, productivity in the main capture fisheries waterbodies increased from 10–15 kg/ha to 20–27 kg/ha. A special culture-based fishery enterprise named Zhizak was established on Lakes Aydar, Tuzkan and Arnasay.

Following independence in 1991 and the subsequent restructuring of the economy from a planned to a market economy, the fisheries sector underwent a process of privatization during the period from 1994 to 2003. The reported total fish production decreased from 26 500 tonnes in 1990 to 4 300 tonnes in 2004. There are several reasons for this decrease, including the overall economic crisis of the country, severed links with the fisheries institutions in the former USSR, problems with fish feeds and equipment supplies, and deteriorating education and research in fisheries. Moreover, during the initial stages of privatization, investment in the fisheries sector was not a preferred option among the various alternatives. Traditional carp culture and small-scale fish-capture facilities with low profitability were not of interest to investors. As a result of the aforementioned factors, fish production as well as fish processing and trade decreased. Privatization also had a negative impact on education and research in the fisheries sector. All the enterprises that provided aquaculture with various services (e.g. fish feeds, chemicals, equipment and gears) closed their doors or changed the nature of their businesses. At present, only a few private fish-capture and fish-culture enterprises remain active in the fisheries sector.

Enactment No. 350 “On measures to remove monopolies and to privatize the fishery sector” (Annex 4) approved by the Cabinet of Ministers on 13 August 2003 officially ended the privatization process. The main state fishery enterprises Uzbalyk and Karakalpakbalyk were liquidated; all fish-culture and fish-capture facilities were privatized. The main administrative functions relating to the development of animal husbandry, poultry farming and fisheries were centralized within the Ministry of Agriculture and Water Resources (MAWR) of the Republic of Uzbekistan, while departments for the development of animal husbandry, poultry farming and fisheries were established in the regional administrations for agriculture and water resources.

Today, it is common practice to assign natural waterbodies to fishery enterprises on a rental agreement basis. Fish capture in reservoirs and lakes is carried out by fishery enterprises that conclude contractual rental agreements with local administrations for periods of more than ten years. These enterprises catch fish on a quota-free basis, exploiting the available biological resources in an attempt to meet their customers’ demands. At the same time, they are required by contract to take measures to conserve species and to maintain the productivity of waterbodies and the reproductive capacity of fishery resources at proper levels. Two groups of lakes are of major importance for capture fisheries: (a) one group of about 20 lakes covering a total of 97 000 ha in the Amudarya delta, which provides about 1 500 tonnes of fish annually; and (b) one group of lakes in the the Aydar-Arnasay lake system midway along the course of the Syrdarya River, which provides 1 600–2 300 tonnes of fish annually. One of the main problems of fish capture in Uzbekistan is that the water levels are greatly influenced by irrigation needs and annual natural changes of water volumes in the basin and that sizes and depths of waterbodies can change every year and during the growing seasons. Changes in water levels have a negative impact on fish production.

At present, aquaculture is the most important and also the most promising sector for development in the fisheries industry. Currently, only one aquaculture system is applied in the country, namely extensive or semi-intensive pond culture of cyprinids. The total area of pond fish farms is 10 200 ha. For over 15 years, fish-farm ponds have been used without the necessary maintenance and major repairs. Pond productivity at present is between 1 tonne/ha and 1.9 tonnes/ha. Although private entrepreneurs have expressed interest in fish farming as a profitable venture, since privatization ended in 2003–2004 there is scarce evidence (to 2006) of new investments in the sector. A few entrepreneurs have adopted modern technologies and their farms are beginning to show some progress in fish production.

In 2003, the state ended the financing of fish restocking in the country, and since then fish have not been restocked in most of the waterbodies in Uzbekistan, with the exception of those waterbodies leased or rented out to private enterprises. Today, fisheries-sector support industries are nonexistent in Uzbekistan. All fish producers try to produce their own equipment and feeds or import equipment and materials.

Fish-processing and storage facilities are poorly developed in the country. Reasons for this are the limited domestic live and fresh fish supply, and the lack of investment in the sector. In the last two to

five years, some enterprises began to process and store fish. All currently active fish-processing and trade companies are private enterprises.

Fish and fisheries marketing and sales can be performed only in places allocated by local municipal and district authorities (hokimiyats). Officially, fish sales are allowed only if a wholesaler or retailer has documents confirming the lawfulness of the catch or of the purchase of the fish, as well as a certificate confirming the quality of the produce.

In the town of Chinaz, Tashkent province, there is a wholesale fish market. Fish are transported from this market to Tashkent, a distance of 70 km. Fish are transported to this market from the Aydar-Arnasay lake system and from the Chardara reservoir in the Republic of Kazakhstan. It is very difficult to estimate the volume of fish sold in this market because almost all the fish sold are illegally caught, go unreported and/or are smuggled in across the border. According to various unofficial sources, on average between 3 tonnes and 5 tonnes of fresh fish are sold every day in the Chinaz market, although on some days the volume of fish traded reaches 20 tonnes. Refrigerators are available in the market, as well as ice, and there are designated places for selling fish, but generally the conditions for the wholesale fish activities are unhygienic.

Most fish farms are situated near cities and towns (at distances of 5–70 km) and most farmed-fish sales are made in the autumn. Part of the harvested fish is sold pondside to wholesalers in small lots (up to 200 kg), for which sales contracts are drawn up. Another part of the fish is sold by the fish farmers to nearby markets and shops.

The main fisheries industry authority of Uzbekistan is the Ministry of Agriculture and Water Resources (MAWR). The ministry has a central administrative board for animal husbandry, poultry farming and fisheries. Research in the fisheries sector is conducted mainly by the Uzbek Research Center for the Development of Fisheries (of the MAWR), the Institute of Water Problems, the Institute of Bioecology and the Institute of Zoology (all part of the Academy of Sciences).

According to the law “On State Statistics” of Uzbekistan, capture fishery enterprises and aquaculture farms must submit reports on their activities to the state statistics office where they are registered.

In Uzbekistan, there are no unions, cooperatives or associations of aquaculture and fishery producers at the national level. Non-governmental associations of fish farmers have been created in the provinces of Samarkand and Bukhara and in the Republic of Karakalpakstan.

Uzbekistan does not have an official fisheries and/or aquaculture sector policy or development strategy in place. It is, however, signatory to a number of international conventions and agreements related to fisheries, aquaculture, biodiversity and the environment. It has no specific laws that regulate the fisheries sector, but there are laws in place that regulate the protection of nature and biodiversity conservation, and, therefore, are relevant to the fisheries sector and its development and management.

The management of farms is regulated by codes, laws and decrees of the President of the Republic of Uzbekistan and enactments of the Cabinet of Ministers. More specifically, regulations include:

- The Tax Code;
- The Land Code;
- The Law on Protection of Nature;
- The Law on Water;
- The Law on Farms;
- Presidential Decree No. VII-2086 “On introduction of a single land tax for agricultural producers” of 10 October 1998;
- Regulation No. 21-f “On the improvement of the system of fishery sector management” approved by the Cabinet of Ministers on 20 January 1997 and Enactment No. 289 of 6 July 2001;
- Enactment No. 258 “On improvement of the organization of the activity of the Ministry of Agriculture and Water Resources” approved by the Cabinet of Ministers on 28 June 2003;
- Enactment No. 350 “On measures to remove monopolies and to privatize the fishery sector” approved by the Cabinet of Ministers on 13 August 2003;

- Enactment registered by the Ministry of Justice No. 1292 “On the approval of the regulation of the calculation and levying of rent payment for the use of natural waterbodies by fish farms” of 20 December 2003; and
- The Hunting and Fish Catching Regulations on the Territory of Uzbekistan adopted by the State Committee for Nature Protection of Uzbekistan in May 2006.

Currently, fishery management is very poorly developed in Uzbekistan. The main reasons for this are that (i) the fish-capture sector is very small and only important at the local level and (ii) fish resources are determined by irrigation management, fisheries being considered a much less important user of the water resources.

A strengths, weaknesses, opportunities and threats (SWOT) analysis of the sector revealed that though the sector has a number of weaknesses, it also has considerable strengths. These strengths include the availability of suitable fishery resources and ample opportunities for rehabilitation of fish production by tackling threats through the preparation of a strategic plan for the development of responsible and sustainable fisheries and for improving the socio-economic status of fishers. Uzbekistan has at present a promising potential to increase fish production through the development and application of modern aquaculture systems, diversification of fish species to be cultured, an increase in services to the sector based on financial support mechanisms, and research and training development.

Chapter 1
INTRODUCTION

Fisheries is an important sector of food production in the world, providing high quality proteins, fatty acids and minerals to the population to overcome malnutrition as well as food security, while contributing to export earnings and substantial employment generation in rural areas. In 2004, world fisheries produced 106 million tonnes of fish. Fish provides 20 percent of animal protein to 2.6 billion people. Average world consumption of fish reached 16.6 kg/per capita (live weight) in 2004 (FAO, 2007).

In many countries, capture fishery (both in marine and inland waters) has reached its maximum potential. Many fish resources are overfished. Management needs to be more effective. At the same time, aquaculture production continues to increase rapidly in most regions of the world. The annual growth rate of aquaculture was 9 percent in the early 2000s. In 2004, 43 percent of all fish were produced by the aquaculture sector. World trade in fish and fish products was worth US$72 billion in 2004. About 38 percent of all fish produced was exported. (FAO, 2007).

In the Republic of Uzbekistan (or Uzbekistan), the fisheries sector, composed of inland capture fisheries and aquaculture sectors, has a potentially important role in the development of the rural economy. However, in recent years the sector's contribution to the gross domestic product (GDP) was less than 0.1 percent. In spite of the vast water resources available for fisheries sector development (ponds, reservoirs, lakes, rivers, irrigation canals), fish production declined significantly from 27 200 tonnes in 1991, the year of independence from the former Union of the Soviet Socialist Republics (the former USSR), to 7 200 tonnes in 2006 (Umarov, 2003; Kamilov, 2003; Karimov *et al.*, 2005, 2006; Shohimardonov, 2007). Imports of fish and fish products decreased as well. As a consequence, per capita consumption of fish and fish products decreased to less than 500 g in 2006 (Karimov *et al.*, 2005), which means a reduction of over 90 percent in comparison with the 5–6 kg per capita consumption of fish in the late 1980s.

In July 2007, the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan made a request to the Food and Agriculture Organization of the United Nations (FAO) to develop strategic partnerships to support responsible aquaculture and fisheries development in Uzbekistan and to assist the Government of Uzbekistan in identifying effective livelihood-supporting policy interventions in the aquaculture and inland fisheries sectors through the formulation of a policy and strategic plan for the fisheries sector. In response to this request, FAO provided assistance under its Technical Cooperation Programme through the project "Development of strategic partnerships in support of responsible fisheries and aquaculture development in Uzbekistan" TCP/UZB/3103 (D). The implementation phase of this project started in August 2007.

The **Development objective** of the project is to develop strategic partnerships for and assist the Government of Uzbekistan in the rehabilitation of the national capture fisheries and aquaculture sectors in a structured and responsible manner, with specific emphasis on the achievement of food security and alleviation of poverty in rural areas for which the fisheries sector could play a more prominent role.

The **immediate objectives** of the project are:

- to increase knowledge and understanding among national policy-makers and potential donors on the status of capture fisheries and aquaculture in the country and on the current and potential contribution of these sectors to the achievement of food security and alleviation of poverty;
- to identify effective livelihood-supporting policy interventions in the inland fisheries and aquaculture sectors through the formulation of a fisheries-sector development strategy and implementation programme;

- to develop strategic partnerships among national and international agencies and donors in support of the rehabilitation and responsible development and management of the fisheries sector; and
- to increase the technical and managerial capacity of fishers and aquaculturists in Uzbekistan through training and dissemination of information on sustainable fishery technologies and better management practices.

This report on the fisheries sector in Uzbekistan was a first step towards increasing the understanding of policy-makers on fisheries and aquaculture issues and was intended to provide baseline information on the current situation of the fisheries in the country to the stakeholders involved in the participatory process of formulating a national strategic framework for the sector.

STRUCTURE OF THIS REPORT

This report contains eight chapters. Chapter I briefly introduces the fisheries sector in Uzbekistan. Chapter II provides historical background on the situation of the fisheries sector up to independence in 1991 and from independence in 1991 to 2006. Chapter III offers an overview of the potential of the current natural resources and fisheries sector in Uzbekistan, describing the status of inland capture fisheries and aquaculture. Chapter IV focuses on the developments regarding fish-storage facilities, processing, distribution, marketing and fish consumption. Chapter V describes the fishery administration in the country, with particular attention to training, research and extension, fishery statistics, associations of fishery enterprises and international relations of the fisheries sector. Chapter VI provides an overview of fisheries policy, legal and regulatory frameworks and management issues. Social and economic aspects of the fisheries sector and credit and insurance issues are detailed in Chapter VII. Chapter VIII concludes with a diagnosis of the current situation using a SWOT analysis.

Chapter II
HISTORICAL BACKGROUND

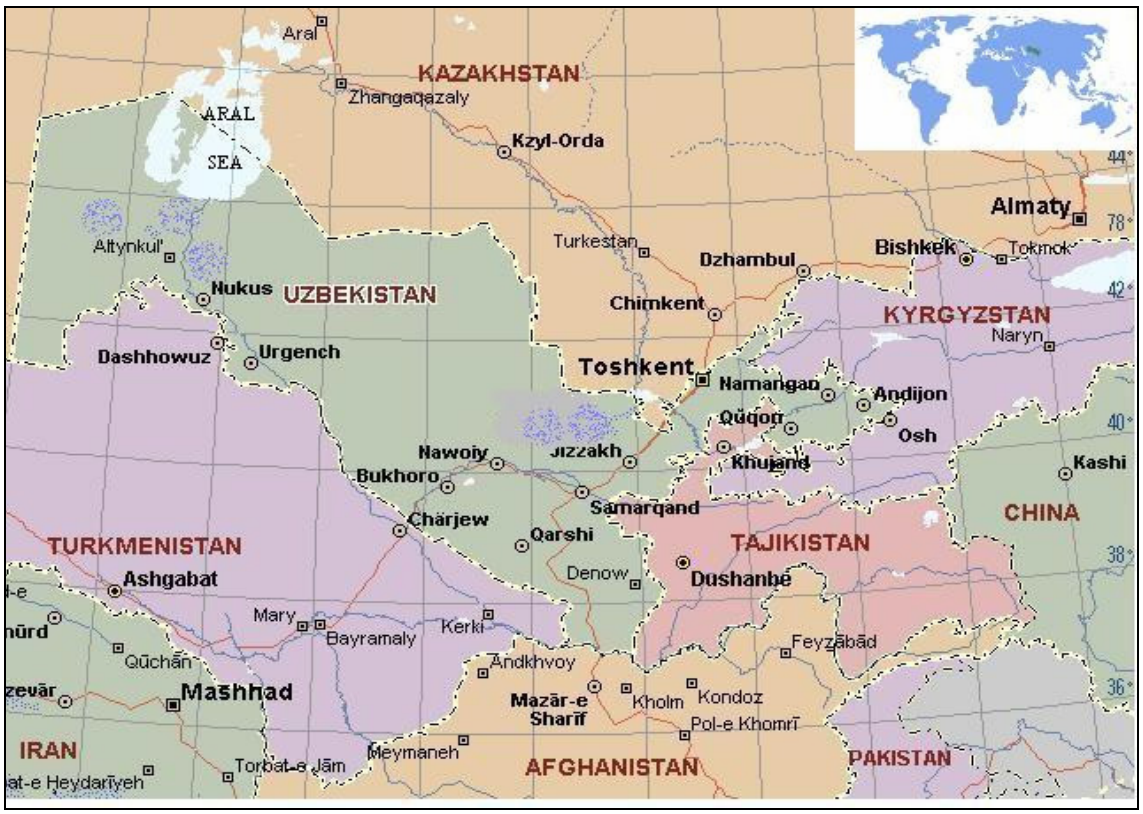
This chapter provides some background information on fisheries-sector development in Uzbekistan up to 2006. The chapter is divided into two parts, the period before independence and the period from independence in 1991 to 2006.

Uzbekistan is situated in Central Asia between latitude 37–11 °N and longitude 37° 10′–56 °E. It spans 1 400 km from east to west and 925 km from north to south. The Turan plain is in the northwestern part of Uzbekistan and occupies an area of more than 35 500 km^2. The Tien-Shan mountain system is in the eastern part of Uzbekistan and covers about 9 600 km^2. The latitudinal range of Uzbekistan is from –10 m (Sarikamish cavity) to +4 643 m (Western Tien-Shan) above sea level.

Uzbekistan is bordered by the Republic of Kazakhstan to the north, Turkmenistan and the Islamic Republic of Afghanistan to the south, and the Kyrgyz Republic and the Republic of Tajikistan to the east. The total area of the country is 447 400 km^2, and is divided into 12 main administrative areas (oblasts) and the Republic of Karakalpakstan (or Karakalpakstan). It has a population of about 26.5 million people.

Uzbekistan is bound on the northwest by the Aral Sea, whose basin is the concern of the entire country. The main rivers, the Syrdarya River and the Amudarya River, flow into the Aral Sea. These two rivers flow through the countries of Central Asia. Other rivers like the Kashkadarya River and the Zarafshan River dry up on the plains.

FIGURE 1
Geopolitical map of Central Asia/Aral Sea basin



FISHERIES AND AQUACULTURE UP TO INDEPENDENCE IN 1991

Under former Soviet rule, the fisheries sector in Uzbekistan was established as a branch of industries. Before 1961, only captured fish mainly from the Aral Sea was available on the market. State and private fisheries units/cooperatives operated around the Aral Sea. This landlocked sea was rich in fish species and Uzbekistan fishers captured on average 25 000 tonnes of valuable fish per year.

In the Aral Sea basin the irrigated area increased from 2.0 million ha to 7.2 million ha between 1925 and 1980. The huge and extensive network of irrigation and drainage canals created in those years has become the main cause of the ecological crisis in the basin. The Aral Sea has dwindled and now has an extremely high salinity (74–90 g/litre^{-1} compared with 10–11 g/litre^{-1} during the years of a more favourable ecohydrological regime). As a result, the lake is of only minor fishery importance today. During the 1970s, fishery operations were transferred to the other inland waterbodies (Tleuov, 1981; Kamilov *et al.*, 2004).

Irrigation and drainage systems link various river basins into one network in Uzbekistan. Irrigation systems include reservoirs, irrigation canals, drainage canals and lakes for residual water. In fact, there are no waterbodies with natural fish-stock regimes on the plains in the country; all rivers are used as part of the irrigation system.

Under the former Soviet Union planned economy, the basin of the Aral Sea region was important for the production of agricultural crops (mainly cotton) and extensive technologies using large-scale irrigation networks prevailed. The flow of waters that empty into the Aral Sea basin was heavily regulated. As a result of the development of the large-scale irrigation system during the period from 1960 to 1990 in Central Asia, the volume of water flowing into the Aral Sea dropped from 50–53 km^3 to 0–10 km^3 per year. The water inflow from the Amudarya and Syrdarya Rivers into the Aral Sea almost ceased. A catastrophic shrinking of the Aral Sea, deterioration of the water quality and the rapid desertification that unfolded during the last decades caused the United Nations in 1992 to declare the Aral Sea basin a zone of ecological crisis (Figures 3 and 4).

FIGURE 2

Hydroecological map of Central Asia/Aral Sea Basin

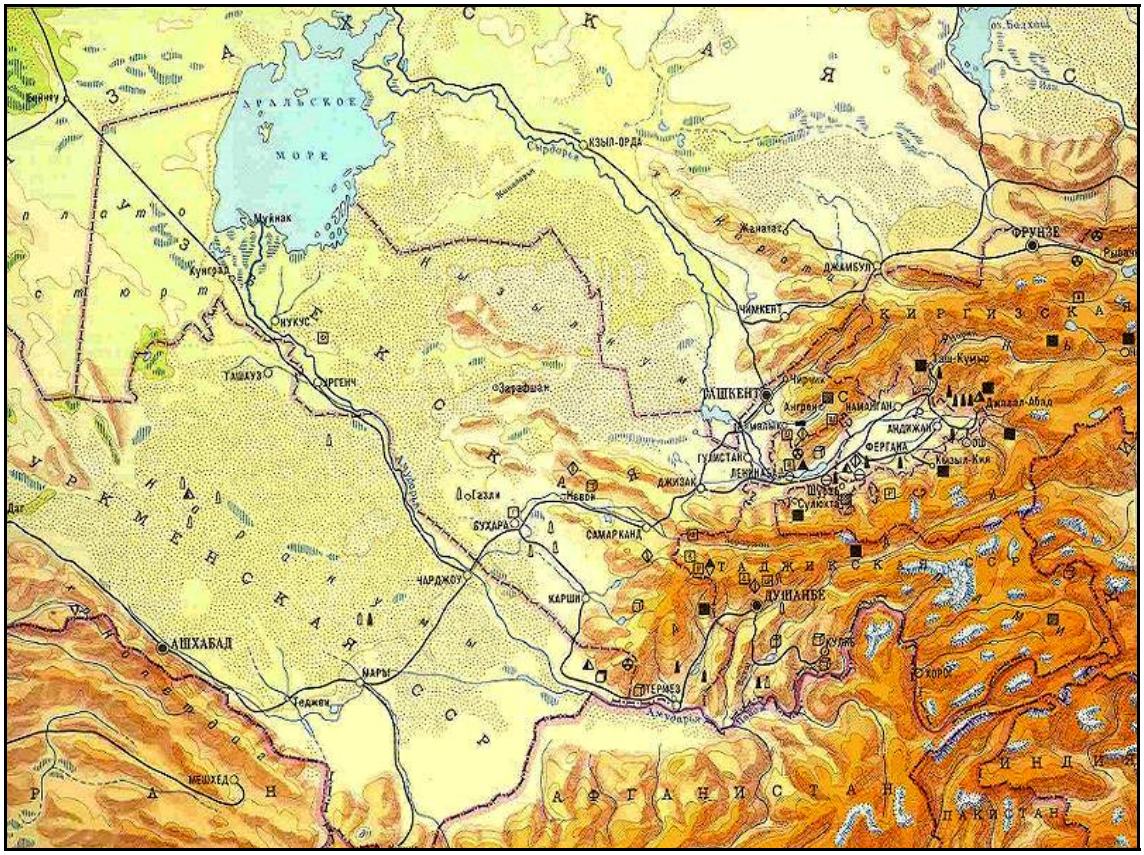


FIGURE 3
Degradation of the Aral Sea ecosystem

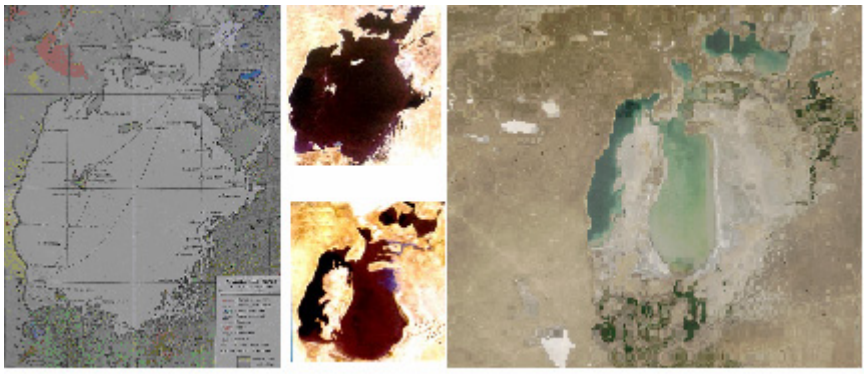


FIGURE 4
Remainder of the Aral Sea fishing fleet at Sarbas Bay in 2006

Photo courtesy of Mr B. Karimov.

With the diversion of growing volumes of water since the 1960s and a gradual decline in the flow of rivers, changes took place in every aspect of the Aral Sea regime. Water that evaporated was no longer compensated by the waters of the Amudarya River and the Syrdarya River: the flow of the rivers declined from 5 km^3 to 11 km^3 per year. Eventually, the Aral Sea began to dry up (Barkhanskova *et al.*, 1963; Kamilov, 1973). In the 1960s, the water level fell on average by 27 cm per year, while from 1970 to 1980 it fell by 71 cm per year. By the late 1980s, the area of the Aral Sea had split into the Bolshoe (Great) Sea and the Maloe (Small) Sea. By the late 1990s, the area of the Aral Sea decreased by 30 000 km^2 and the volume of the Aral Sea decreased by 260 km^3. The average depth in the remaining parts of the Aral Sea dropped to as low as 6 m in the Bolshoe Sea and 8 m in the Maloe Sea. The salinity increased dramatically. The local fauna degraded and vanished. In the 1960s, the salinity of water of the Aral Sea increased by 1.84 percent per year; in the 1970s by 5.5 percent; and in the 1980s by 16 percent. Currently, various sources claim that the salinity of the Aral Sea ranges from 70 percent to 100 percent (Tleuov, 1981; Letolle and Mainguet, 1993; Joldasova *et al.*, 2004; Karimov *et al.*, 2005).

Traditions in capture fisheries and aquaculture

As mentioned above, before 1960 fishery activities in Uzbekistan consisted only of fish capture in the Aral Sea and production averaged 25 000 tonnes/year (Tleuov, 1981). During the 1960s and 1970s, fish yields of the Aral Sea sharply decreased. In 1983, the last catch officially recorded was 50 tonnes (Karimov, 1995; Kamilov *et al.*, 2004). The fish industry in Uzbekistan had to find new water resources to supply fresh fish to the markets. In the 1970s, fish-capture activities were largely transferred from the Aral Sea to the other inland lakes, reservoirs, and lakes intended for residual water storage. The average natural fish productivity of waterbodies was 5–10 kg/ha in submountain reservoirs and 10–20 kg/ha on the plains. In the 1970s and 1980s, up to 6 000 tonnes of fish were caught annually in inland waters (excluding the Aral Sea).

However, specialists understood as early as the 1960s that fish capture in the reservoirs and lakes could not produce enough fish to meet the demand of the Uzbek population. The sectoral specialists (together with policy-makers) gradually turned their attention to aquaculture development. In the early 1960s, the government initiated a large-scale programme of fish-culture development with the establishment of about 20 fish-culture farms (with a total pond area of about 20 000 ha) located throughout all the regions of Uzbekistan. Development of new technologies and the establishment of research centres and educational programmes in fisheries and fish-culture were key components of the programme. The main technology promoted was polyculture of cyprinids in earthen ponds under semi-intensive conditions. As a result, in the 1970s and 1980s fish farms produced 20 000–25 000 tonnes/ year. Productivity in Uzbekistan was the highest of all the regions in the former USSR, averaging 3–3.5 tonnes/ha in Uzbekistan and as much as 4 tonnes/ha in the Tashkent region.

Aquaculture also served as a basis for the development of the culture-based fisheries. Local ichthyofauna in the inland waters of Uzbekistan is generally rather poor with commercial fish species. According to scientists, the ecological niche for herbivorous fish was not fully occupied. This is why artificially reproduced fry of Chinese carp (silver carp, bighead carp and grass carp) were stocked (on an annual base) in lakes used for residual water storage, in reservoirs and in drainage channels in all the regions of Uzbekistan. The cycle between stocking and capture lasted two or three years. Waterbodies were also stocked with cultured common carp fry. As a result, in the main capture fisheries waterbodies, productivity increased from 10–15 kg/ha to 20–27 kg/ha. In the Zhizak region, special culture-based fishery enterprises were created on Lakes Aydar, Tuzkan and Arnasay.

Production systems

Capture fishery

In the twentieth century, capture fishery was conducted by fishers' brigades working for the state fishery enterprises. Each brigade had its own fishing territory or zone. Usually from 5 to 25 fishers worked in one brigade. Brigades were equipped with five to ten motor boats, 100 to 200 gillnets of various meshes and/or one to five seines. Some brigades had one or two cutters. The two main fishing gears used in Uzbekistan were gillnets and seines.

Each year the state enterprises sent applications for a quota to the State Committee for Fisheries. This Committee sent a general, comprehensive application on behalf of all fishery enterprises to the Uzbekribvod (the commission for the protection of fish resources). The Uzbekribvod assigned an annual quota to each brigade based on its own studies or the assessments of the fish stocks in specific waterbodies by the research institutes. The quota protected fish stocks from becoming overfished. The amount of fishing gears (nets, seines) with marked mesh sizes, the number of boats and the number of fishers per brigade were indicated in the assigned quota. Fishing activities were also regulated by the "Regulations on fish capture", which were based on the All-Union standards: a ban on fishing during fish spawning, limitation on net mesh sizes (usually minimum mesh sizes of 27 mm or 36 mm), areas prohibited for fishing (spawning areas of the main commercial fishes), lists of protected species and fines for illegal catches. The fines were very high; several USSR roubles for each fish caught illegally, irregardless of fish size. In some cases the Uzbekribvod closed down a brigade's activities and withdrew its assigned quota if many breaches of the regulations on fish capture occurred. In summary, the state plans and budgets assigned to the state enterprises determined the volume of fish

to be caught, as well as the type and amount of equipment, the number of staff and many related issues.

Aquaculture

The one prevailing fish-culture technology used in Uzbekistan since the 1960s was the polyculture of cyprinids in gigantic earthen ponds. The cultured species were common carp, *Cyprinus carpio*, silver carp, *Hypophthalmichthys molitrix*, bighead carp, *H. nobilis*, and grass carp, *Ctenopharyngodon idella*. The growing season for fish in these ponds lasted from late March–early April to October–November. Market-sized fish were produced in two-year cycles. During the first year, small fry were raised in fingerling ponds (10–50 ha each) to the size of 25 g; after the winter season they were transferred to so-called "fattening" or grow-out ponds (70–150 ha) where they grew to marketable sizes of 500 g–1 kg. The average productivity of ponds in Uzbekistan was 3–3.3 tonnes/ha in the 1970s and 1980s, which is high in comparison with 1.5–1.7 tonnes/ha on average in the former USSR during the same period. Aquaculture produced 20 000–25 000 tonnes/year (Kamilov *et al.*, 2004).

Liming and fertilization were common practices in pond management and lime and fertilizer were frequently applied before and during the vegetation season. The lime and fertilizer in the waterbody stimulated the growth of plankton for silver carp and bighead carp and the growth of plants for grass carp. Supplementary feeds were given for the growth of common carp and, in part, for grass carp. Commercial fish feeds were prepared in special animal-feed producing factories. These feeds were of good quality, with protein levels of 28–32 percent for fry and early fingerlings and 24–28 percent for the grow-out of the fish. All fish farms had well-equipped laboratories and were able to test the fish-feed quality, the quality of the water and the health of the fish. The heads of these farm laboratories and the main specialists at the farms were generally highly educated.

A special broodstock programme was conducted in the country as part of the All-Union broodstock programme. Broodstocks were produced and strains of the most suitable stocks for fish production were kept in hatcheries called "special reproduction centers". Artificial reproduction practices, using hormonal stimulation of maturation, fertilization and egg incubation, were applied. Larvae from several hatcheries (Balikchy Fish Farm, the State Regional Fish Hatchery) were transported to all the regions of Uzbekistan and other republics of Central Asia, and to the former USSR.

Fish production and reproduction technology were detailed in manuals and other documents in the form of norms for fish culture with quantitative and qualitative indicators (broodstock formation, egg and larvae production, raising of fingerlings, wintering, table-fish raising and other cycles). The financing of fish-farm activities was based on the degree to which norms were applied and the farms' annual reports. New methods developed by research institutes were tested for two to three years in working environments, and if successful, the general norms and related budgets were changed accordingly. This mechanism in support of aquaculture development was considered effective.

As mentioned above, fish farms generally had well-educated specialists. Each year the State Committee for Fisheries requested from the Ministry of Higher Education and the Tashkent State Agrarian University a specific number of highly educated students required for fish-farm activities. Generally, the requests were met. As a consequence, all the chief specialists of the State Committee for Fisheries, the fish farms, the research institutes, the Uzbekribvod and other organizations active in the sector had access to highly qualified people. It can be argued that aquaculture production was determined mainly by state plans and related state budget allocations, as was the case for capture fisheries. Funds were allocated to fish farms based on pond area and the degree to which technological norms were applied.

Only carp culture was well-developed in Uzbekistan. There was only one small trout farm named Tavaqsay, which produced 20–50 tonnes/year (1970s and 1980s). Some experimental projects were carried out, including one project to develop cage culture in Uzbekistan in the 1980s. Another series of research projects concerned the introduction of new species. Small experiments were carried out with channel catfish (*Ictalurus punctatus)*, Siberian sturgeon (*Acipenser baieri)*, three species of buffalo (*Ictiobus cyprinellus*, *I. bubalus*, *I. niger*), some strains of rainbow trout (*Oncorhynchus mykiss*) and some other species. However, even when research projects were successful in introducing

new species, the mentality of those persons in the All-Union Ministry of Fisheries of a centrally planned economy prevailed and the orientation towards carp culture remained unchanged. Uzbekistan was one of biggest carp producers in the former USSR. The promising results of the experimental projects proved that some areas in Uzbekistan were suitable for channel catfish, sturgeon and trout culture development. Technologies for channel catfish reproduction, fingerling raising and grow-out fish production in semi-intensive conditions were developed in the mid-1980s. Broodstock was kept and small volumes of marketable fish were produced (up to 40 tonnes/year) at the Balikchy Fish Farm (Tashkent region). A small volume of broodstock is to this day being kept there, while a small number of Siberian sturgeon is still being kept at the Tashkent trout farm Tavaqsay.

Culture-based fisheries

Fry and sometimes fingerlings of silver carp, bighead carp, grass carp and common carp, produced at the State Regional Fish Hatchery, the Balikchy Fish Farm (both located in the Tashkent region) and some regional fish farms were used to stock lakes used for residual water storage, lakes, reservoirs and drainage channels, with the aim of occupying empty ecological niches and of increasing fish productivity. Norms for stocking were recommended by the state research institutes. Stocking was financed by the state budget. There were norms also with regards to commercial catches of stocked fish over several years: for example, 0.1 percent from larvae stocked, 1–2 percent from fry, 2–5 percent from fingerlings and 5–8 percent from yearlings. The stocking and restocking activities were quite successful in the most important waterbodies. Special culture-based fishery enterprises were established in the Aydar-Arnasay lake system and lakes in the lower Amudarya River.

Fisheries-sector structure

In the former USSR, Uzbekistan fisheries formed a part of the All-Union Ministry of Fisheries. Primarily three branches of the central Ministry of Fisheries operated in Uzbekistan: the Uzbekribvod for fish resources protection, the State Committee for Fisheries for local fish production, and the Ribsbit for fish trade. They were independent from one another at the national level.

Uzbekribvod

The Uzbekribvod (Uzbekistan commission on fish resources and fish reproduction protection), created in the early 1960s, was responsible for the protection of waterbodies and fish resources to ensure sustainable fish production. Uzbekribvod had branches in all the regions of Uzbekistan. It had divisions for fish protection inspection, fish reproduction, and fish stock monitoring and water quality monitoring. It had extensive authority and could fine and even close a factory or enterprise of a ministry that polluted water or negatively impacted fish reproduction and fish stocks. All chemical factories, for example, had to use filters or some type of water filtering or cleaning mechanism before returning water to a river basin. The Uzbekribvod was responsible for the adoption of the All-Union standards for fish protection (regulations on fish capture) that would be suitable for the conditions of the Aral Sea basin.

The State Committee for Fisheries

In the early 1960s, the State Fisheries Department was created under the Ministry of Agriculture of Uzbekistan. Towards the end of the 1960s, it was renamed the State Committee for Fisheries of Uzbekistan and officially came under the Cabinet of Ministers, but in fact came under the administration of the former All-Union Ministry of Fisheries. This implied that the financing of new enterprises (both fish capture and fish culture) and the budget allocations for these new enterprises came from the former All-Union Ministry of Fisheries. All waterbodies and their fish stocks belonged to the state, as well as all enterprises involved in fishing, aquaculture, processing, trade, manufacture of equipment and production commercial feeds, research, engineering and construction. Together, these enterprises constituted the State Committee for Fisheries of Uzbekistan.

The State Committee for Fisheries was headed by a chairperson and under the committee's direction were departments of fish pond culture, fish capture, feed supply and equipment, fish

processing and economics, each headed by a deputy chairperson. The committee was responsible for fish production and the processing of fish produced in the republic.

Uzbekistan had the capacity to can fish and to process fish into various other forms. Fish canning was done at the Muynak Fish Cannery (Figure 5). Raw fish, including sprat, saury and capelin, was imported from other republics. However, in the early 1990s, the factory began processing silver carp from ponds because of a shortage of marine fishes. This resulted in the loss of links with suppliers from abroad and, together with the transition to a free market economy, resulted in the closing of the fish canning factory in 2004.

FIGURE 5
Main entrance of the Muynak Fish Cannery in 2003

Photo courtesy of Mr B. Karimov.

Fish-storage and small-scale processing facilities (mainly smoking facilities) were established in all aquaculture and fish-capture enterprises to maintain the freshness of fish. The volume of processed and stored fish was hundreds of tonnes per year, thus a rather small-scale industry.

There was also a large commercial fish-feed producing factory in the city of Chinaz (Tashkent region), which had all the necessary facilities to produce balanced feeds used for various fish diets and various sized fish. Production capacity was from 60 000 tonnes/year to 80 000 tonnes/year. Feeds were distributed domestically and to the other republics of Central Asia. Currently, the factory no longer belongs to the sector, but it still has the facilities to produce commercial fish feeds.

Ribsbit

Ribsbit (fish distribution) was responsible for imports and for the distribution within Uzbekistan of fish products from other republics of the former USSR. In order to meet the health norms for fish consumption (12 kg/person/year), the All-Union Ministry of Fisheries imported fish from the coastal regions of the former USSR. Every year 50 000–80 000 tonnes of frozen, salted and smoked marine fishes and canned fish products were imported by Uzbekistan. Large industrial cold storage facilities operated in all the regions of Uzbekistan. The cold storage facilities had the capacity to store 500–2 500 tonnes of frozen fish. Ribsbit also had the facilities to process marine fish (mainly production of salted and smoked herring) and to distribute to institutional users (the army, the police, correctional institutions). Distribution branches were located in all the regions of Uzbekistan. After independence in 1991, all regional enterprises became trade companies and generally ceased activities in the fisheries sector.

SAO Gidroribproekt
SAO Gidroribproekt (a Central Asian engineering organization for fisheries) was responsible for the development of engineering projects for fisheries in Uzbekistan, the Kyrgyz Republic, the Republic of Tajikistan and Turkmenistan. Projects included pond construction, construction of fish-capture facilities, fish-processing facilities and aquaculture facilities (including hatcheries), manufacture of fishery equipment and construction of fish-storage and marketing facilities.

The Central Asian Laboratory of Ichthyopathology
The Central Asian Laboratory of Ichthyopathology (inspection) was responsible for the control of fish health and for aquatic animal disease treatment in Uzbekistan and the neighbouring countries.

There was a strong link among Uzbekribvod, the State Committee for Fisheries, Ribsbit, SAO Gidroribproekt and the Central Asian Laboratory of Ichthyopathology, all operating at the national level and through the All-Union Ministry of Fisheries.

Education and research
Former Tashkent State Agrarian University
A special Department of Hydrobiology and Ichthyology was created at the former Tashkent State Agrarian University in the early 1960s, when the All-Union Ministry of Fisheries developed its large-scale programme for aquaculture and fisheries development in Uzbekistan in order to compensate for the reduction in fisheries production in the Aral Sea. The department provided fishery enterprises and research institutes with highly qualified specialists for some 40 years. Even today, most specialists who are active in the sector were educated in the department. Strong links were established among the department in Tashkent and similar departments and research institutes in Moscow, Leningrad and other regions of the former USSR. In a special agreement between the former All-Union Ministry of Fisheries and the Ministry of Education, every year one or two postgraduate students of ichthyology and hydrobiology from Uzbekistan would study at the central universities. The main focus of these students was aquaculture. All graduates and PhD students were sent to the State Committee on Fisheries of Uzbekistan. The Department of Hydrobiology and Ichthyology was generally considered for 40 years a strong research centre.

Institute of Zoology and Parasitology
The Laboratory of Ichthyology and Hydrobiology, under the direction of the Institute of Zoology and Parasitology of the Uzbekistan Academy of Sciences (UzAS), supported the fisheries sector. The focus of the laboratory was on the fauna of rivers, reservoirs and irrigation channels. In the mid-1960s, the part of the laboratory dealing with fish culture was closed at the Institute of Zoology and Parasitology and a new laboratory was created at the All-Union Institute of Pond Fish Culture. However, this laboratory was too small to significantly assist fish-culture development in Uzbekistan (at that time fish-culture farms in Uzbekistan had the highest productivity in the former USSR). That is why in the early 1970s, the Institute of Fisheries in Inland Water Bodies of Uzbekistan was created. Although this new institute was officially under the Uzbekistan State Committee on Fisheries, all research programmes were approved by the All-Union Institute of Pond Fish Culture.

Institute of Fisheries in Inland Water Bodies
The Institute of Fisheries in Inland Water Bodies coordinated research programmes in capture fisheries as well as in fish culture. Research programmes that were important for aquaculture and fisheries were financed by the state, and the Institute of Fisheries in Inland Water Bodies was the coordinator of these activities. Usually grants were awarded the Department of Hydrobiology and Ichthyology of the former Tashkent State University, the Institute of Zoology and Parasitology and the Research Institute of Bioecology in Karakalpakstan. Sometimes other research laboratories and departments were granted support: from example, the teacher training institutes in Bukhara province and Ferghana province.

Moscow State University

For over 40 years, special missions from Moscow State University worked in Uzbekistan (mainly at the Balikchy Fish Farm). Collaboration among the local education and research centres and the missions was excellent. Often the missions were given grants by the All-Union Institute of Pond Fish Culture and by the Uzbekistan Institute of Fisheries. It can be argued that the Uzbek fisheries sector had a good educational and research programme during the Soviet era. After the collapse of the former USSR, the structure in support of the fisheries sector could no longer be maintained and its restructuring was unavoidable.

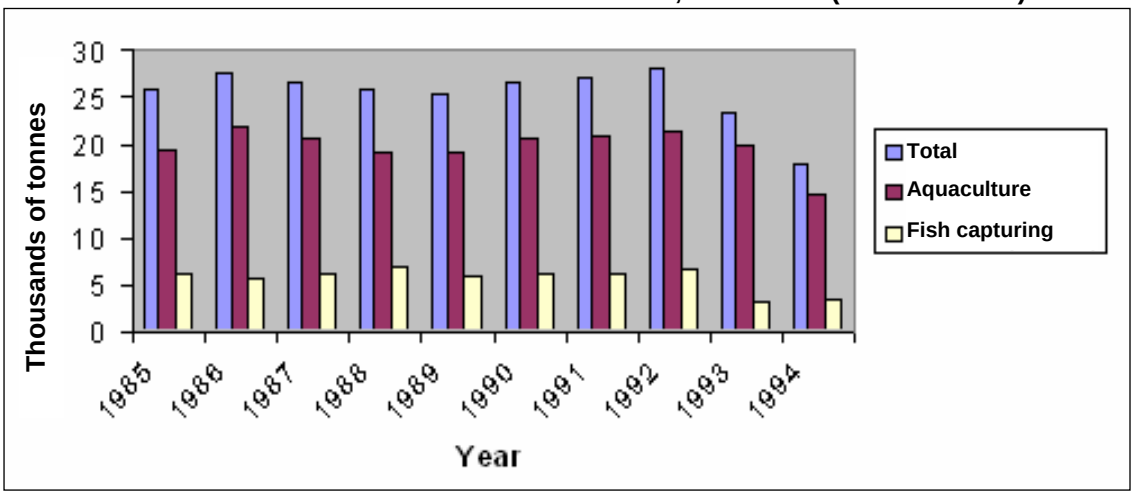
Fish production

Total fish production in Uzbekistan is presented in Figure 6. Until 1994, aquaculture was the main fish producing sector (Table 1). Fish-capture data include culture-based fisheries. It should be noted that some regions were more important for fisheries than others. The most important regions were the lakes of the lower Amudarya River (situated primarily in Karakalpakstan) and the Aydar-Arnasay lake system (Tables 2 and 3).

Fish was sold live or fresh and processed. Products such as salted and smoked fish, canned fish and fish oils and fats were prepared from fish produced in Uzbekistan (Table 4). It should be noted that the Muynak Fish Cannery also canned fish using imported herrings and other marine fishes and that the statistics on this production are not shown.

FIGURE 6

Production of the fisheries sector in Uzbekistan, 1985–1994 (in '000 tonnes)



Source: The State Committee for Fisheries.

TABLE 1

Fish produced by aquaculture and capture fisheries in Uzbekistan, 1985–1994 (in percentages of total production)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Aquaculture	76	79	77	73	76	77	77	77	85	81
Capture fisheries	24	21	23	27	24	23	23	23	15	19

Source: The State Committee for Fisheries.

TABLE 2
Fish catch in regions of Uzbekistan and Karakalpakstan in selected years (in tonnes)

Republic/regions	Type of waterbody	1991	1993	1994
Rep. Karakalpakstan	Lakes	2 835	364	396
Zhizak region (Aydar-Arnasay lake system)	Culture-based fishery enterprise	1 650	833	710
	Other parts of the lake system	890	740	690
Other parts of Rep. of Uzbekistan	Lakes	560	560	820
	Reservoirs	423	799	744
Total		6 358	3 296	3 360

Source: The State Committee for Fisheries.

TABLE 3
Volume of fish stocked in natural waterbodies in Uzbekistan in the early 1990s (in millions of fry)

Fish species	1992	1993	1994
Common carp	5.12	4.31	1.97
Silver carp and bighead carp	4.88	3.16	0

Source: The State Committee for Fisheries.

TABLE 4
Fish and fish products using fish produced in Uzbekistan, 1985–1994 (in tonnes)

Type of fish product	1985	1987	1989	1991	1992	1993	1994
Live & fresh (filets, steaks)	16 055	17 801	15 485	18 428	19 957	16 997	14 119
Frozen fish	576	361	449	630	361	861	105
Smoked or salted fish	2 743	2 404	2 903	2 160	2 872	1 993	1 459
Canned fish & other fish preparations	5 255	5 456	5 626	5 950	4 907	3 016	2 061
Fish oils and fats	620	328	364	0	0	453	256
Fish processed for other than human consumption	512	246	485	0	0	29	0
Total fish and fish products	25 761	26 596	25 312	27 168	28 097	23 349	18 000

Source: The State Committee for Fisheries.

Employment
In the 1980s, more than 70 farms and enterprises were active in the fisheries sector and 5 600–5 800 people were employed by the enterprises of the State Committee for Fisheries, the Uzbekribvod and the Ribsbit. Under the conditions of the planned economy, all workers were full-time employees. Moreover, about 100–150 specialists worked at SAO Gidroribproekt and the Central Asian Laboratory of Ichthyopathology.

Recreational fishing
Recreational and sport fishing was organized in societies of hunters and fishers (hunting and fishing clubs) on the base of voluntary membership. Regional branches of these societies were located in the various regions. In the Tashkent region, recreational fishers were members of a Uzbekistan society named Uzbekokhotribolovsoyuz, a society originally established by the former USSR Central Asian military forces headquartered in Tashkent. Uzbekokhotribolovsoyuz was a very rich organization. It also had an independent society of hunters and fishers with well-equipped bases on sites of large waterbodies (e.g. Lake Arnasay and Lake Aydar).

Members paid annual contribution fees. Societies had their assigned and registered hunting and fishing territories, often in very convenient places. Members could go fishing when they liked, using membership cards and (if needed) fishing permits. Each recreational fisher was allowed to catch 5 kg of fish at no charge and an additional 10 kg of fish for a certain fee. The maximum catch was limited

to 15 kg per person for each fishing foray. Societies had their own staff to monitor and control fishing by their members.

FISHERIES AND AQUACULTURE AFTER INDEPENDENCE (1991) AND UNTIL 2006

Changes in institutional arrangements, policies, planning and legal framework

After Uzbekistan proclaimed independence in 1991, reforms in the fisheries sector were started and aimed at the privatization of state property.

Before 1994, the enterprises involved in aquaculture, capture fishery, fish processing, trade in fish and fish products, research in fish production, design and construction of fish production facilities, and fish-feed production were all state properties. The government financed their activities, including the (re-)stocking of natural waterbodies. After the former USSR collapsed and from 1993, the state ceased funding the sector, which eventually resulted in the decline of fish production and fish imports.

One of the first changes to occur was the closing of Uzbekribvod. Some of its functions were transferred to the newly organized State Committee for Nature Protection and its special agency Gosbiokontrol for the control of the biological resources. The agency is responsible for the protection of fish, but important functions were lost, namely the use of fish resources and the exploitation of the potential of waterbodies to produce fish. Currently, no institution is responsible for the exploitation or utilization of such an important resource as fish. Gosbiokontrol only protects fishes and has no goal or interest to develop fish capture and to increase fish production.

The first stage of privatization

The first step taken towards privatization was the issuance by the Cabinet of Ministers of Decree No. 427 “On the establishment of the Uzryba corporation” of 18 August 1994. Uzryba was comprised of 62 enterprises, namely the Karakalpakbalyk association with its 27 capture-fish farms, 18 pond farms, 11 trade unions, 2 construction/maintenance enterprises, a project design institute, an ichthyopathology centre, the fish cannery in Muynak, and a fish-feed production plant in Chinaz. Large enterprises obtained the status of joint-stock companies with 30 percent state ownership (Uzryba was the stockholder on behalf of the state), 55 percent workers’ collective ownership and 15 percent ownership by private investors. Small enterprises became collectively owned. The buyout by investment capital of the shares owned collectively by the workers weakened the financial situation of many enterprises. The high interest rate loans (100–106 percent interest rate per annum) used for the buyouts further aggravated the financial situation of many enterprises.

The second stage of privatization

By Enactment No. 289 “On the improvement of the system of fishery sector management” issued by the Cabinet of Ministers on 6 July 2001, the Uzryba corporation was transformed into the joint-stock company named Uzbalyk. Trade unions were withdrawn from Uzbalyk, leaving 28 enterprises under its wings, including 15 pond farms, 5 capture-fish farms, the Karakalpakbalyk association (with 27 capture-fish farms), 2 construction/maintenance enterprises, 2 project design institutes, 2 fish-processing enterprises (the fish cannery in Muynak and the Baliksavdo), and the fish-feed production plant in Chinaz. In the statutes of the enterprises, state ownership was reduced to 25 percent, ownership of the workers’ collective was reduced to 10 percent, and the remaining 65 percent ownership was sold to private enterpreneurs.

The end of privatization of the fisheries sector

Enactment No. 350 “On measures to remove monopolies and to privatize the fishery sector” adopted on 13 August 2003 (Annex 4) formalized the end of the privatization of the fisheries sector. Uzbalyk and the Karakalpakbalyk were liquidated: fish-breeding and fish-capture enterprises were completely privatized. The Main Administration for the Development of Animal Husbandry, Poultry Farming and Fisheries was established within the central apparatus of the Ministry of Agriculture and Water Resources. Departments for the development of animal husbandry, poultry farming and fisheries were established in regional administrations for agriculture and water resources. These departments were responsible for the development of fisheries.

Unfortunately, privatization had a negative impact on education, research and the services infrastructure in the fisheries sector. The Department of Hydrobiology and Ichthyology of Tashkent State University (now named the National University) was closed. SAO Gidroribproekt was of no interest to private investors and also closed. All the enterprises that provided various services to aquaculture changed their business focus and left the sector. As a result, only some capture fisheries and aquaculture private enterprises survived to the present.

The Research Center for the Development of Fisheries, of which the State Regional Fish Hatchery became a part, was created (2003) within the Uzbek Research-Production Center for Agriculture under the Ministry of Agriculture and Water Resources.

The Fund for the Development of Fisheries was created (2003) with the funds obtained from the sale of state shares of joint-stock companies within Uzbalyk. The funds obtained from the rental of natural waterbodies are allocated as follows: 60 percent to the local state budget; 25 percent to the Fund for the Development of Fisheries under the Uzbek Research Center for the Development of Fisheries; and 15 percent to the State Committee for Nature Protection of Uzbekistan for measures aimed at the protection and sustainable use of fish resources. Natural waterbodies are assigned to capture fishery enterprises on a competitive basis.

Organizational structure of the fisheries authorities

Until 1994, the capture fishery was virtually run only by the state-owned enterprises of the State Committee for Fisheries of Uzbekistan. Enterprises in any form other than state-owned property did not exist in fisheries. Fish resources protection and ecological control were tasks of the government.

After the independence of Uzbekistan in 1991, fisheries was organized into two fields/departments:

- protection and control of wild fish stock use
- capture fisheries

Protection and control of wild fish stock use

All fish stocks that had formed under natural conditions in waterbodies belonged to the state and were declared aquatic biological resources. The use of these fish stocks for fisheries, as well as the control of the ecological conditions of waterbodies, is regulated by a number of laws on nature protection. The enforcement of the laws was assigned to the State Committee for Nature Protection (1991). The basic law on the use of biological resources in Uzbekistan is the Law on Nature Protection adopted by the Uzbekistani Parliament on 9 December 1992. In Uzbekistan, waterbodies and fish resources inhabiting them (except the fish bred in aquaculture) are the property of the state.

In conformity with Enactment No. 95 of the Cabinet of Ministers of Uzbekistan adopted on 14 April 1991, state protection of animals and state inspection of the work of departmental protection is the task of a special inspection agency called Gosbiocontrol (in full: the Republican State Inspection for the Protection and Sustainable Use of the Animal and Plant Worlds) set up under the State Committee for Nature Protection. Gosbiocontrol develops instructions on the protection of the animal and plant worlds. All ministries, state committees, agencies, organizations and citizens must observe these instructions. In addition, Gosbiocontrol develops the “rules of fisheries”. The current rules of fisheries (i.e. Instruction on the Utilization of Fish Stocks) were adopted by the State Committee for Nature Protection on 15 April 1997 and registered at the Ministry of Justice on 1 May 1997.

Up to 2003, juridical and physical persons who managed capture fisheries, based fisheries operations on: (1) state ecological expertise of projects in fish areas; (2) information on stock size; (3) quotas for the exploitation of aquatic animals; and (4) contracts which showed the registration of waterbodies, the measures being taken for their protection, and the fish-breeding and stocking practices to be applied.

According to Enactment No. 350 (2003), natural waterbodies are to be assigned to fishery enterprises on a rental basis. The fishery enterprises that concluded rental/lease contracts for a period of more than ten years operate the capture fisheries. These enterprises catch fish on a quota-free basis, but the catch is based on the carrying capacity of the available biological resources and on customer

demand. They are obliged to also take measures to conserve the productivity of waterbodies and maintain the reproductive capacity of fish stocks at proper levels.

Capture fisheries

Capture fisheries is practiced in freshwater reservoirs and in lakes used for residual water storage. Two groups of such lakes are of major importance for capture fisheries (Table 5). One group of lakes is in the Amudarya delta and provides about 1 500 tonnes of fish annually. This group is composed of 20 lakes with areas varying from 4 000 ha to 15 000 ha and covering a total of 97 000 ha (some sources report a total of as many as 150 000 ha) (Director of the Nukus Branch of the International Fund to save the Aral Sea (IFAS), personal communication, September 2007). The second group of lakes is composed of the Aydar-Arnasay lake system situated midway along the course of the Syrdarya River (Figure 7 and Figure 8). In 1994, 760 tonnes of fish were captured and in 2000, 1 600 tonnes of fish were captured. The problem is that the water level and the water quality of these lakes are strongly influenced by irrigation needs and waterbody size, and water depths can fluctuate by year and within a season. This restricts fisheries development, especially as water-level fluctuation has a negative impact on the reproduction of fishes (Karimov and Razakov, 1990; Borodin *et al.*, 1998; Karimov *et al.*, 2004).

TABLE 5
Fisheries main landing places in Uzbekistan

Lakes	Area (ha)*	Quantity of harvested fish 1998-2001 (tonnes)
Lakes in the Amudarya delta	97 000	550–1 200
Aydar-Arnasay lake system	400 000	1 500–2 000

* Surface area can change every year due to the natural hydrological regime, irrigation goals and water balance.

Source: Authors.

FIGURE 7
Flooded area on the shoreline of Lake Tuzkan in the Aydar-Arnasay lake system in 2005

Photo courtesy of Mr B. Karimov.

Of regional importance are also the fishery activities in lakes and reservoirs in the lowland parts of the Kashkadarya and the Zarafshan Rivers. Together the fishery activity on these rivers provides for less than 10 percent of the national fish catches.

Until 2003, the state financed the stocking of waterbodies with silver carp, common carp and grass carp. The aim was to increase the productivity of the waterbodies. When it became practice to assign the use of the natural waterbodies on a rental basis (Table 6), the state stopped financing the stocking of natural waterbodies. Now the stocking of waterbodies is supposed to be carried out by the private sector. However, the private entrepreneurs generally do not carry out (re)stocking because fry and fingerlings are either not available or the costs are considered too high. The exception to this rule is the joint venture Akva-Tudakul working on the Tudakul reservoir.

Fish production after independence and reforms

The official total fish production from all resources, i.e. ponds, reservoirs, lakes and rivers, was reported at 26 500 tonnes in 1990. Production declined to 4 300 tonnes during 2004. Total production in 2004 of both capture fisheries and aquaculture is depicted in Figure 9 and shown as Table 23 in Annex 1.

FIGURE 8
Fishers sorting harvested fish in the Aydar-Arnasay lake system

Photo courtesy of Mr B. Karimov.

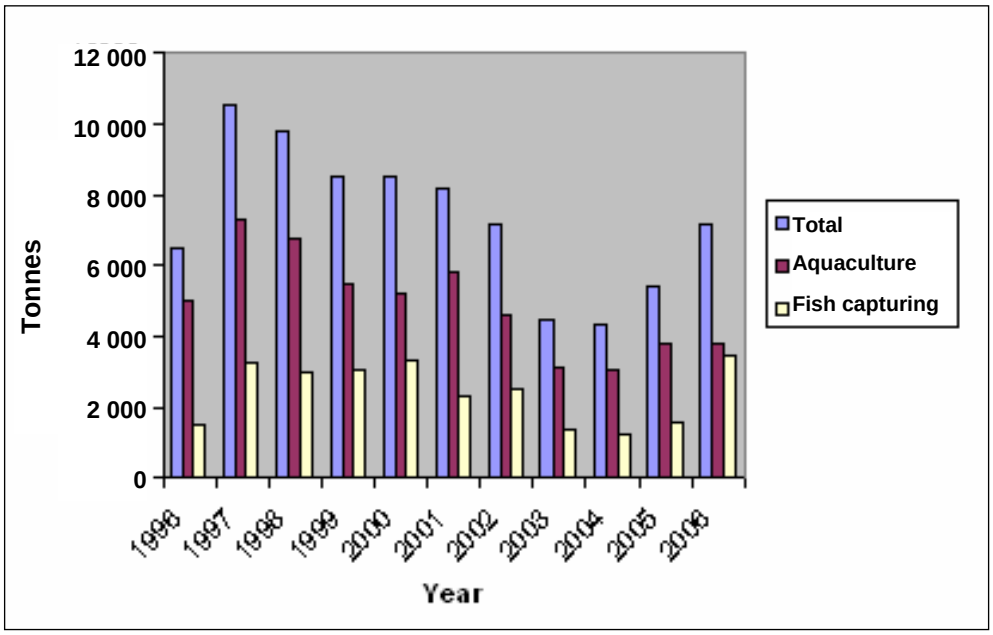
TABLE 6
Assignment of natural fishery waterbodies in 2007

Republic/province	No. of waterbodies	Area of waterbodies (in '000 ha)	No. farmers renting waterbodies	Area given on rental basis (in '000 ha)
Rep. of Karakalpakstan	31	113 597	69	77 275
Zhizak province	3	205 000	78	186 590
Navoi province	3	150 489	78	114 292
Bukhara province	8	101 321	16	101 321
Kashkadarya province	11	26 094	21	17 253
Khorazm province	10	68 330	9	4 117
Samarkand province	6	10 680	4	1 274
Surkhandarya province	6	13 186	5	10 858
TOTAL	78	688 697	280	512 980

Source: Authors.

There are several reasons for the decrease in fish production, including: the general economic crisis in the country; broken links with the fisheries institutions of the Soviet era; problems with fish feed quality and availability; problems with availability and quality of equipment and supplies; and a decline in the quality and availability of education and research in fisheries (Kurbanov, 2007). Moreover, during the first stages of privatization, the fisheries sector was not preferred among the various investment alternatives. Traditional carp culture and small-scale fish-capture facilities with low profitability were not interesting to investors. Because of the above-mentioned factors, fish production as well as fish processing and trade decreased. Privatization also had a negative impact on education and research in the fisheries sector. Enterprises that provided aquaculture with various services (e.g. fish feeds, chemicals, equipment and gears) closed their doors or changed their business activity. At present, few private-sector fish-capture and fish-culture enterprises remain active in the fisheries sector.

FIGURE 9
Fish production in Uzbekistan, 1996–2006 (in tonnes)



Source: The State Committee for Fisheries.

From a technological point of view, aquaculture production largely decreased because of the reduced use of fish feeds. In 1992, the fish feed sector produced 40 000 tonnes of fish feeds, in 1994 only 24 000 tonnes and in the new millennium not more than 2 000 tonnes of fish feeds were produced.

In terms of the share of total production contributed by aquaculture and by capture fisheries, the share produced by capture fisheries decreased in recent years (Table 7). This decrease is because of reduced investments. Private-sector entrepreneurs who took over the state enterprises since 2003 generally do not have sufficient financial backing to invest in new technologies.

Analysis of fish production of aquaculture and capture fisheries

Table 7 shows the results of a year-by-year analysis of the fish catch of capture fisheries in waterbodies such as lakes, reservoirs and rivers, as reported in a paper on the use of irrigation systems for sustainable fish production in Uzbekistan (Kamilov, 2003).

TABLE 7

Fish produced by aquaculture and capture fisheries in Uzbekistan, 1996–2005 (in percentage of total production)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Aquaculture	77	69	70	65	61	71	64	70	72	70
Fish capture	23	31	30	35	39	29	36	30	28	30

Source: Uzbalik and the Research Center for the Development of Fisheries.

During the period from 1996 to 2005, aquaculture produced between 61 percent and 77 percent of the fish in Uzbekistan, while the estimated value of the total fish production realized by aquaculture was between 90 percent and 95 percent. During the same period, aquaculture produced on the average of 4 200 tonnes of fish annually with an estimated farm-gate value of US$4 200 000.

Analysis of the available data shows that about 60 percent of catches for the last few years originates from lakes used for residual water storage and 40 percent of catches originates from reservoirs (Table 8). The catches from rivers are negligible.

TABLE 8

Capture fisheries production by type of waterbody (in '000 tonnes)

Year	Fish catch from lakes	Fish catch from reservoirs	Fish catch from rivers	Total
1980–1990 (average catch for a decade)	5.5	1.0	0.5	7.0
1994	2.0	0.8	0.3	3.1
1996	1.2	0.3	0	1.5
1999	3.1	0.4	0	3.5
2000	2.7	0.3	0	3.0
2005	2.6	0.3	0	2.9
2006	2.1	1.3	0	3.4

Source: Authors.

Fish processing

The decrease in fish production also brought about changes in fish processing in Uzbekistan. The gap between demand and supply of fish has been widening, with demand increasing and supply decreasing. In recent years, there has been a deficit of fish in the market. During the month of Ramadan in the winter–autumn period of 2007, the Moslem people increased their fish consumption. The farmed fish was harvested during the same period as the pond fish farms supplied the market with live fish. Farms could easily sell/distribute live and fresh fish and did not need to arrange for any processing. As a result, the volume of processed fish products decreased. Only specific institutional consumers (army, hospitals, rehabilitation facilities) ordered frozen fish. In recent years, many farms did not even present statistics on fish processing. The available data are presented in Table 9. The

increase in fish-freezing activities can be explained by the fact that the Balikchy Fish Farm and some other farms renovated their freezers and refrigerators in the last few years.

TABLE 9
Fish and fish products used in fish processing in selected years (in tonnes)

Type of fish product	1996	1997	2006
Live and fresh fish (filets)	6 120	9 913	6 292
Frozen fish	222	267	885
Smoked and salted fish	158	385	12
TOTAL	6 500	10 565	7 200

Source: Uzbalik and the Research Center for the Development of Fisheries.

Up to 2003, the state financed the restocking of waterbodies, although the restocking was in fairly modest quantities (Table 10).

TABLE 10
Fry and fingerlings stocked in natural waterbodies in Uzbekistan, 1996–2002 (in millions)

Fish species	1996	1997	1998	1999	2001	2002
Common carp	6.0*	2.72	1.7	0.6	1.0	1.6
Silver carp & bighead carp	1.7	1.97	2.8	2.0	1.5	4.9

* Millions of larvae instead of fry/fingerlings.
Source: Data from Uzbalik and the Research Center for the Development of Fisheries.

In the 1990s, the number of boats used by capture fishery enterprises sharply decreased. In the mid-1990s, no new boats were built or purchased, and only the fleets remaining from former years were used. In total, not more than 340 boats were used for fishing activities, including 12 cutters with engines of 130 hp, 32 cutters with engines of 20–60 hp and between 280 and 300 motor boats. After privatization came to a close, the new owners started to equip the brigades with boats again (refer to Chapter III).

Changes in employment in the fisheries sector

During the period from 1994 to 2003, many changes took place in the fisheries sector, job security and salaries were low, and there were no new entrants. At the beginning of privatization, the trade companies left the sector. Other enterprises followed suit and only some fish farms and capture fishery enterprises remained active in fisheries. As a result, the number of people employed in the sector decreased significantly, particularly in the early years of privatization (Table 11).

Table 11
Employment in the fisheries sector, 1996–2003

Year	1996	1997	1998	1999	2001	2002
No. of employees	5 800	4 500	4 500	4 450	4 400	4 400

Source: Uzbalik and the Research Center for the Development of Fisheries.

Chapter III
THE CURRENT STATUS OF CAPTURE FISHERIES AND AQUACULTURE

The fisheries sector contributes less than 0.1 percent to the national GDP of Uzbekistan. Nevertheless, it is an important source of livelihoods for the rural people of some less-developed areas along the lower course of the Amudarya River and midway along the course of the Syrdarya River. Inland waterbodies in Uzbekistan are a valuable source of fish and fish products, which contribute to the food security (in terms of quality and quantity) of the population, provide healthy nutrition and support a diverse diet. Moreover, inland waterbodies of Uzbekistan offer great value in terms of recreational fishing, which is not accounted for in the GDP estimates. The fisheries sector also provides avenues for foreign exchange earnings through export of fish and fish products, but the current state of the sector makes a search for export opportunities unnecessary, as national demand for fish is far from being met at present. The sector also provides an opportunity for the rural population to diversify their economic activities and earn additional income.

NATURAL RESOURCES AND THE POTENTIAL OF THE FISHERIES SECTOR

Description of the water resources

The total area of inland waterbodies in Uzbekistan (except the Aral Sea) is more than 800 000 ha. The waterbodies in the Aral Sea basin can be grouped as follows (Karimov, 1994):

- natural waterbodies (rivers and streams, lakes);
- primary, artificial freshwater waterbodies (irrigation canals, reservoirs, ponds); and
- secondary, artificial brackish waterbodies (drainage canals, lakes for residual water storage).

In Uzbekistan, there are more than 600 large and small rivers. Only a few of them, those in the mountains, are not affected by irrigation. The Amudarya River, 1 440 km long, has the highest annual discharge of about 78 km³ of water. The Syrdarya River is 2 140 km long and has a discharge of 36 km³ of water. During the last few decades, all natural lakes have been impacted by large-scale irrigation development. Some lakes have dried up and others have been used for residual water storage. Almost none of the natural lakes at the middle and lower courses of the Uzbekistan rivers have a water regime and water quality that is not affected by salinity and by the irregular discharges of drainage water (Karimov and Razakov, 1990; Joldasova *et al.*, 2004; Karimov *et al.*, 2006).

In the countries of Central Asia, about 60 reservoirs with a total volume of 61.6 km³ were constructed in the basins of all large rivers. In the basins of the two major rivers, the Amudarya and the Syrdarya Rivers, there are 39 reservoirs (Table 12 and Table 13). The total water surface of reservoirs that are important for fisheries is 3 310 km² (Nikitin, 1991). Some of the large Uzbekistan reservoirs, such as the Tudakul, the Shorkul and the Mezhdurechye reservoirs, are important for fisheries.

TABLE 12
Reservoirs in the Aral Sea basin

River basin	Number of reservoirs	Area km^2	Volume km^3
Syrdarya basin	22	1 850	34.5
Amudarya basin	17	1 460	23.3

Source: Nikitin, 1991.

TABLE 13
Distribution of reservoirs by size in the Aral Sea basin

Volume (in million m^3)	The Amudarya basin	The Syrdarya basin
Number of reservoirs		
1–50	5	4
50–500	6	13
>500	6	5
Total	17	22
Volume of reservoirs in million m^3		
1–50	110	112
50–500	1 490	1 543
>500	21 700	32 850
Total	23 300	34 505

Source: Nikitin, 1991.

The system of irrigation canals is well-developed and totals about 150 000 km of canals. Only five or six large main canals, each 100–350 km long and with a capacity of 100–300 m^3/sec, are at present of fishery significance. They are the Yuzhnogolodnostepsky, the Karshi, the Amu-Bukhara main canals and several other main canals. In most canals, water flows by gravitation. In the Karshi and the Amu-Bukhara main canals, pumps are used.

There are about 100 000 km of drainage canals (collectors) in Uzbekistan. The only collectors of some importance to fisheries are the large, main collectors that are longer than 100 km and have water flow rates of 40–100 m^3/sec. The annual discharge of some of these collectors is comparable with rivers such as the Ozerny (1.5 km^3) and the Centralno-Golodnostepsky Rivers (2.5 km^3).

Lakes used for or especially created for residual water storage are important for fish fauna. The lakes that are import for fish fauna cover a surface area of about 7 000 km^2, about twice the area of that covered by the important reservoirs. Most of the lakes function for many years. They do not experience major seasonal changes in water levels and water quality.

Water resources used for capture fisheries in recent years

Following the demise of fisheries in the Aral Sea, capture fisheries is conducted in a range of inland waterbodies. Fishery enterprises presently exploit 11 reservoirs, which cover a total area of 90 000 ha, and 34 lakes with a total area of 347 000 ha. The most important regions for capture fisheries in recent years are:

- the area occupied by lakes and reservoirs in the lower Amudarya River (in Karakalpakistan), which provided between 550 tonnes and 1 200 tonnes of fish annually. In this region, there are 20 lakes with areas ranging from 4 000 ha to 15 000 ha each. The total area occupied by lakes and reservoirs is about 96 800 ha (150 000 ha according to modern estimates [IFAS]).
- the area occupied by the Aydar-Arnasay lake system, which covers about 400 000 ha and includes three brackish-water lakes. This lake system provides between 760 tonnes and 2 000 tonnes of fish annually. The actual productivity (2–3.3 kg/ha) is as little as one tenth of the potential productivity (estimated to be 20 kg/ha).

Reservoirs and lakes situated midway along the course of the Syrdarya, the Amudarya, the Zarafshan and the Kashkadarya Rivers are also used for fisheries, but the productivity of these waterbodies is low because of poor fishery equipment and poor fishery management. An excellent example of positive changes in productivity is the Tudakul reservoir, where a newly created enterprise named Akva-Tudakul developed a culture-based fisheries programme and in four years increased fish production from 170 tonnes to 1 000 tonnes. It is likely that production will increase further in the near future. The reservoir is now considered a success story for culture-based fisheries development in Uzbekistan. This unique waterbody has a large, dead volume and, therefore, is very suitable for fishery development. It is, however, very difficult to repeat the success of Tudakul reservoir in other

waterbodies because of the often very small, dead volumes and the frequent, full discharges of water during the vegetation periods when all waterbodies are used for irrigation.

Potential water resources for fisheries

It can be argued that the utilization of reservoirs and lakes by capture fisheries can only improve compared with the current situation. If the fishing brigades were well-equipped and methodologies for better fishery management were applied, utilization of the available resources would improve tremendously. Most promising are culture-based fisheries (including restocking programmes) and cage-culture development. Waterbodies suitable for these practices can be found in all regions of the country: Tuya-muyun, Talimardjan, Kattakurgan, Uchkizil, Yujnosurkhan and Zhizak and other reservoirs on the plains for warm-water fishes; and Andijan, Charvak, Akhangaran, Karkidon and other reservoirs in submountain and mountain regions. For cage-culture development, virtually all large irrigation canals and, more importantly, most drainage canals have suitable areas available.

Fish fauna

Prior to large-scale irrigation efforts, the indigenous fish fauna in the Aral Sea catchments, rivers and lakes was little affected by human activities. G. Kamilov and Zh.U. Urchinov (1995) listed 84 species of fish for Uzbekistan, including both rare and introduced species. The ichthyofauna has undergone major changes as a result of water regulation and the introduction of fish species from outside the Aral Sea basin (Kamilov, 1973; Kamilov *et al*., 1994). Some species disappeared or became rare, such as three species of endemic shovelnoses (*Pseudoscaphirhynchus kaufmanni*, *P. hermani*, *P. fedschenkoi*), ostroluchka (*Capoetobrama kuschakewitschi*), minnows (*Alburnoides bipunctatus, A. taeniatus, A. oblongus*) and Zarafshan dace (*Leuciscus lehmanni*), because they have been unable to adapt to the changed environment or because dams blocked their spawning migrations (spiny sturgeon *Acipenser nudiventris*, Aral barbell, *Barbus brachycephalus*). Some species, such as gudgeons (*Neologies fluviatilis, N. melanostomus, Pomatoschistus caucasicus, Proterorhinus marmoratus*) and Baltic herring (*Clupea harengus membras*), which were introduced into the Aral Sea, were common for a while but later disappeared as a result of increasing salinity and other changes in the Aral Sea environment.

During the period from 1960 to 1990, a number of fish species from outside Central Asia were introduced into the water irrigation systems of the region. Pike-perch and bream were released into reservoirs and lakes fed by the Zarafshan and the Kashkadarya Rivers and were released midway along the courses of the Syrdarya and the Amudarya Rivers. Silver carp (*Hypophthalmichthys molitrix*), bighead carp (*H. molitrix*), grass carp (*Ctenopharyngodon idella*) and snakehead (*Channa argus warpachowskii*), which were introduced from the Far East, were stocked in fish farms in the Tashkent area and from there the hatchery-produced stocking material was regularly released into lakes and reservoirs (Salikhov and Vundzettel, 1986).

Three species of buffalo (*Ictiobus cyprinellus*, *I. bubalus*, *I. niger*) were introduced into the country by fish farms but they did not enter river systems. In contrast, channel catfish (*Ictalurus punctatus*) were also introduced and entered the Syrdarya River basin. Rainbow trout (*Oncorhynchus mykiss*), Sevan trout (*Salmo ischchan issykogegarkuni*), peled (*Coregonus peled*) and lake herring (*Coregonus sardinella*) were released into the Charvak reservoir in the Tashkent region, where they are now established. A list of 73 fish species found in Uzbekistan over the last 40 years is given in Annex 2.

Commercial fishes

Of the 73 species of fish that can be found in Uzbek waterbodies, only 35 species (48 percent) are considered to have commercial value and the balance of 38 species (52 percent) are regarded as having less value and/or as being a trash fish species. Of the 35 species of commercial value, only about 18–20 species are captured for commercial purposes because the rest of the 35 species have

small populations and some are listed in the Red Data Book[1]. The eight main species of fishes caught in inland waterbodies are shown in Table 14.

TABLE 14
Common commercial fish species in Uzbekistan

Common name	Scientific name
Common carp	*Cyprinus carpio*
Pike-perch	*Stizostedion lucioperca*
Eastern bream	*Abramis brama*
Catfish	*Silurus glanis*
Crucian carp	*Carassius auratus*
Grass carp	*Ctenopharyngodon idella*
Silver carp	*Hypophthalmichtys molitrix*
Snakehead	*Channa argus*

Source: Authors.

The catch of the above-listed eight species made up 62 percent of the total catch of 3 400 tonnes from natural waterbodies in 2006.

Analysis shows that many of the fishes in Table 14 are representatives of the family *Cyprinidae*. Because of intermuscular bones and the rather low quality of meat, these fish species have no great value in either the international or the local market. Private investors, therefore, have little interest in growing these fish species. Only pike-perch, snakehead, trout, pike and white fishes (*Coregonus* sp.) are considered commercially attractive for investments in the sector. European catfish is very popular in local markets and in neighbouring countries. Cray fishes are also caught in some waterbodies of the Navoi and the Bukhara regions, but the limited volume caught make them of low commercial significance.

It can be argued that the local ichthyofauna has low biodiversity and largely consists of species that are of limited commercial value and/or are not well-appreciated by consumers.

The variability of the water environments (including in high and cool mountains and hot deserts) provides good prospects for the development of recreational fisheries and ecological tourism. The fisheries sector has not investigated and/or invested in the opportunities recreational fisheries and ecological tourism may provide.

MARINE CAPTURE FISHERIES

Uzbekistan is considered a landlocked country and does not have access to an ocean or a sea. As a result of the ecological crisis in the Aral Sea (once the fourth biggest lake in the world), Uzbekistan ended its capture fishery activities in the 1980s. Currently, there is no marine fishery activity carried out in this country or under the flag of Uzbekistan on the world's seas and oceans.

INLAND CAPTURE FISHERIES

In this millennium, inland capture fisheries produced only between 2 000 tonnes and 4 000 tonnes of fish annually, representing between 28 percent and 39 percent of the country's total fish production. The reasons for the small harvest are because waterbodies are not being fully exploited and scientifically managed and because all rivers are managed for the purpose of supplying water for agriculture: the water level regime is often very variable both during and between seasons. Fish production per hectare over the last 50 years fluctuated between 1 kg/ha and 69 kg/ha (average 21 kg/ha). In the early years of this millennium, fish production per hectare, as recorded by some enterprises, varied between 6 kg/ha and 10 kg/ha, while potential productivity is estimated to be

[1] The Red Data Book contains the official list of all endangered, rare and near extinction species of wildlife in Uzbekistan. As a rule, the catching, hunting and selling of these species are prohibited.

between 12 kg/ha and 150 kg/ha (average 37.1 kg/ha), meaning that actual production averages only between 30 percent and 57 percent of potential production.

Technological aspects of fish capturing

Capture fishery enterprises in Uzbekistan use only gillnets and do not use other technologies such as seines, trawls, drag nets and other gear. The current capture technology yields very low productivity. The enterprises are generally poorly equipped with fishing boats and engines (Figure 10). While Table 15 and Table 16 show a large increase in outboard motor boats, the fleet of small-scale (inboard motor) boats decreased dramatically between 1991 and 2004. Due to privatization, the large majority of vessels and outboard motor boats used in inland capture fisheries and by fish farms is now privately owned.

FIGURE 10
Fishing fleets on the Aydar-Arnasay lake system in 2005 (left) and on the former Muynak Bay on the Aral Sea in 2003 (right)

Photos courtesy of Mr B. Karimov.

TABLE 15
Type and number of outboard motor boats available at inland fishery enterprises and fish farms in Uzbekistan

Power of boat motors (horsepower)	1991			2004		
	Total	State	Private	Total	State	Private
Up to 12 HP	52	52	0	150	3	147
Up to 20 HP	14	14	0	80	2	78
Up to 25 HP	78	78	0	243	3	240
Up to 30 HP	78	78	0	257	12	245
Up to 60 HP	48	48	0	51	4	47
Up to 90 HP and higher	4	4	0	55	15	40
Total	274	274	0	836	39	797

Source: Authors.

Major difficulties encountered by the inland capture fisheries sector are as follows.

- Gears and equipment for catching fish are of poor quality.
- The water levels of all waterbodies on the plains are affected by irrigation goals, which generally are in conflict with commercial fish reproduction goals.
- The capacity to store and to process fish from inland capture fisheries is lacking.
- Government financial support of and private investment in the sector are lacking, which situation is further exacerbated by the absence of special credit lines for the sector.

TABLE 16
Type and tonnage of small-sized vessels used by fishery enterprises and fish farms in Uzbekistan

Name of small-sized vessel	Tonnage (kg)	1991			2004		
		Total	State	Private	Total	State	Private
Amur	900	40	40	0	0	0	0
Motor boat	1 500	9	9	0	2	1	1
BMK-130	4 700	20	20	0	8	0	8
BMK-130K	5 200	1	1	0	0	0	0
PTS	6 000	2	2	0	0	0	0
MRB	18 000	5	5	0	1	1	0
T-63	36 000	1	1	0	0	0	0
Power boats	600	0	0	0	11	1	10
with various	700	0	0	0	4	0	4
modifications	800	1	1	0	1	0	1
"	1 000	2	2	0	8	1	7
"	1 200	0	0	0	1	0	1
"	1 500	0	0	0	2	1	1
"	2 000	0	0	0	2	0	2
"	3 000	0	0	0	1	1	0
"	5 000	0	0	0	1	0	1
"	8 000	0	0	0	1	0	1
"	12 000	0	0	0	1	0	1
	Total	81	81	0	44	6	38
Boats	100	297	297	0	4	1	3
with various	200	1 568	1 568	0	54	0	54
modifications	250	108	108	0	30	1	29
"	300	60	60	0	63	3	60
"	350	6	6	0	116	3	113
"	400	78	78	0	513	15	498
"	500	58	58	0	66	8	58
"	No tonnage	35	35	0	14	4	10
	Total	2 210	2 210	0	860	35	825
	Grand total	2 291	2 291	0	904	41	863

Source: Authors.

- Poaching of fish is widespread. As a rule, fishing activities need to be registered but often they are not. Common carp, asp, catfish and pike-perch are common species in the catches of poachers. Poaching causes the fisheries productivity of many natural waterbodies to be low and underestimated in national statistics.
- Materials and technical resources at national level for the improvement of production and profitability are lacking.
- Stocking practices using fish seed in waterbodies are poorly organized. Previously, the government absorbed the cost of (re)stocking programmes but in 2003 this support ended.
- Governmental and non-governmental institutional structures to promote the use of irrigation systems for fish production are generally lacking. There is no law that ensures the rights of private fish farmers to a guaranteed water supply.
- Fish protection devices on irrigation structures, which would prevent fish from being discharged with irrigation water into irrigation fields, are lacking.
- There are no corridors between waterbodies (including floodplains, river reaches and canals) to allow for migration of fish and fish fry to and from places of spawning and reproduction.

- There are no fish passes in hydropower structures.
- The current priorities for water use to satisfy irrigation demands and hydropower production demands often do not allow for maintaining optimal water levels and water supplies for fish spawning, reproduction and nursing.
- Water pollution in irrigation/drainage systems is hampering fish stock development and the fisheries sector; high mineralization levels and concentrations of toxic substances of agricultural and industrial origin make the environment less suitable or even unsuitable for fish. The total amount of mineral salts introduced into the hydroecosystems through collector-drainage waters (CDW) is about 70–80 million tonnes/year.
- There is a general, low level of public awareness that the irrigation network can be used for fish production.
- Fishery experts are in short supply and a lack of fishery training programmes results in a shortage of qualified persons and prevents an inflow into the sector of young persons with knowledge of modern fishery production, management and conservation practices.

RECREATIONAL FISHING

Recreational fishing in Uzbekistan has not changed much since independence in 1991. It continues to be fairly disorganized. Most recreational fishers are not members of a fishing club or association. Persons can fish recreationally in almost all waterbodies in all regions of Uzbekistan but not in protected areas, on private fish farms, in areas leased by fishery enterprises and, of course, in areas managed and serviced by fishing clubs. Very popular areas for recreational fishing are lakes and rivers in submountain and plains regions. There are no statistics kept on the number of recreational fishers.

Target species that are popular among recreational fishers are common carp, common (European) catfish, pike-perch, asp, snakehead, bream and pike on the plains, trout in the submountain areas of Tashkent region and marinka (snowtrout) (Schizothorax intermedius) in all submountain regions.

Recreational fishing is not considered to be of major importance for household food security in Uzbekistan, although a local tradition holds that caught fish should be consumed by the recreational fishers and their relatives and friends.

Recreational fishers can be members of fishing clubs. There are two national fishing and hunting societies: Uzbekokhotribolovsoyuz (Uzbekistan hunters and fishers' societies) and Okhotribolovsoyuz for members of the military forces. Both societies have units or organizations in all regions and in Tashkent. A similar situation exists in Karakalpakstan.

All regional branches of Okhotribolovsoyuz have offices in the main cities (which are centrally located in the regions) and also in several areas that are managed by them and have good fishing environments. Members pay annual membership fees. They are issued membership cards and can visit and can fish the territories managed and serviced by Okhotribolovsoyuz. For each visit, they are issued a ticket. The territories generally possess service staff, including hunters.

There are no specific programmes in place for the restocking of waterbodies for recreational fishing purposes. It is acknowledged, however, that restocking with common carp, as was the practice before 2002, had a positive impact on the size and number of fish in the catches of recreational fishers. Codes of conduct for recreational fisheries or recreational fishery guidelines are not available in Uzbekistan.

AQUACULTURE

Aquaculture is the most promising sector of the fisheries industry in Uzbekistan. The only aquaculture production system applied in the country is pond culture of cyprinids. Pond fish farms operate in all regions. The Regional Fish Hatchery belongs to the state, while all other farms are privately owned.

The total pond surface area of all fish farms in Uzbekistan is estimated to be 10 237 ha, which includes 8 619 ha of fattening/grow-out ponds and 1 618 ha of nursery ponds (Table 17). These ponds have the potential to produce 26 000 tonnes/year of fish at an average productivity rate of 3 tonnes/ha. For over 15 years, the pond production system has not been well-maintained and repaired when needed, as generally funds to do so were lacking.

TABLE 17
Fish-culture farms and their pond surface area in 2007

Republic/province	Names of farms	Pond area (ha)		
		Total	Fattening	Nursery
Rep. of Karakalpakstan	Nukusbalyk Ltd	46	0	46
Andijan province	Andijanbalyk JS	986	894	92
Bukhara province	Bukharabalyk Ltd	574	428	146
Kashkadarya province	Kashkadaryabalyk Ltd	409	359	50
Namangan province	Namanganbalyk Ltd	800	600	200
Namangan province	Madaminjon Ota Ltd	90	90	0
Samarkand province	Ashurota farm	93.3	68.7	24.6
Samarkand province	Sherali farm	116.3	59	57.3
Samarkand province	Taidyl AV farm	93.4	70	23.1
Surkhandarya province	Azizbobo farm	34	34	0
Surkhandarya province	At-Termizij farm	34	34	0
Surkhandarya province	Abu-Hurairo farm	32	32	0
Syrdarya province	Syrdaryabalyk Ltd	980	980	0
Syrdarya province	Yangierbalyk Ltd	400	400	0
Tashkent province	Balykchi JS	2 573	2 351	222
Tashkent province	Damachi Balyk Ltd	275	275	0
Tashkent province	MBP ShK	258	0	258
Tashkent province	Toshkentbalyk Ltd	133	133	0
Ferghana province	Besharykbalyk Ltd	503	385	118
Ferghana province	Urai Ltd	334	314	20
Khorazm province	Horazmbalykmahsulot JS	1 473	1 112	361
Total		10 237	8 619	1 618

Source: Authors.

The combined nursery ponds in the republic have the potential to produce as many as 93 million yearlings per year. However, due to poor financing and management, the actual production is much lower.

Fish-culture technology

Fish farmers continue to use the fish-culture production system of carp (cyprinids) polyculture that was introduced last century in the period of the former USSR. The system has not been adapted because of a lack of investments. As inorganic fertilizers in specified amounts are much cheaper than fish feeds, liming and fertilization of ponds is done in order to stimulate phytoplankton development. In this way, silver carp became the main cultured species and make up between 70 percent and 85 percent of the total aquaculture production. Common carp, together with grass carp and bighead carp, are now becoming additional cultured species. Some farmers use supplementary feeds (mainly bran, husks of cotton seeds, wheat) for common carp feeding, but other farmers do not use supplementary feeds. Occasionally, grass carp is fed with freshly cut plants (mainly reeds).

Artificial reproduction methods, using hormonal or pituitary injections, egg incubation, and larvae and fry raising to fingerlings, or so-called summerlings, are in common use. Over-wintering is done in ponds that are generally a little smaller than they were in former times. Large ponds (50–100 ha and larger) are filled with fresh river water every year in the spring, and stocked with yearlings. This requires large financial investments and efforts to ensure forage reserves (to make the water fertile) if it is to be done properly. Stocking densities of yearlings are between 1 500 fish per ha and 2 000 fish per ha (fish weighing 15–25 g at the age of one year) and the fish are cultured until autumn. Forage is added to ponds in the summer, taking into account that in well-managed ponds, 5 kg of forage produce 1 kg of fish.

In autumn, the water with its accumulated fertility is discharged from the ponds and all the fish have to be sold in a few days to one week. Then the ponds remain empty from autumn to spring. In spring the ponds are again filled with fresh "infertile" water. Under the former planned economy, fish farmers aimed to meet their production targets and they did not look into the commercial aspect of production. Currently, the private farmers are seeking ways to reduce production costs and increase productivity of the commonly used two-year production cycle. There is a need for the development and adoption of more cost-effective technologies.

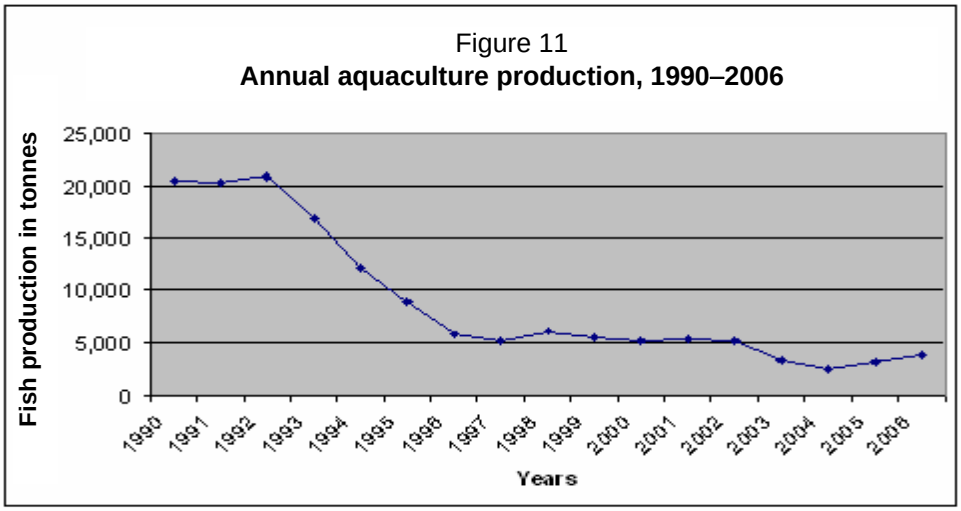
Some large fish farms stock at higher densities (up to 3 000–4 000 fish/ha), resulting in a need to raise the fish during a third year. These farms aim at producing fishes weighing 1.5–3 kg each. The price of their silver carp is higher per kilogramme of product. The practice is profitable because there is no real competition among the farms, and taxes on land and water use are low.

In the period from 1991 to 2006, there has been no attempt to develop or apply new aquaculture production systems, introduce new species or change to semi-intensive or intensive culture of carps.

Fish production

Annual fish production in aquaculture from 1990 to 2006 is shown in Figure 11.

Figure 11
Annual aquaculture production, 1990–2006



Source: The State Committee for Fisheries.

Private entrepreneurial initiatives in fish culture

Private entrepreneurs are starting to show some interest in fish production as a profitable venture. From 2003–2004, when privatization of the sector ended, until 2005, there were no positive developments in fish production. However, recently some new, private fish-farm owners (investors from outside the sector) purchased and installed modern technology. A few of these private ventures have shown good progress in fish production. For example, the company Asia Agro Alliance bought the Damachi Fish Farm in 2005. This company restored the old Soviet technology and financed feeding of the fish and manuring of the ponds. It harvested 400 tonnes in 2005 and 490 tonnes in 2006. Because commercial high-quality fish feeds are not available in the country, Asia Agro Alliance uses farm-made feeds of wheat and bran. It markets its fish at the following weights: silver carp 1 200–1 500 g, common carp 800–1 500 g and grass carp 1 000–1 500 g. In recent years, its productivity was 2.1 tonnes/ha. Net profitability of production is estimated at 30–40 percent.

It is reported that the Namangan Fish Farm, in the Namangan region of the Fergana Valley, has also increased fish production using the methods of the Asia Agro Alliance.

Tashinvest, the new owner of the largest fish farm, Balikchy Fish Farm, has changed from a two-year to a three-year cycle of silver carp production (with small volumes of common carp and grass carp) in order to produce fish weighing 1.5–2 kg, which obtain a higher price in the local market. Of course, this practice is rather inefficient but is possible under conditions wherein competition in the

sector is almost nil, land and water costs as percentage of total production costs are minimal and there is a severe shortage of fish on the market.

The only new, private fish farm oriented towards intensive fish-culture practices is the NT Fish Farm (Tashkent). This private company was set up in 2007 and is fully oriented towards intensive fish-farming activities. In 2007, NT Fish Farm constructed flow-through tanks for intensive rainbow trout farming and started operations in 2008. This intensive fish-farming activity is the result of the German-Uzbek research project "Sustainable Aquaculture in Recirculating Systems – a feasibility study for the catchment area of the Aral Sea" carried out in 2006 and 2007. The research project was funded by the German Federal Foundation for the Environment (DBU).

Paddy-cum-fish farming

Some agricultural farmers are adopting paddy-cum-fish farming practices in Uzbekistan. For example, Mr Adiljan Abdurazzakov, a farmer in the village of Navruz in the Pap district of the Namangan region, harvests about 1 000–1 500 kg/ha/year of fish in addition to the paddy crops and earns an estimated profit of US$500 per ha/year from the fish-farming activity. He undertakes the paddy-cum-fish farming in about 50 ha of paddy fields. This practice ensures him a reasonably good income. Because of its high water requirements, this production system has only limited potential in Uzbekistan and is limited to the paddy producing areas.

Ornamental fish production

Ornamental fish production is not conducted by aquaculture farms in Uzbekistan. Ornamental fish production is generally carried out by so-called "aquarians", who are either private-sector entrepreneurs or hobbyists fond of aquaria and of keeping fish in aquaria.

Ornamental fishes are generally sold through a network of pet shops in the main cities, in two small wholesale markets (Yangiabad market and Farkhad market) in Tashkent and some similar markets in other large cities. Also some hobbyist traders take orders from pet shops and provide the shops with small quantities of ornamental fish species imported mainly from China, Malaysia and other countries of southeast Asia.

Local prices for some ornamental fish species available in a market in Tashkent are given in Annex 3.

Good Aquaculture Practices, Aquaculture Codes of Conduct and Better Management Practices in aquaculture are unknown in Uzbekistan and, therefore, not applied. The FAO Code of Conduct for Responsible Fisheries has, however, the support of the Ministry of Agriculture and Water Resources of Uzbekistan. A Regional workshop on the "1995 FAO Code of Conduct for Responsible Fisheries in the Central Asian region: A Call to Action", was organized by the Uzbek Research Center for the Development of Fisheries of the Ministry of Agriculture and Water Resources of Uzbekistan, in close technical collaboration with FAO and with organizational support from the State Committee for Nature Protection of Uzbekistan and the Institute of Water Problems of the UzAS of Uzbekistan, in Tashkent on 8–10 April 2008[2].

Culture-based fisheries

At present, the private company Akva-Tudakul operating at the Tudakul reservoir is the only positive example of a private-sector restocking activity. This recently established company applies culture-based fisheries practices in Uzbekistan. It obtained the use rights of the Tudakul reservoir in 2003 and started off with a production of 170 tonnes in that same year. The company established a hatchery that produces seeds of common carp, grass carp and silver carp. The hatchery and nursery is well-equipped for reproduction and has earthen nursery ponds with a total area of 120 ha. Fish seeds are raised to fingerling size in these ponds and then the fingerlings are stocked in the reservoir (on

[2] FAO. 2008. *Report of the Regional Workshop on the 1995 FAO Code of Conduct for Responsible Fisheries in the Central Asian region: A Call to Action*. Tashkent, Uzbekistan. 8–10 April 2008, FAO Fisheries Report No. 866. Rome. 92 pp.

average about 45 000–55 000 fingerlings of common carp and silver carp per year). Production levels were about 356 tonnes of fish in 2004, 502 tonnes of fish in 2005 and about 1 000 tonnes of fish in 2006.

In 2006 and 2007, private companies similar to Akva-Tudakul were created at the Talimardjan reservoir (Kashkadarya region) and the Kattakurgan reservoir (Samarkand region). However, these companies do not have their own financial resources to conduct large restocking programmes. They established small hatcheries in 2006 and started restocking the reservoirs with fry of common carp, silver carp and grass carp in 2007. They stocked a total of about 110 000 fry in these reservoirs. It should be noted, however, that these reservoirs are less suitable for culture-based fisheries than the Tudakul reservoir. In the Kattakurgan reservoir, for instance, there is no dead volume of water because of huge sedimentation, which means that all introduced fish should be caught in one growing season.

Major constraints to aquaculture development in Uzbekistan at present are as follows.

- Diversity in fish species culture is limited. Culture practices are based on the culture of silver carp, common carp, grass carp and bighead carp.
- Technology applied to fish culture is based on extensive culture practices; limited examples of intensive culture practices exist in Uzbekistan.
- Access to investment funds and credit lines for fish production is difficult.
- High quality, commercial aquaculture feeds are not available on the markets in Uzbekistan.
- Government support to the sector is insignificant.
- Extension and training facilities in support of aquaculture development and management are non-existent.

FACILITATING INDUSTRIES

Facilitating industries in support of the fisheries sector are not developed in Uzbekistan. All fish producers design and construct their own equipment or try to purchase equipment and materials abroad.

Feeds

The commercial feed producing plant in Chinaz (that was created for aquaculture feed production in the 1980s) is no longer serving the sector, although it is capable of doing so. The main reason feed production for aquaculture ceased was because the demand from farmers reduced dramatically in the 1990s. Fish farmers currently do not establish new contacts with the feed plant because balanced fish feeds are considered too expensive for common carp production compared with the gains to be made from producing this species.

Supplementary feeds (wheat, bran) can easily be purchased locally by fish farmers. Mills produce such feeds and have distributors all over the country.

Veterinary service

There is no network of veterinary stations in the country that can supply the aquaculture sector with services. At the Balikchy Fish Farm and the Khorazm Fish Farm, laboratories for water-quality control and fish health monitoring are in operation. Other farms do not have such laboratories.

There are only two laboratories in Uzbekistan with specialists in fish pathology. These laboratories are located in the Uzbek Research Center for the Development of Fisheries and the Center for Fish Products Certification, both in Tashkent.

The extensive culture systems used during the last decade did not require much veterinary service (because of low densities of fish and limited live-fish movements and introductions), but with the development of the aquaculture sector, the country needs to revive and strengthen its aquatic animal health services.

In general, fish culture managers (technologists) who graduated before 1994 have some basic knowledge about fish health monitoring and fish disease treatment methods. In the event of fish health problems, they often purchase a series of medicines through private trading companies. These companies, however, confirmed that sales of medicines/chemicals for aquaculture purposes are only made occasionally.

Equipment

Capture fishery enterprises give orders for equipment, boats and gear to general trading companies. There is no network of trading companies specialized in supplying fishery equipment and gear in Uzbekistan.

Aquaculture farms are poorly equipped and mainly use equipment of pre-1994 manufacture. There are no specialized enterprises that import, sell and distribute aquaculture equipment in the country.

Freezing/storage facilities

Freezing/storage facilities are constructed at aquaculture farms for use by the farmers. Capture fishery enterprises (brigades) generally buy blocks of ice at refrigeration stations. Refrigeration stations were not established to supply the fisheries sector, but consider sales to the sector as an additional activity. Only in the Navoi region does a capture fishery enterprise have a commercial refrigerator and sell ice also to other companies.

Supply of materials to the sector

Through the Republican Commodity and Raw-Material Exchange, fish farms can buy mineral fertilizers, materials and equipment produced in Uzbekistan (Table 18). Many types of equipment and materials (e.g. boats, outboard motors, nets, chemicals, medicine and preparations) are not being produced in Uzbekistan. They are imported by private firms on the basis of orders placed by the consumer. As the orders pass through several intermediaries and wholesale companies, prices increase two to four times before the equipment reaches the final consumer.

Hatchery services

Only a few hatcheries sell fish seeds to other fish farms: the State Regional Fish Hatchery, the Balikchy Fish Farm (both in the Tashkent region) and the Khorazm Fish Farm (the Khorazm region).

TABLE 18
Prices of main inputs used in aquaculture in Uzbekistan, September 2007

Inputs	Price per tonne in soums (US$ in bracket)
Cattle manure	32 000 (25)
Ammonium nitrate	190 000 (150)
Ammonium phosphate	320 000 (251)
Cottonseed cake	200 000 (158)
Cereals	490 000 (385)
Lime	80 000 (63)
Petrol, diesel oil	710 000 (710)

Source: The State Regional Fish Hatchery.

Importation of equipment

Generally, trade companies search on the international market for the equipment required by fish producers. They do so only after having received an order, using their routine procedures. Fish producers themselves can find equipment manufacturers or distributors in other countries by checking for information on the internet, in journals and at exhibitions. Information on equipment for fish culture and fisheries is not available in the country.

Chapter IV
PROCESSING, MARKETING AND TRADE OF FISH AND FISH PRODUCTS SINCE 2005

FISH PROCESSING AND STORAGE

Processing and storage facilities are generally in poor condition throughout Uzbekistan. The reasons for this are the limited supply of fish, resulting in most fish being distributed in live and fresh forms, and the lack of investment in fish-processing and storage facilities. However, during the last two to five years, some enterprises gradually became interested (again) in fish processing. All fish-processing and fish-trade companies are privately owned. All processing enterprises must obtain national certification for each type of product to be processed. Upon presentation of samples of their products, enterprises can obtain the required quality and safety assurance certification at the State Center for Standardization, Metrology and Certification (UzGosStandard) in Tashkent as well as at regional centres.

The largest fish-processing and fish-trade company is Baliksavdo (translated as Fish Trade) situated in Tashkent. This company was established during privatization and resembled the earlier fish-processing facilities of Uzribsbit. In contrast to other fish-storage and fish-processing companies in existence before independence, this company did not move away from the fisheries sector after independence. Using the international network that it established before independence and using existing technologies, the company imports frozen fish and salts and smokes the fish at its own facilities (which is its main activity). The company also imports canned fish and other canned fish products, has a distribution network in the country and processes domestically produced fish from aquaculture farms. Annually the company processes about 3 500–4 000 tonnes of frozen herring, capelin and mackerel.

A few other fish-processing companies were established recently in the following places:

- in the town of Dustlik in Zhizak province, where Turkish entrepreneurs set up a company for the production of pike-perch for export;
- in Karakalpakstan and in Samarkand province, where private entrepreneurs established small-scale artisanal workshops for the production of canned roach products;
- in Tashkent province at Balykchi JSC (joint-stock company), where frozen silver carp are gutted, scaled and decapitated; and
- in the town of Navoi at Navoibalikichlik-2003, where entrepreneurs produce frozen and smoked roach, which in part is exported.

Statistics on the amount of investment and on the production of the newly established companies are unavailable as yet.

DISTRIBUTION AND MARKETING OF FISH AND FISH PRODUCTS

Fish retail activities can be conducted only in places designated by the local authorities of cities and districts (hokimiyats). The sale of fish is allowed only if a retailer holds documents confirming the legality of the catch or showing the purchase of the products and a certificate confirming the quality and safety of the products on sale.

There are designated areas in the markets for the sale of fish, areas that are generally equipped with basins for selling live fish and have access to tap water. The markets also have refrigerators or are equipped with power outlets for refrigerators and freezers. Each retailer has her or his own table. The fish retail sections have special containers for waste, which is frequently removed. Generally, there are also open sewage systems with grid covers, which are used to drain waste water.

In every green market of Tashkent, there are from three to five retail shops that sell imported, high-value fish and fish products from the Russian Federation and other former USSR countries. The products for sale include frozen, canned, salted and dried fish in various forms and caviar packed in

convenient and attractive packages. These products are generally expensive and vary in price from som25 000 to som40 000 per kg (US$19.60–32.00).

In the town of Chinaz, Tashkent province, there is a wholesale fish market. Fish are transported on a daily base from this market to Tashkent, which is about 70 km away, and transported to this wholesale market from the Aydar-Arnasay lake system and the Chardara reservoir situated in Kazakhstan. In the market, freezers are available, as well as an ice making machine. It is very difficult to estimate the volume of fish sold in this wholesale market. Almost all fish sold there is illegally caught and goes unregistered. According to various unofficial sources, on average 3–5 tonnes of fresh fish are sold there daily. The maximum recorded volume of sales is 20 tonnes in one day. The market facilities include water and electricity and there are special areas for selling fish. However, it should be noted that the hygienic conditions under which the current sale of fish takes place are extremely poor. Ice is rarely used, and transporters generally do not have refrigeration equipment installed on their trucks and in their cars.

Capture fishery enterprises primarily sell their fish right on the shores of lakes and reservoirs and ask prices that are generally 50 percent of the wholesale prices. Fish brigades catch about 200–300 kg of fish per day. Most of the small-scale, intermediary companies use passenger cars for transporting fish. Larger intermediary companies (e.g. Navoibalikchilik-2003 in the town of Navoi) have trucks with cold storage/refrigeration capacity. All the caught fish is transported in freezers or refrigerators to cold storage, where part of the fish is processed and part of the fish is sold whole in fresh and frozen forms (Table 19).

Pond fish farms are often situated near cities and towns. Farmers harvest and sell their fish production in the autumn. Part of the harvested fish is sold at the farm gate to wholesalers and retailers in small lots (up to 200 kg), for which contracts generally have been concluded beforehand during the growing season. Another part of the fish is sold by the pond farmers in nearby markets and to nearby retail shops.

All fish wholesalers and retailers are licensed to market fish. The marketing of fish is highly seasonal; therefore, only a few companies are specialized in this activity. Baliksavdo is the only company that imports canned fish for institutional consumers (the Home Ministry, the Ministry of Defense and the National Security Service). It has specialty shops in the markets as well. In addition, in its workshop imported fish is processes into salted fish (mainly herring), which is considered a local delicacy.

Sixty percent of the fish is sold in markets, more than 15 percent is sold in shops and supermarkets and about 25 percent (mainly frozen and processed) is sold from warehouses to special consumers and wholesale buyers.

More than 90 percent of the live and frozen fish products available in the markets is domestic. About 8–9 percent of the fish products is (often illegally) imported from Kazakhstan *vis-à-vis* the Chinaz wholesale market, and about 1 percent is imported from Turkmenistan to the southern regions (Surkhandarya and Kashkadarya). Of the smoked fish available in the markets in Tashkent, some 90 percent originates from domestic sources and about 10 percent is imported.

Information on aspects of fish marketing (market structure, operations and performance) is scarce. Fish producers, wholesalers and retailers have limited knowledge about market volumes and price fluctuations during the year. The marketing strategies followed by the wholesalers and retailers are based on observations. Aquaculturists and fishers transport their fish to the Chinaz wholesale market. It is reported that an average of about 3–5 tonnes (maximum 20 tonnes on some days) of fresh fish arrive daily and are bought by about 30–50 intermediaries (buyers), who supply retailers in Tashkent. Retailers also purchase directly from fishers at the wholesale market. The intermediaries active in fish marketing earn a 10–20 percent margin.

The Chinaz market supplies fish to about ten green markets in Tashkent. In these green markets, adequate water supplies are provided for washing and cleaning the fish. In the market in Alay, one of the green markets, about 25 to 30 women are involved in selling fish. It was estimated that about 1 000–1 500 kg of fish are sold in the Alay market on a daily basis. Fish display tables are rented to every retailer/seller at a cost of som3 600 (US$2.80) per day. The turnover in retail sales ranges

TABLE 19
Seasonal consumer market prices for fish in Uzbekistan in 2007

Fish species	Average price of 1 kg of fish in US$			
	January-April	May-August	Septembe-December	Month of Eid
Common carp (*up to 1 kg)*	0.47–0.63	0.47–0.63	0.80	1.50
Common carp (*1–3 kg)*	2	2	1.80–2	5
Bream (*up to 0.3 kg)*	0.30	0.20	0.35	0.40
Bream (*more than 0.3 kg)*	0.50	0.50	0.60–0.70	0.90
Catfish (up to *1 kg)*	1.80	0.80–1	1–1.60	2–3.50
Catfish (*1–3 kg)*	4	3.70	2.40–2.80	4–5
Catfish (*3 kg and more)*	4–4.20	4	4	7
Common carp (*3 kg and more)*	4	2–3	3.50–4	7–8
Grass carp (*up to 1.3 kg)*	1.10	0.80–1	1–1.20	2
Grass carp (*1.5–3 kg)*	1.60	1–1.20	1.60–1.70	3
Grass carp (*3 kg and more)*	2–2.20	1.50–1.70	2.40–3	6
Pike-perch (*up to 1 kg)*	1.40	1.60	1.60–2	3–4
Pike-perch (*1–3 kg)*	2.80	1.80	2–2.50	4–5
Pike-perch (*3 kg and more)*	3	2	2.50–3	5–6
Roach (*up to 0.3 kg)*	0.30	0.20	0.30	0.40
Roach (*more than 0.3 kg)*	0.50	0.50	0.60	0.90
Silver carp and bighead carp (*up to 1.2 kg)*	0.60	0.60	1.20	2–2.50
Silver carp and bighead carp (*1.5–3 kg)*	0.80–1	0.80	1.10	3
Silver carp and bighead carp (*3 kg and more)*	1.10	1.10	2–2.30	4–5

Source: Authors.

between som500 000 and som800 000 (US$394–630). Profits vary between US$7 and US$20 per day. The prices of fresh fish during Ramadan in 2007 are shown in Table 20.

Taking into account also the unregistered volume of fish that passes through the Chinaz market, the volume of fish going through the market in 2007 is estimated as follows:

- about 11 000 tonnes of live fish worth approximately US$9.6 million;
- 885.2 tonnes of frozen fish (including gutted fish without head and tail) worth US$878 600;
- 32 tonnes of refrigerated fish worth US$22 800;
- 12 tonnes of smoked fish worth US$9 750; and
- 34.4 tonnes of filleted fish worth US$55 500.

TABLE 20
Prices of fresh fish during Ramadan in Uzbekistan in 2007

Fish species	Price per kg in soums (US$ in brackets) (1US$ = som1 270)
Carp from pond fish farm	1 500 (1.25)
Catfish	8 900 (7)
Grass carp	6 000 (4.7)
Pike-perch	7 600 (6)
Silver carp	6 400 (5)
Snakehead	4 500 (3.5)

Source: Authors.

Fish and other aquatic products in transit officially must be accompanied by a copy of the declaration of origin and a veterinary certificate.

In Uzbekistan, only fish is cultivated and caught. Molluscs and crustaceans are not cultivated and, therefore, are not widely available in the markets. The main fish species sold in the markets are common carp, silver carp, grass carp, pike-perch, roach, barbell, wels (catfish), snakehead, asp and pike.

IMPORTATION AND EXPORTATION OF FISH AND FISH PRODUCTS

Imports

Fresh fish are mainly produced for the domestic market. Limited volumes of fish and fish products are imported; mainly from Turkey and the Russian Federation. Frozen fish are imported from Norway, the Russian Federation, the United Arab Emirates, Turkey and the United Kingdom. Fish are also imported in dried, smoked and salted forms from Korea, Norway, the Russian Federation, Latvia, Turkmenistan and occasionally some other countries. Canned fish are mainly imported from Belgium, Canada, Germany, Italy, Latvia, the United States, Turkey, the Russian Federation, New Zealand and the United Arab Emirates.

According to data of the State Committee on Statistics of Uzbekistan, imports of fish products in 2006 were the following:

- frozen fish (including gutted fish without head and tail) – 991.2 valued at US$ 625.60 (51.5 percent from Lithuania; 30 percent from the Russian Federation; the remainder from Latvia and from Turkey);
- fresh (refrigerated) fish – 1.7 tonnes valued at US$1 700 (94 percent from Latvia; 5.6 percent from the Russian Federation and 0.4 percent each from Norway and Turkey); and
- fish flour – 79.5 tonnes valued at US$79 900 (99.5 percent from the Russian Federation; 0.5 percent from Norway).

Canned fish is not produced nowadays in Uzbekistan. For this reason all canned fish sold and consumed in the country is imported. The major suppliers of canned fish are the Baltic States. The value of canned fish and fishery product imports reached US$1.35 million in 2006.

Exports

A very small volume of fresh fish is exported, mainly to the Russian Federation, Turkey and Afghanistan (Table 21). In 2006, Uzbekistan exported the following fish products:

- frozen fish (gutted fish without head and tail) – 744.2 tonnes valued at US$712 100 (65 percent to the Russian Federation; 35 percent to Turkey);
- fresh (refrigerated) fish – 30 tonnes valued at US$21 400 (100 percent to Afghanistan);
- smoked fish – 9.6 tonnes valued at US$7 800 (100 percent to the Russian Federation); and
- filleted fish – 34.4 tonnes worth US$55 500 (100 percent to the Russian Federation).

There are legislative acts concerning marketing standards for various products, including fish and fish products, and in particular marketing standards concerning content, main characteristics and name of foodstuffs, as well as labelling, packaging and promotion requirements.

TABLE 21
Annual export of fish and fish products, 2004–2006

Type of fish product	2004		2005		2006	
	Tonnes	US$	Tonnes	US$	Tonnes	US$
Fresh fish	–	–	5.0	4 300	30.0	21 400
Frozen fish	29.8	11 000	624.4	282 600	744.0	712 100
Fish fillets	–	–	–	–	34.4	55 500
Dried, salted and smoked fish and flour	17.5	11 600	8.6	8 300	9.6	7 800
Canned fish	–	–	0.1	300	–	–

Source: State Committee on Statistics.

FISH DEMAND AND CONSUMPTION

Fish consumption levels in Uzbekistan are amongst the lowest in the world. The nominal per capita consumption of fish is less than 0.5 kg/year, while health and nutrition institutions recommend a per capita consumption of 10–12 kg/year. In former Soviet times, the fish per capita consumption was about 5–6 kg/year. The main reasons for the low consumption are the limited imports due to import restrictions (high import duties) and low levels of domestic fish production. In terms of market prices, fish is considerably cheaper than beef and usually two to three times cheaper than poultry. In particular, the prices paid by consumers for silver carp and common carp are relatively low compared with other animal protein sources. Large fish (1.5–3 kg and more), generally originating from natural waterbodies, is considered a high- quality product by Uzbek consumers and is only slightly cheaper than beef and poultry.

A substantial gap exists between supply and demand of fish and fish products in the Uzbek market. The current supply is far from sufficient to cover demand for fish and fish products. Future domestic demand will largely depend on the socio-economic development of the country, but also depend on whether the sector can supply the quality and safe fish products that consumers desire. General economic development, the expansion of the tourist industry and some other factors will certainly stimulate fish demand. Considering the present population of 26 million people, the country would need 260 000 tonnes of fish in order to provide 10 kg of fish per capita, whereas fish production in 2006 was reported to be not more than 7 200 tonnes. The government has the task of providing an enabling environment for the enhancement of fish production to meet the dietary animal protein requirements of the population through the optimization of fish yields from present farms and through the development of technologies and the diversification of types and objects of aquaculture.

The domestic consumers mainly purchase freshwater inland fish species, i.e. catfish, common carp, snakehead, pike-perch, asp, wels and barbell. Larger-sized fish (greater than 1.5 kg) are generally more popular. Large silver carp, bighead carp and grass carp are popular among consumers. Other fish species such as sturgeon and trout also easily attract consumers. It is expected that, as in the past, marine fish species will be popular among consumers in Uzbekistan if they become available in the market.

Today, the amount of fish consumed by urban and rural populations differs. Given that fish are mainly distributed to and sold in urban centres, fish are more available to urban consumers than rural consumers. If more fish were available in local, rural markets in the countryside, fish would play an important part in the diet of the rural population.

Traditionally, molluscs and aquatic plants are not part of the diet in Uzbekistan. Fish production is largely focused on the domestic market. Due to the limited quantities of fish available in recent years, fish for the most part is currently sold fresh, with small amounts of fish sold as smoked or salted fish.

Chapter V
GOVERNANCE AND INSTITUTIONAL FRAMEWORKS

FISHERIES ADMINISTRATION

As per Enactment No. 350 of the Cabinet of Ministers of Uzbekistan approved August 2003, the management of the fisheries sector is entrusted to the Ministry of Agriculture and Water Resources (Figure 12). To that end, the Main Administration for the Development of Animal Husbandry, Poultry Farming and Fisheries was established. Of the 12 officers who work in the main administration, five officers work within the Department for the Development of Poultry Farming and Fisheries and two of these five officers are responsible for fisheries development, both having an educational background in aquaculture.

Departments for the development of animal husbandry, poultry farming and fisheries have also been established in the regional departments for agriculture and water resources, which were entrusted with the promotion of fisheries development.

Commissions under the Council of Ministers of Karakalpakstan and regional authorities were created for allocating waterbodies to a variety of users, based on lease or rental agreements.

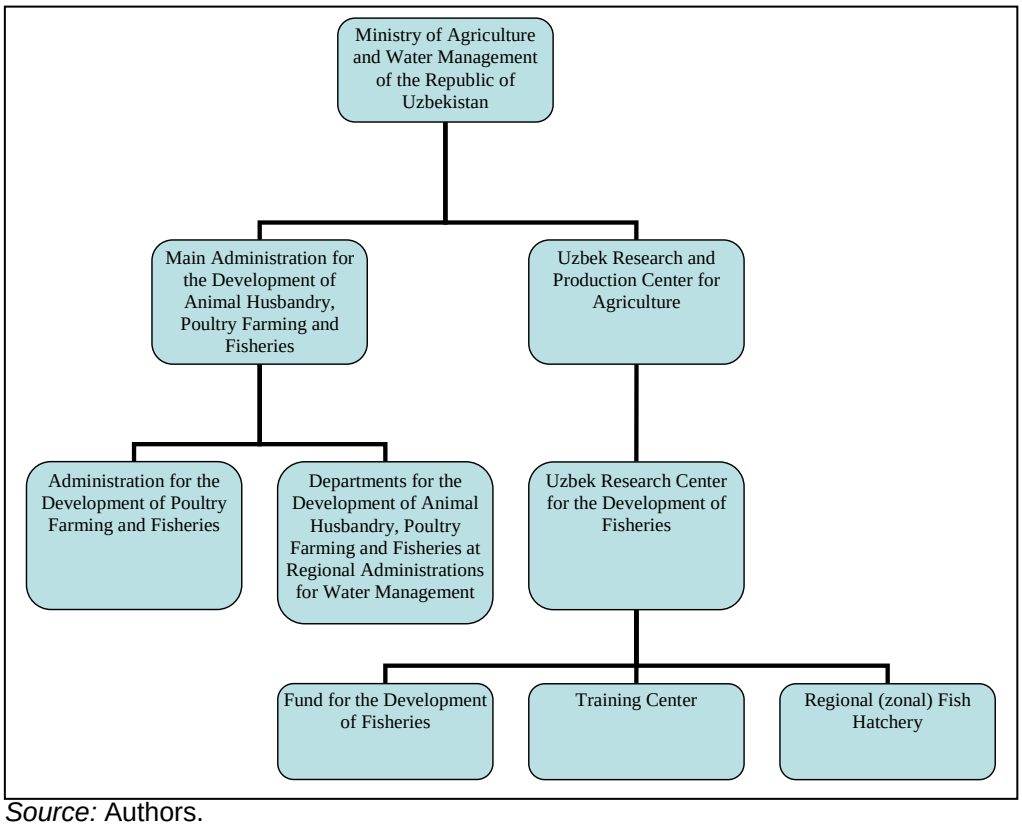
Non-governmental associations of fishers and of fish breeders were set up (2006) in Karakalpakstan and the provinces of Bukhara (2007) and Samarkand (2008). The main task of these associations is to protect the interests of fish farmers at the regional level.

The objectives of the Ministry of Agriculture and Water Resources are the following:

- carry out the unified policy on agrotechnology aimed at the modernization of rural industries;
- improve and introduce modern agrotechnologies for rural industries;
- coordinate activities of branches and structures servicing agricultural producers on the basis of market principles and mechanisms;
- coordinate work on the intensification of economic reforms in the rural sector, large-scale improvement of rental agreements and improvement in contract farming;
- develop recommendations for the improvement of the system of agriculture and distribution of agricultural crops;
- carry out the state policy on seed selection and seed growing, livestock breeding, veterinary services, and plant quarantine and carry out the provision to secure sustainable livestock production, poultry farming and fishery;
- manage the surface water resources according to the basin principle of management of irrigation systems and introduce market principles of water management at all levels;
- implement measures aimed at the improvement/reclamation of old irrigated lands and at the development of new lands;
- participate in the development of investment policies for agriculture, water and forest farms;
- ensure strict observance of laws on the use of land and water resources;
- implement state policy in the sphere of use, protection and development of forestry;
- provide scientific and technical information to organizations and enterprises reliant upon the ministry; and
- improve education, training and skills of managers and specialists in the fields of agriculture, and water and forest farm management.

Until 2003, Uzbalyk functioned as the agency responsible for fisheries development and sectoral management. Currently, there is no such specialized agency in Uzbekistan.

FIGURE 12
The structure of fisheries-sector management



Source: Authors.

FISHERY TRAINING, RESEARCH AND EXTENSION

Research

Research on fish breeding development is conducted under the umbrella of the Coordination Committee for Science and Technologies Development of the Cabinet of Ministers of Uzbekistan. The one research institute specialized in the field of aquaculture and fisheries is the Uzbek Research Center for the Development of Fisheries at the Uzbek Research-Production Center for Agriculture. There are four other research institutes with divisions/departments conducting research in the fields of ichthyology, hydrobiology, fishery and aquaculture. They are the Institute of Water Problems of the UzAS (the Laboratory of Hydroecology), the Institute of Zoology of UzAS (the Laboratory of Ichthyology and Hydrobiology), the Institute of Bioecology of the Karakalpak Branch of UzAS (located in Nukus) and the National University of Uzbekistan (the Department of Ecology). Three of these research institutes are discussed briefly below.

The Uzbek Research Center for the Development of Fisheries

The Uzbek Research Center for the Development of Fisheries was established on 13 August 2003 (by Enactment No. 350) and functions under the Ministry of Agriculture. It is headed by a director, who is assisted by deputy directors (Figure 13). Of the 17 scientists working in the laboratory, 7 scientists have a doctoral degree and 10 researchers have a master's degree. The research conducted by the laboratory is field tested at the fish-seed production farm called the Regional (zonal) Fish Hatchery in the city of Yangiyul.

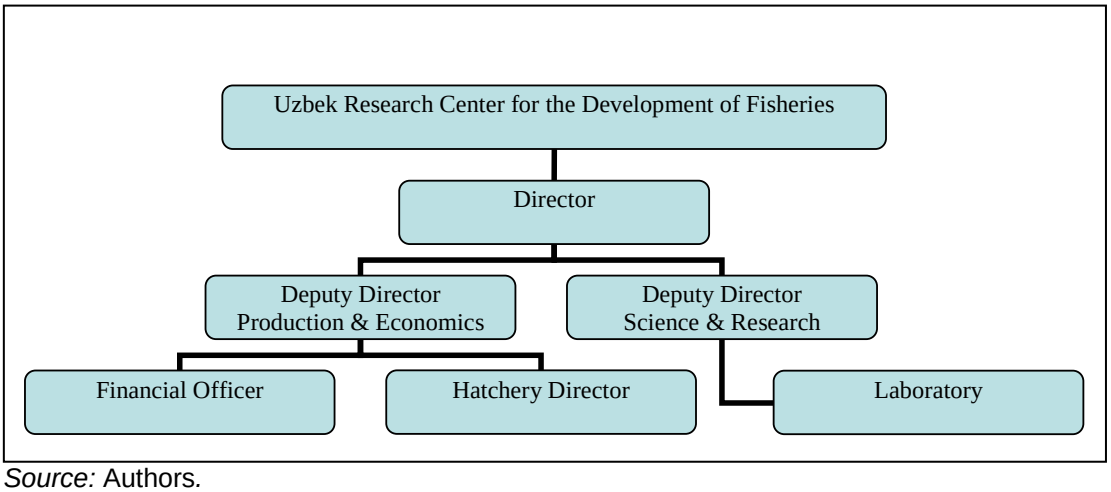
The Regional (zonal) Fish Hatchery at Yangiyul was established in 1975. The director reports that the nursery has 370 ha of land, of which 248 ha are water areas, including 84 ponds (72 nursery ponds and 12 broodstock ponds). The production potential is 15 million yearlings whereas present production is about 2 million yearlings and 50 million larvae. Breeding and rearing is undertaken mainly for three species, i.e. common carp, silver carp and grass carp. The yearlings, ranging in size from 6 cm to 12 cm and in weight from 20 g to 70 g, are sold for som3 000 (US$2.30) per kg for

silver carp and som3 500 (US$2.75) per kg for common carp and grass carp. Larvae are sold for som41 500 (US$32.60) per bag containing 100 000 larvae, which includes som40 000 for the 100 000 larvae and som1 500 for the bag and oxygen. The nursery also conducts research on fish pathogens/fish health, the impact of an increase in density of grass carp and water plant eradication and utilization.

The main objectives of the center (for staffing see Figure 13) are:

- formulate scientific and methodological recommendations on the fish industry and its forage reserve development;
- carry out research on fish breeding and capture fisheries, namely develop activities regarding fish disease treatment and preventive measures, and develop actions to improve the brood fish quality and acclimatization of new species;
- provide fisheries and fish breeding farms with high-quality selective materials; and
- organize training and raise the qualification and skills of fish industry personnel.

FIGURE 13
The structure of the Uzbek Research Center for the Development of Fisheries



Source: Authors.

The Institute of Water Problems

The Institute of Water Problems functions under the UzAS in Tashkent. It was established in 1991. The division that looks after the fisheries sector is known as the Laboratory of Hydroecology. It is managed by a director and has a staff of five scientists, i.e. an ichthyologist, a hydrobiologist, a hydrochemist, a fish feed specialist and a technician. Two staff members have doctoral degrees and three staff members have master's degrees.

The institute owns 93 ha of experimental farm and a small laboratory for hydrochemical and hydrobiological analysis. The research staff explores GIS technologies, irrigation and processing of statistical information and accounts, and is conducted with the assistance of the Ministry of Agriculture and Water Resources. The institute makes recommendations to the Committee on the Protection of Nature and to the Ministry of Health. Services developed by the institute are also made available to the committee and the ministry.

Research of note includes the following:

- study of the laws on particular features of arid hydrology and hydrogeology, including problems regarding the mode of formation of water resources and their size and quality under various economic conditions, and also the search for non-traditional sources of water;
- study on problems of management and rationalization of the utilization and protection of water objects;
- development of a methodology to forecast water supply in the country and its various regions in support of long-term planning of water resources in the general context of ecological and national safety;

- development of the ecosystem approach to hydroecological research: studies and estimates of the pollution level of various aquatic and terrestrial ecosystems in Uzbekistan, studies on biodiversity, primary productivity and intensive fishery/fish-farming technologies, and the effect of environmental conditions on the health of the aquatic populations;
- development of industrial sewage, water purification technologies;
- investigation of non-conventional water and land resource utilization in desert areas and arid zones; and
- development of a database on hydroecology of large fishery waterbodies of Uzbekistan.

The Institute of Zoology
The Institute of Zoology is part of the UzAS in Tashkent. Fishery sector research is conducted by the institute's Laboratory of Ichthyology. The laboratory has five scientists, including the head of the laboratory, two senior research scientists and two research scientists. Two scientists possess doctoral degrees in zoology. Major research includes:

- fundamental research on the state of ichthyological aspects;
- fish stock assessment in the Aydar-Arnasay lake system;
- Tudakul reservoir stock assessment;
- study of fauna, ecology and fisheries of rivers;
- conservation of rare and threatened (aquatic animal) species;
- monitoring of aquatic ecosystems and their bioresources; and
- taxonomy of aquatic animals.

Training and extension support
There are no specialized educational or capacity-building institutions that prepare specialists for the capture fisheries and aquaculture sectors. This means that neither researchers nor lecturers and technologists with specializations in capture fisheries and/or aquaculture are entering the sectors. Currently, the persons who work in the sectors as specialists were trained in subjects related to fisheries at the National University (biologists), at the former Tashkent State Agrarian University (agricultural experts) and at the Technical University (engineers, food industry experts).

Vocational training and other practical training opportunities for fish farmers do not exist in the country. However, the Uzbek Research Center for the Development of Fisheries has recently taken the initiative to build a training centre for fish farmers at the Regional (zonal) Fish Hatchery at Yangiyul, which became operational in 2008. There is no extension support for capture fisheries development in the country. Support for sustainable fisheries development needs to be developed.

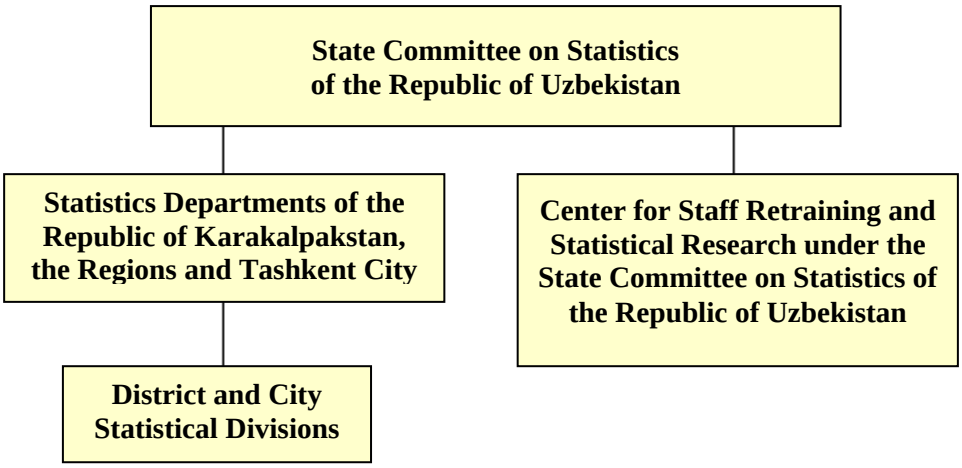
In the past, specialists trained for aquaculture and fishery professions in the higher educational system studied at the Department of Hydrobiology and Ichthyology in the Faculty of Biology at the former Tashkent State Agrarian University (now called the National University). Each year 8 to 20 students graduated in fishery and/or aquaculture subjects. In 2003, the department was transformed into the Department of Ecology, which does not list fishery and aquaculture among its priority subjects.

FISHERY STATISTICS

Until 2003, Uzbalik (Fisheries Corporation) had been collecting, analysing and disseminating statistics on the fisheries industry. Since 2003, the collection and analysis of statistics are being performed by the State Committee on Statistics of Uzbekistan headed by a chairperson with the rank of minister, who is supported by deputy chairpersons and the Department of Cattle Breeding and Fisheries (Figure 14).

The State Committee on Statistics has regional, municipal and district branches. In the administration of the State Committee on Statistics, there is a department of statistics on agriculture and ecology, while in regional and district administrations, there are departments of statistics on agriculture and ecology.

FIGURE 14
The structure of the State Committee on Statistics of Uzbekistan



Source: Authors.

The law "On State Statistics" in Uzbekistan was adopted on 12 December 2002. According to this law, capture fish farmers and aquaculture farmers must submit reports to the state statistics administration where they are registered. Entrepreneurs who rent or lease ponds and/or reservoirs from the government are obligated to provide annual fish production information to their district administration. This information is collected and analysed by the State Committee on Statistics.

The level of experience in the actual collection, analysis and use of data is low at local district levels. Therefore, Inland capture fishery and aquaculture production figures are still considered questionable. It is known among all those involved that the official data significantly underestimate actual production. The problem is that although pond farmers pay the single land tax that is levied on agricultural producers (8 percent tax on all products, including fish produced for sale in Uzbekistan), they are not obliged to declare the height and composition of these products. Only the biggest fish farms, such as Balikchy, Khorazm, Todakol, the Regional Fish Hatchery and Zhizak, provide statistics on fish production. Therefore, an appropriate statistical system in support of decision-making by fisheries-sector management is required urgently.

FISHERIES- AND AQUACULTURE-RELATED UNIONS, COOPERATIVES, ASSOCIATIONS AND OTHER FISHERIES-LINKED INSTITUTIONS

In Uzbekistan, there are no unions, cooperatives or associations of aquaculture and fishery stakeholders active at the national level.

Non-governmental associations of fish breeders/fishers have, however, been created in Karakalpakstan (2006), in Bukhara province (2007) and recently (2008) in Samarkand province.

The association of fishers in Karakalpakstan unites more than 50 fish farms and capture fishery enterprises. The association of fishers in Bukhara province unites 16 fish-capture farms and 1 pond farm.

The Association of Fishery Enterprises

The fish farmers in Karakalpakstan have taken the initiative and founded the Association of Fishery Enterprises, with current membership numbering 50 members. The association registered in November 2006 as a non-governmental organization (NGO). The major objectives of the association are to:

- to protect the rights of registered members in relations with the government;
- to provide business support to members;
- to provide market support in the selling of fish; and
- to present issues of the fish farmers to the government in the quest for advice and solutions.

The management committee of the association is elected democratically. A chairperson and six members are elected to the management committee. Members contribute som10 000 per month (per farm) to the association and the government also promised to provide funds to the association. This will facilitate the association in providing fishing inputs and equipment to members on credit and at cheaper rates than if inputs were purchased individually.

The Business Women's Association

The Business Women's Association is active in the country and provides assistance to women entrepreneurs. The association undertakes capacity-building activities and consultancies, provides assistance in obtaining credit, and is active in lobbying and advocacy and in attracting funds and programmes for the country in support of poverty reduction objectives. A few fishery entrepreneurs have received supported from the association but details regarding the type of support received were not available. The association is willing to be involved in supporting women in the creation and management of businesses in the fisheries sector.

INTERNATIONAL COOPERATION IN FISHERIES DEVELOPMENT AND MANAGEMENT

As already mentioned, the fisheries sector in Uzbekistan is not considered a priority sector for the development of the national economy. This is reflected first by the limited interest of the government and second by a general lack of international assistance to the sector.

The few examples of international cooperation that occurred in recent years are mentioned below.

The Uzbek-American joint venture for the development of the Akva-Tudukal reservoir

The Uzbek-American joint venture for the development of the Akva-Tudukal reservoir in the Navoi region showed that the adoption of appropriate technologies can enhance fish production many fold. The initial production of 170 tonnes in 2003 increased to 356 tonnes in 2004, 502 tonnes in 2005 and 1 000 tonnes in 2006.

German-Uzbek research projects

Since the early 1990s, a number of important ecological research projects were undertaken that were devoted mainly to the Aral Sea problems. Some of these projects included fishery issues and were carried out in close cooperation with leading German scientists in fisheries and ecology from the Universities of Hamburg, Osnabruck and Bonn.

The Alexander von Humboldt Foundation, the European Union (EU), and International Association for the Promotion of Cooperation with Scientists from the New Independent States of the Former Soviet Union (INTAS)

A project funded by the EU and INTAS and entitled "Restoration and management options for aquatic and tugai ecosystems in the northern Amudarya delta region" (Aral Sea 00-1039) was carried out during the period from 2001 to 2003. Because the funding by INTAS was insufficient, the Institute Partnerships Grant of the Alexander von Humboldt Foundation (Germany) funded a follow-up joint research project entitled "Contributions to the decision-support system for sustainable development in the Amudarya delta region, Uzbekistan", which was implemented during the period from 2003 to 2005.

The main objective of both projects was to develop a model and database for a GIS-based, integrated modeling system to support the planning of ecologically-sound water management strategies in the northern Amudarya delta region under varying water supply alternatives. Concerning fishery issues, the Alexander von Humboldt Foundation project concluded that the ecotoxicological situation in the region has improved considerably and that development of commercial fisheries and fish farming based on the natural production and transport of larvae to the delta area is feasible. It made the following recommendations.

- The water in lakes and reservoirs and the flow in rivers and canals should be kept at levels that support fish reproduction. Water allocation should take the needs of fisheries into account.

- The restoration of the Muynak fish-breeding plant in Muynak district could serve to restock the lakes and to support conservation of rare fish species.
- The development of small-scale aquaculture (in ponds) to produce fish as a source of food for the local human population is a feasible alternative to compensate for the loss of the Aral Sea fisheries.

The German Federal Foundation for the Environment (Deutsche Bundesstiftung Umwelt (DBU)) and the University of Osnabruck

In 2006–2007, the DBU awarded a research grant for a project entitled "Sustainable Aquaculture in Recirculation Systems – Feasibility Study for the Catchment Area of the Aral Sea", and under the project framework, new, sustainable aquaculture concepts were developed for Uzbekistan (Wecker, *et al.*, 2007).

The study was carried out by the Institute of Environmental Systems Research at the University of Osnabruck. The project was a collaborative effort among various fishery research institutes and enterprises in Germany and Uzbekistan. A multidisciplinary approach was chosen to consider the biological, ecological, technological and economical criteria for aquaculture development.

The use of various production systems, including "flow through systems", "recirculation systems", optimization of pond culture and fisheries enhancement, was analysed and evaluated in light of the situation in the sector. A scoring model was chosen to determine the most valuable or promising concept on the basis of a variety of economic, social and other criteria. The scoring model showed that the most promising concepts today are the following:

- an integrated pond culture system (combination of intensive monoculture of species such as catfish in small, divided parts of ponds and extensive polyculture of cyprinids in large parts of ponds; these two culture systems would benefit from each other when combined into one system);
- a flow through system with intensive trout culture; and
- fisheries enhancement with special attention to restocking (this concept includes the use of a moveable hatchery in containers called "hatchcons").

On the basis of the results of the study, one new trout fish farm named the NT Fish Farm was created in the Tashkent region in 2007. In 2007, concrete tanks and other facilities were constructed, and the NT Fish Farm began the first production cycle in 2008.

The World Bank Rural Enterprise Support project

The Rural Enterprise Support project, with the assistance of the World Bank**,** was implemented between 2002 and December 2007. The major objectives of the project were:

- to increase productivity and profitability in the agriculture sector;
- to support private-sector initiatives; and
- to ensure sustainability of the agriculture sector through the rehabilitation of an irrigation drainage system.

The project provided loans through commercial banks for agricultural activities, including livestock and fisheries. Loans ranged from US$10 000 to US$100 000 to each farmer and from US$100 000 to US$200 000 to agroservices. Rural business advisor services were provided for research, marketing and capacity building. Loan interest rates were 7–8 percent per annum. Though loans were available to the fisheries sector, fishery- and aquaculture-sector stakeholders showed no interest in obtaining loans. The World Bank agreed in principle to cover fishery investment under a second phase of the project, which was approved and awaits implementation start up.

The Food and Agriculture Organization of the United Nations project TCP/UZB/3103 (D)

FAO, at the request of the Ministry of Agriculture and Water Resources of Uzbekistan, provided technical and policy advice to the fisheries and aquaculture sectors of Uzbekistan in 2007 and 2008. Under the FAO Technical Cooperation Programme (TCP) facility project "Development of strategic partnerships in support of responsible fisheries and aquaculture development in Uzbekistan",

TCP/UZB/3103 (D), a number of capacity-building and training activities were carried out at the national level. The project had the following objectives:

- to increase knowledge and understanding among national policy-makers and potential donors on the status of fisheries and aquaculture in the country and on the current and potential contribution of the sectors to the achievement of food security and the alleviation of poverty;
- to identify effective livelihood-supporting policy interventions in the inland fisheries and aquaculture sectors through the formulation of a fisheries-sector development strategy and implementation programme;
- to develop strategic partnerships with national and international agencies and donors in support of the rehabilitation and responsible development and management of the sectors; and
- to increase the technical and managerial capacity of fishers and aquaculturists in Uzbekistan through training and dissemination of information on sustainable fishery technologies and better management practices.

The project organized, therefore, a number of national-level workshops and produced this "Review of the Current Status of Inland Capture Fisheries and Aquaculture in Uzbekistan", and the final draft of the document entitled "Conception of Aquaculture and Capture Fisheries Development of the Republic of Uzbekistan, 2008–2016" contained in Part II of this FAO circular. The Conception of Aquaculture and Capture Fisheries Development outlining the development policy and strategy of Uzbekistan was endorsed by the "Conference on Fisheries in Uzbekistan: problems and the ways to their solution", organized by the Uzbek Parliament on 29 September 2008. The conference recommended to the MAWR and other relevant agencies to accelerate the process of official approval of the document and to implement the development measures.

Chapter VI
POLICY, REGULATORY AND MANAGEMENT FRAMEWORKS

FISHERIES AND AQUACULTURE POLICIES AND PLANNING

There is currently no official policy for fisheries development and management in Uzbekistan. One reason for the lack of a policy and legal framework for the fisheries sector is that privatization of the sector was completed as recently as 2003. As yet the private sector has not received government agreement on the roles of the public and private sectors in a joint effort towards sustainable development of the fisheries sector. In 2007, as mentioned above (refer to the section on international cooperation and the FAO project), the document entitled "Conception of Aquaculture and Capture Fisheries Development of the Republic of Uzbekistan, 2008–2016" was prepared in a participatory manner, involving all relevant sectoral stakeholders and also key representatives from other sectors in the process. This document awaits official approval.

To realize the programme to intensify economic reforms and to realize an increase in the rate of production of fish and fish products to meet the demand, the Cabinet of Ministers adopted Enactment No. 344 "On the measures to increase the production of fish and fish products in Uzbekistan for the years 1999–2001 and for the period until 2005" on 14 July 1999. The enactment was prepared by the state joint-stock corporation Uzryba. The enactment roughly delineated the targets for the development of the fisheries sector, e.g. the construction of three mini fish canneries. No state financial support for the measures outlined in the enactment was envisaged.

The main goal of the economic reform programme drafted in support of the implementation of the enactment was to restore aquaculture and fishery enterprise facilities to a pre-1994 level (before privatization). However, the programme was decided upon by a limited number of authorities (mainly the Ministry of Agriculture and Water Resources) and is not known among local authorities and sectoral stakeholders. The approved text of the programme, which is not in conformity with the realities of a modern, free market economy, was not easily available.

FAO Code of Conduct for Responsible Fisheries

In Uzbekistan, the FAO Code of Conduct for Responsible Fisheries is not actively being applied. The FAO Code of Conduct for Responsible Fisheries has, however, the support of the Ministry of Agriculture and Water Resources of Uzbekistan. A Regional Workshop on the "1995 FAO Code of Conduct for Responsible Fisheries in the Central Asian region: A Call to Action" was held in Tashkent on 8–10 April 2008[3].

Uzbekistan has ratified 9 international conventions on the environment and respective protocols for their implementation and signed 12 international agreements on cooperation in the field of environmental conservation. A list of the most important agreements relevant to the fisheries sector are mentioned below (refer www.nature.uz for detailed information).

The United Nations Convention to Combat Desertification

The Government of Uzbekistan signed this convention in 1995. The State Committee on Hydrology and Meteorology (Uzgidromet) was appointed the national agency responsible for its implementation. The *main obligations* of the government, according to this convention, relate to the use of an integrated approach to increase the productivity of land resources and to the restoration, protection and sustainable management of land and water resources for the improvement of the living standard.

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[3] FAO. 2008. *Report of the Regional Workshop on the 1995 FAO Code of Conduct for Responsible Fisheries in the Central Asian region: A Call to Action. Tashkent, Uzbekistan, 8–10 April 2008*. FAO Fisheries Report. No. 866. Rome. 92 pp. [Bilingual English/Russian)

To meet its obligations, the government decided to undertake a number of steps, including the following: to study the opportunities for financing soil protection, especially the control of erosion and salinization; to create an infrastructure for the improvement of the management of water resources in agriculture; and to develop the scientific basis of organic farming.

The United Nations Framework Convention on Climate Change

This convention was adopted by the United Nations in 1992. It was ratified by the Government of Uzbekistan in 1993. The main goal of the convention was to stabilize the concentration of greenhouse gases in the atmosphere at levels that would not cause climate change. In 1998, the Kyoto protocol was adopted, which was ratified by the Government of Uzbekistan in 1999. The protocol determined ways to implement the convention by the international community. Uzgidromet was appointed the agency responsible for the implementation of this convention by Uzbekistan.

Other signed conventions and agreements

Other signed conventions and agreements with some relevance for Uzbek fisheries-sector management and development include the following:

- the Convention on Prohibition of Military Actions or Any Other Hostile Use of Environmental Modification Techniques, signed 26 May 1993;
- the Vienna Convention for the Protection of the Ozone Layer, signed 18 May 1993;
- the Montreal Protocol on Substances that Deplete the Ozone Layer, signed 18 May 1993;
- the Convention on Biological Diversity, signed 6 May 1995.
- the Convention on the Protection of the World Cultural and Natural Heritage, signed 22 December 1995;
- the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, signed 22 December 1995;
- the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), signed 1 July 1997;
- the Convention on the Conservation of Migratory Species of Wild Animals, signed 1 May 1998;
- the London corrigenda to the Montreal Protocol on Substances that Deplete the Ozone Layer, signed 1 May 1998;
- the Copenhagen corrigenda to the Montreal Protocol on Substances that Deplete the Ozone Layer, signed 1 May 1998; and
- the Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat, signed 30 August 2001;

The Convention on Biological Diversity was ratified and came into force in Uzbekistan in 1996. The State Committee for Nature Protection is responsible for supporting the implementation of the convention in Uzbekistan.

FISHERIES LEGAL AND REGULATORY FRAMEWORK

Uzbekistan has no specific law on fisheries. This is rather understandable if one considers the peculiarities of the country. Uzbekistan is a landlocked country; it has no access to the sea. Inland waterbodies are mainly used for irrigation and natural fish resources are low as a result of large-scale fish capture in the past. The main potential for fish production is aquaculture, which in its present state can be regulated through the existing agricultural laws. The government pays careful attention to nature protection and fish biodiversity. The regulatory framework for the capture fisheries and aquaculture sectors contains several laws and decrees.

The following laws are applied according to the type of property of the enterprise and include enterprises active in the fisheries sector at large:

- the law on joint-stock companies and the protection of the rights of stockholders;

- the law on associations of limited liability: and
- the law on farming

The management of farms is further regulated by codes, laws and decrees of the President of Uzbekistan and by enactments of the Cabinet of Ministers, namely:

- The Tax Code of 24 April 1997;
- The Law on the Protection of Nature of 9 December 1992;
- The Law on Water of 6 May 1993;
- Regulation No.21-f of the Cabinet of Ministers of 20 January 1997;
- The Law on Farms of 30 April 1998 (Annex 6);
- Decree No. VII-2086 "On the introduction of a single land tax for agricultural producers" by the President of Uzbekistan on 10 October 1998;
- Enactment No. 289 "On the improvement of the system of fishery sector management" approved by the Cabinet of Ministers on 6 July 2001,
- Enactment No. 258 "On the improvement of the organization of the activity of the Ministry of Agriculture and Water Resources" approved by the Cabinet of Ministers on 28 June 2003;
- Enactment No. 350 "On measures to remove monopolies and to privatize the fishery sector" approved by the Cabinet of Ministers on 13 August 2003 (Annex 4);
- Enactment No. 1292 registered at the Ministry of Justice on 20 December 2003 "On the approval of the regulation of the calculation and levying of rent payment for the use of natural waterbodies by fish farms"; and
- The Hunting and Fish Catching Regulations on the Territory of the Republic of Uzbekistan, No. 1569, registered at the Ministry of Justice on 2 May 2006.

Considering that the agrarian sector occupies an important place in the Uzbek economy, significant benefits are given to the agricultural organizations, including aquaculture enterprises. In Regulation No.21-f of the Cabinet of Ministers of 21 January 1997, fish farmers involved in the cultivation of pond fish are on equal standing with agricultural enterprises as regards access to credit and to combustive-lubricating materials, mixed feeds, agricultural equipment and spare parts.

The Enactment of the Cabinet of Ministers No. 289 of 6 July 2001 "On the improvement of the system of fishery sector management" states that fish farms in terms of taxation have the same rights and obligations as agricultural organizations. Pond farmers, therefore, pay a single land tax instead of all state and local taxes (except the excise tax) and fees charged agricultural producers, including:

- income tax (on profits);
- value added tax (except on imported commodities such as labour and services);
- tax on the use of water resources;
- tax on the use of subsurface water resources;
- property tax;
- land tax;
- tax for the improvement of the territory and the development of the social infrastructure; and
- other local taxes and fees.

The single land tax may be levied on the area of the land allocated for ownership or for use or rent for agriculture.

The single land tax is set at a fixed amount per unit of land as determined by a basic rate and correction factors that take into consideration the position, soil and water quality, and water supply of the site. The single land tax contributes to the local revenues. Benefits for fish farms are envisaged under the Tax Code, and more specifically the tax on the property of legal persons. The tax base applied to the cost of property used for the production and storage of fish products is lowered for fish farms.

The benefits available under the land tax regime are tax exemptions for: lands occupied by rivers, lakes, reservoirs, canals, seas, glaciers, marshlands, hydrotechnical and other faculties given to enterprises for water management, as well as diversion strips along the waterbodies; agricultural lands and forest reserves of scientific organizations; and experimental and training-demonstration farms of

research organizations and agricultural and forestry educational institutions that are used for scientific and educational purposes (Land Tax Article 101).

FISHERY MANAGEMENT

The decision to complete privatization in the fisheries sector was made just a few years ago. As a consequence, the fisheries sector has not yet produced any fishery management plans. Public-private collaboration on fishery management has yet to be established.

Fishery management today is very poor. The main reasons are that (i) fish capture is very small (several thousands tonnes); (ii) fish capture is important only at local level; and (iii) fish resources are determined by irrigation management rather than fisher activity.

If those who irrigate would ensure a certain water level in lakes, reservoirs and even in entire regions, then a noticeable increase in fish stocks would be possible, including commercially important species. Irrigation for agriculture is, however, much more important for the country than fish capture. Many traditional methods of fishery management were abolished and lost in the last decade. A study of fish stocks in all regions is not possible because of a lack of funds for research in these matters. Management tools such as regulations on minimal mesh sizes, catch quotas (in total and by species), area closures for fishing and seasonal fisheries closure, which were used previously, are no longer applied.

The latest fish-capture regulations were not developed by the fisheries sector but by the State Committee for Nature Protection. The goal of this committee is to protect the resources, but not to develop the utilization or productivity of natural ecological systems in terms of fish production. The current laws and regulations do not consider fish capture a commercial activity but a recreational activity similar to hunting.

Fish catch regulations

The State Committee for Nature Protection of Uzbekistan adopted “Hunting and Fish Catching Regulations on the Territory of Uzbekistan”, which were registered at the Ministry of Justice on 2 May 2006 (Annex 5). The regulations encompass all rivers with their tributaries and channels, lakes, reservoirs and the other fishery waterbodies in the country. Therefore, they regulate commercial fish capture, procurement of water invertebrates, sport and recreational fishing, and also rearing, scientific research and other works connected with fish capture. The regulations provide the framework for the conservation of fisheries in waterbodies.

These recently enacted new regulations deal with the manner of fishing, prohibition of fishing in various waterbodies, mesh-size regulations for various fishing gears, quota on various types of fishes, and prohibition of non-ecological fish-capture methods.

Fisheries is also controlled by the Regulation “On the procedure for allocation and use of natural fishery waterbodies of the Republic of Uzbekistan” (attachment to Annex 4), which is contained in Enactment No. 350 “On measures to remove monopolies and to privatize the fishery sector” approved by the Cabinet of Ministers of Uzbekistan in 2003). This regulation identifies the procedure for renting natural waterbodies in Uzbekistan.

Legal and physical persons now have the right to conduct commercial capture fishery activities that are covered under rental/lease contracts, which generally are valid for a period of more than ten years.

The amount of rent to be paid for the use of a natural waterbody is determined by:

1) the surface area and WATER volume of the waterbody;
2) the volume of aquatic animals caught in the waterbody in the last three years;
3) average annual catch as determined on the basis of catches in the last three years;
4) the yield per 1 ha as determined by dividing the average annual catch by the area of the waterbody; and
5) the average yield per 1 ha multiplied by 1.5 percent in the first year of rent; by 2 percent in the second year; and in subsequent years by 3 percent of the minimal salary.

The amount of the rent payment is determined annually at the beginning of the year (Table 22).

TABLE 22
Rent payments per hectare for natural waterbodies in four provinces of Uzbekistan and in Karakalpakstan in 2007

Republic/province	Name of waterbody	Rent payment per 1 ha (in soums)
Rep. of Karakalpakstan	Zhiltirbas	1 000
	Sarykamish	1 000
	Dautkul	2 847
	Sudochie	800
	Mezhdurechie	735
Bukhara province	Kara-kir	372
	Zamonbobo	745
	Agitma	969
	Devhona	1 043
	Hadicha	1 043
Jizzak province	Aydar-Arnasai	820
Navoi province	Aydar-Arnasai	606
	Tudakul	2 594
	Shurkul	640
Kashkadarya province	Sechankul	411
	Talimardjan	411
	Luhlikul	411

Source: Authors.

The Cabinet of Ministers of Karakalpakstan and the regional administrations (hokimiyats) have the right:

- to suspend the capture of fish and other aquatic animals and the storage of plants if violations of the laws and terms of contract are reported, particularly violations of that part of the provision regarding annual stocking, maintenance and reproduction of fish resources; and
- to terminate a contract upon systematic, gross violation by an enterprise renting a waterbody safeguarded by nature protection laws and by regulations on fish catches.

Fish farmers have the right:

- to use the allocated waterbody or a part of it according to the rent contract;
- to carry out commercial catch of fish on a quota-free basis and to sell produce at their discretion;
- to create subsidiary farms beyond the water protection zone for the production of forage and other crops connected with the main activity, as well as for production of fish products;
- to create their own hunting estates or fish farms; and
- to other rights in compliance with the law.

The tenant fish farmer/fishery enterprise is obliged:

- to catch fish in compliance with established laws and to obey nature protection laws;
- not to sublease the waterbody;
- to carry out annual stocking and melioration, to save juveniles and to take other measures to ensure the integrity and reproduction of fish resources;
- to submit each December information on the state of fish stocks in the natural waterbodies and the measures necessary for their reproduction to the State Committee for Nature Protection of Uzbekistan and to the Research Center for the Development of Fisheries;
- to register all caught fish in the standard book of catches;
- to ship fish using commodity-transport invoices;
- to keep records on all vessels and observe safety measures while catching fish;
- to submit statistical information according to the approved format; and
- to make timely rent payments for the use of the natural waterbody.

Inspections to ensure adherence to the Hunting and Fish Catching Regulations on the Territory of the Republic of Uzbekistan are carried out by Gosbiokontrol (State Biological Control Agency) under the State Committee for Nature Protection. The officers of Gosbiokontrol keep records on nets and fishing equipment used for fish catching.

Chapter VII
SOCIAL AND ECONOMIC ASPECTS OF FISHERIES AND AQUACULTURE

FISHERIES AND AQUACULTURE EMPLOYMENT

After the issuance of Enactment No. 350 in 2003 when privatization of fisheries was completed, the number of enterprises in the fisheries sector increased: (i) existing enterprises split into several smaller enterprises; and (ii) new enterprises were created. The number of people employed in the sector also increased in comparison with 1994–2003.

Official government figures estimate that about 5 700 people are employed in primary production activities in the fisheries industry (including aquaculture and capture fisheries). The two hundred-eighty private enterprises involved in fisheries employ 3 700 persons. More than 2 000 workers are employed at 21 aquaculture farms.

The administrative staff consists of 616 employees, representing 11 percent of the total number of people engaged in the fisheries industry. The percentage of staff to total number of people employed in the sector varies from region to region. The highest percentage of administrative staff is employed in enterprises in Surkhandarya province (14.9 percent).

The above-mentioned figure of 5 700 employees does not include the number of employees working in support services such as transport, processing by enterprises other than fishing enterprises, retail (mainly women) and wholesale trade and ice supply. It is estimated that about 10 000 people, including workers in the support services, are employed in the fishery industry in Uzbekistan.

As per a government report, the greatest number of specialists with diplomas, such as fish breeders, mechanics, and technicians and engineers, are in Tashkent (44.3 percent of the total number of workers), while 56 percent of the specialists are located in the other provinces, i.e. Ferghana, Navoi and Andijan provinces, and Karakalpakstan. Currently, there is a lack of qualified personnel in the fisheries industry because no educational institution offers an education in fisheries.

The National University (formerly the Tashkent State Agrarian University) may have to initiate action to provide for fisheries education at bachelor and master levels and establish regional vocational training centres for aquaculturists and fishers.

SOCIAL SECURITY OF FISHERS, AQUACULTURISTS AND OTHER WORKERS ENGAGED IN THE SECTOR

Special social security benefits are not envisaged for employees in the fisheries sector, neither at the state level nor at the private enterprise level (except in certain cases maybe a small benefit for workers employed in enterprises). Social security and (life and health) insurance programmes, which are common in other sectors, would also be beneficial in the fisheries sector, but at present no such programmes are envisioned. The current role of trade unions or associations in terms of contributing to the social welfare of fishers in private enterprises is negligible.

The salaries of fishers are low, on average about US$100 per month. This low salary leaves them with insufficient income to make contributes to a social security scheme.

The current law requires an employer to pay 24 percent of employee salaries to a pension fund (workers receive their salaries in full).

ECONOMICS OF FISHERIES AND AQUACULTURE

As economic figures on various fishery and aquaculture activities in Uzbekistan are not available, the aim in this section of the report is to provide a general indication of investments and earnings made by the fisheries and aquaculture sectors.

Fish-capture technology used in Uzbekistan is limited to gillnetting in inland waters. The economics of fish capture with gillnets can be summarized as follows:

- initial investment low
- operational costs (per year) low
- gross income (per year) low
- net profits (annual) low
- trend in net profits compared with last years stable

Aquaculture technology in Uzbekistan is mainly limited to pond culture of cyprinids in extensive and slightly semi-intensive production systems. The economics of this activity can be summarized as follows:

- initial investment low
  (as ponds generally exist from Soviet times)
- operational costs (per year) low
- gross income (per year) low
- net profits (annual) low
- trend in net profits compared with last year increasing (because production is generally increasing)

The relative common cost-benefit structure of table-fish production by farmers who produce their own seeds and table fish are the following:

Primary costs

- salaries 12 percent
- feeds, seeds and other materials 74 percent
- gasoline, electricity 9 percent
- services of other enterprises and persons 5 percent

EXPENSES 100 percent

Profit

- primary costs 75 percent of total income
- land tax 2 percent
- net profit 23 percent

INCOME 100 percent

CREDIT AND INVESTMENT IN FISHERIES AND AQUACULTURE

Uzbekistan began to move towards a two-tier banking system under the former Soviet Union regime. The Banking Law of 1991 authorized a new structure. Under this new structure, a government-owned central bank wields control over a range of joint-stock sectoral banks specializing in services to agriculture or industrial enterprises and then referred to as Savings Banks (Sberbanks) and today called Ipotekebanks. The central bank directs the flow of as much as 70 percent of all deposits through more than 1 800 branches of Ipotekebank. The National Bank for Foreign Economic Affairs, established in 1991, conducts international financial exchanges on behalf of the government and holds Uzbekistan's foreign currency reserves.

In addition, there are commercial banks. Currently, commercial banks provide loans with a 14–24 percent interest rate, depending on the duration of a loan, the type of production or activity (services, trade, production, agriculture) of the burrower and an assessment of associated risks of non-repayment of a loan.

A borrower must provide a guarantee and business plan in order to obtain a loan. As a guarantee, a bank accepts the pledge of the main assets of the enterprise, i.e. vehicles and the value of pawned assets, which are estimated by independent appraisers. If the amount of the loan is som1 million, the pawned assets should be no less than som1.2 million. This is generally the main requirement of the bank that provides the credit. Without this guarantee, it is impossible to get a loan.

A beneficial loan from a special fund (with only a 3 percent annual interest rate) is available to farmers growing cotton and cereal crops. This type of loan can be used to pay for combustive-lubricating materials, mineral fertilizers, services and payments. The extent of the credit is determined in relation to the size of the plantation land area.

A specific line of credit may be established in support of the production of certain crops. Based on the distribution of the crops as determined by the departments of agriculture and water resources, the servicing banks send a list of farmers and the estimated number and value of credits to the Ministry of Finance of Uzbekistan. Upon confirmation by the ministry of the correctness of crop cultivation of farmers, the bank is then able to grant the loan. Revenue generated from a 3 percent interest rate is distributed as follows: 1.5 percent to the bank for its service and 1.5 percent to a special fund.

According to Regulation No. 21-f of the Cabinet of Ministers of Uzbekistan issued 21 January 1997, fish farms situated in rural areas and involved in the cultivation of pond fish have equal standing with agricultural enterprises in terms of obtaining credit, combustive-lubricating materials, mixed feeds, mineral fertilizers, agricultural equipment and other material-technical resources. Pond farmers can, therefore, apply to the Ministry of Agriculture and Water Resources and the Cabinet of Ministers of Uzbekistan with a request to establish a line of credit with beneficial terms.

Some efforts were made to study the credit operations of the People's Bank of Uzbekistan. The bank extends credit for livestock production and agriculture, including fisheries. Agriculture crops can be insured by the insurance company UzAgroInsurance for a value of 0.75 percent of the value of a bank loan. The amount of the credit cannot exceed 60 percent of the amount of the total investment, and thus the balance of 40 percent is borne by the farmers.

Credit for investment in livestock and poultry, fisheries and agricultural enterprises and for leasing of equipment is available from commercial banks. The commonly applied interest rate is 14–21 percent per annum. Immovable property is provided as a guarantee to the bank. It is reported that four fish farmers in the Khorazm and the Zhizak regions were given credit on the above-mentioned terms for the purchase of inputs for aquaculture. The total value of the credit provided was som10 million (US$7 875). It can, therefore, be argued that the current supply of credit to the fisheries sector is negligible.

Institutional credit is not available at the moment for most entrepreneurs in the fisheries sector. They must rely on non-institutional sources of credit from moneylenders, relatives, etc. In general, the amount of credit obtainable from these sources is fairly limited and mainly intended for working capital requirements. In addition, most of these non-institutional credit arrangements have a number of disadvantages, such as high interest rates and unfavourable terms and conditions attached to loans.

The lack of flexibility in the Uzbekistan banking system, together with the relatively high interest rate of bank loans, constrain local entrepreneurs from investing in means of production, and thus present an obstacle for the development of the fisheries sector. Credit is needed for the construction of ponds, the purchase of inputs and fishing equipment, such as fishing nets, boats and transport vehicles, and the processing and marketing of fish.

There are no institutions that provide flexible lines of credit that meet the needs of small- and medium-scale aquaculture and fisheries producers in Uzbekistan at present. For the rehabilitation of the fisheries sector, it is important that there be access to credit for those willing to invest in the sector.

Microfinance

Currently, a microcredit bank operates in Uzbekistan. This bank provides microcredit for the purchase of property and for production activities. It also demands a guarantor.

Microcredit interest rates are 10–14 percent per annum and their duration is for a period of less than three years. The largest amount available to legal persons is som15 million and to physical persons som7.5 million.

Policy Brief No. 3, 2006, of the United Nations Development Programme (UNDP) on Microfinance in Uzbekistan states: "Current State and Future Prospects, the total volume of microcredits provided by microfinance institutions as a share of GDP was 0.65 percent in 2003 and increased to 0.71 percent in 2004".

International donor organizations have played, and can continue to play, a decisive role in establishing, facilitating and developing microfinance in Uzbekistan. Some donors have provided start-up capital and funded transaction costs in early stages of microfinance schemes, and the Microfinance Institutions (MFIs), established with their support, continue independently their

operations. Among the donors are the Netherlands Agency for Technical Cooperation and Development (NOVIB), which assisted with the establishment of Sabr NGO-MFI, and the United Kingdom's Department for International Development (DFID), which provided start-up capital for Barokot. The Agency for Technical Cooperation and Development (AECTD), an international NGO based in France, continues to support microfinance. The Asian Development Bank (ADB), together with the Japan Fund for Poverty Reduction (JFPR), are financing innovative techniques for poverty reduction in Karakalpakstan. The World Bank is interested in implementing a microfinance programme in the Samarkand and Bukhara regions in close contact with branches of the Khalq Bank, one of the major banks in Uzbekistan. In its strategy for 2005–2007, the European Bank for Reconstruction and Development (EBRD) identified the establishment of a microfinance bank in Uzbekistan.

The fisheries sector has not been targeted by nor benefitted from microfinance schemes in the country. There is a need to extend support under microfinance schemes to fisheries and aquaculture to overcome the constraint of having to provide guarantees and to promote group lending. In this regard, a project implemented in Ferghana Valley by UNDP and called "Enhancement of Living Standards" provides an example of positive initial success of group lending and joint liability for recovery of loans. So far, a loan of about US$75 000 was granted to 450 members in individual loans of som300 000 (US$236). Loan repayment was reported to be at the rate of 98 percent. Fishery enterprises were not provided loans under this project but efforts will be made to extend the loan schemes also to the fisheries sector.

Insurance

In Uzbekistan, 26 insurance companies currently operate. However, only the insurance company Uzagrosugurta deals with agro-insurance, including livestock. It is a state joint-stock insurance company and has been carrying out its activities since 1997. It has 193 branches employing 2 000 agents and a staff of another 2 000 persons. The business generates income from premiums amounting to som10–12 billion per annum. Premium payments amounting to 3–8 percent of the value insured are charged for crop and livestock insurance. At present, fisheries investments are not covered by insurance but the company has shown a willingness to prepare a scheme for the insurance of fisheries investments, with the assistance of international technical support.

THE ROLE OF FISHERIES AND AQUACULTURE IN FOOD SECURITY AND POVERTY ALLEVIATION

Both during the Soviet era and after Uzbekistan gained its independence, the workers of the fisheries sector were among those people with higher living standards in comparison with workers from other rural sectors. The reason is because Uzbekistan is one of the more southern republics in the Commonwealth of Independent States, which implies warmer weather and higher yields in the fisheries sector compared with those republics in the more northern countries (taking into consideration the technologies that are applied).

In the 1990s, more than 12 000 people were directly involved in fisheries-sector primary production activities. Settlements and schools and kindergartens were built for fishers on some large farms. Food and free medical services were provided for them. In addition, free tickets were given to those people who needed to improve their health in sanatoriums and preventoriums, and tickets to summer camps were given to their children. There were clubs, libraries and other social facilities in these settlements. Trade unions exercised a strong influence over each farm, which together with the administrations of fish farms, addressed the social security issues of the workers in the fisheries.

Currently, it is impossible to distinguish families of fishers from those families working in other rural sectors. Uzbek families are usually large, consisting of several generations (children frequently live with their parents), and maybe only one or two family members are fishers. Other family members can be involved in activities such as the growing of cotton and cattle husbandry or work in the social and service sectors. After the complete privatization of the fisheries sector, employment significantly declined, particularly on pond farms.

Fishers and specialists have left the settlements on many fish farms because of the reduction in jobs. Due to the lack of attention by the fish farm administrators, many houses and social and cultural facilities in the settlements have fallen into ruin and property has been misused (Figure 15). The livelihoods of fishers and their families have deteriorated. Public institutions in the rural areas and the private fishing enterprises have taken almost no measures to improve the living standards and health of the fishers and their families.

FIGURE 15
Ruins left by people now living nearby at the Muynak Fish Farm in the village of Porlatau on the Amudarya River delta in Karakalpakstan

Photo courtesy of Mr B. Karimov.

Capture fisheries

Catches are usually made from the shores of lakes and reservoirs. There are few settlements on the shores of these waterbodies. Beach gangs of fishers usually work on a shift team. While working on the team, the fishers do not have to spend time searching for food because part of the catch is used for food. Furthermore, the owner of the enterprise provides fishers with food and clothes, including winter clothes and robes, when offshore as well as onshore. All this contributes to a slightly higher living standard for the fishers.

Houses of most fishers are situated in towns and villages, where there is always a power supply, pure drinking water and other conveniences. The size of a worker's house depends on his/her needs. Some workers live in flats and some workers live in houses. Gang leaders use high wages to attraction workers to participate in catches. Part of the catch generally constitutes payment for labour, i.e. workers receive piece-rate pay. Various enterprises propose their own terms. As the gangs are usually small (5 to 15 persons) and to catch requires certain skills, the fishers are usually well-known and

valued in the fishery sector. If they are dismissed from one enterprise, they frequently receive proposals of employment from other enterprises.

At the present time, people living in villages situated near waterbodies generally do not catch much fish for domestic/family consumption; instead they catch some fish to sell for hard cash.

Unfortunately, there are no statistical data on real incomes of fishers. However, it is possible to estimate the monthly income of a fisher: it ranges between som100 000 and som300 000. This income is higher than incomes of workers involved in other activities.

Currently, there is no system that prepares specialists for the fishery sector. On some gangs, managers have a higher special education degree in fisheries, received before 1991. On other gangs, there are no specialists with such a degree.

Aquaculture

Enterprises rather than private individuals engage in fish cultivation. The situation for the people working in aquaculture enterprises is similar to that of fishers. All pond farms of Uzbekistan are built near cities and large populated areas and on lands generally unfit for agriculture. In settlements belonging to aquaculture enterprises, the living standards are usually relatively good (Figure 16). Settlements are provided with electricity, gas, drinking water and services.

FIGURE 16
The fishing village of Navruz in the Aydar-Arnasay lake system

Photo courtesy of Mr B. Karimov, 2005.

Average monthly wages/salaries on fish farms are between som100 000 and som130 000. Workers are employed all year round. Aquaculture entrepreneurs generally provide additional help in support of the livelihoods of the workers on their farms. On most farms, plots of land are allocated to workers and their families for growing vegetables and fruit.

In recent years, many fish-farm owners sell the fish produced to their workers at the wholesale price. Then in turn, the workers or their families sell the fish at the market, thus earning additional income.

Currently, the aquaculture sector lacks personnel with a higher education. On many fish farms, the higher education of the heads of the enterprises and the leading specialists was received before 1991. However, there is no specialized training available for young people and this makes it difficult to ensure continuation of aquaculture in the long term.

Chapter VIII
SECTORAL DIAGNOSIS

Chapter III describes the current status of fisheries in Uzbekistan, without giving a detailed analysis of the situation. It is clear that there are a number of constraints to overcome and issues to address if the fisheries sector is to develop in an environmentally and socio-economically responsible and sustainable manner.

Various methods can be used to diagnose the current situation. One of the most commonly used methods to analyse a situation, create understanding and assist future decision-making processes in a simple manner is the strengths, weaknesses, opportunities and threats analysis (SWOT). This method has the advantage that it addresses both internal and external factors that support or constrain development. The analysis of the internal and external pectoral environment provides useful information for the preparation of a strategic plan for fisheries sector development in Uzbekistan. In the following SWOT analysis, the current situation in the Uzbekistan fisheries sector is diagnosed in light of the sector's natural, human, inland and financial resources.

STRENGTHS

- Uzbekistan has the environmental water resources suitable for the development of aquaculture, such as rivers, reservoirs, lakes and irrigation channels.
- Inland water resources are underexploited.
- The experience of entrepreneurs in fish farming and hatchery management was gained during the Soviet era.
- The current fisheries administration in the Ministry of Agriculture and Water Resources is small and as such does not require many financial resources.
- The government has privatized fishery enterprises.

WEAKNESSES

- There is no national fisheries-sector policy or regulatory framework to assist the sector in sustainable management.
- Fisheries is not a priority sector for government development planning.
- The Ministry of Agriculture lacks the financial means to ensure that the Department of Fisheries is a centre of excellence; this department should be staffed with highly qualified personnel and equipped with modern means of communication and transport.
- Extension services are lacking at regional and district level.
- The fisheries-sector research institutes do not have the financial means to undertake the necessary research to assess fishery resources and support the development of fishery management.
- Most hatchery facilities for restocking of inland waters and aquaculture ponds with fish seed are functioning at a low level of efficiency and are underutilized.
- Domestically produced fish feed for aquaculture is of poor quality.
- Inland waterbodies are not being restocked and fishing in inland waterbodies is not being monitored and controlled.
- Per hectare productivity is too low.
- The collection of fishery statistics is not coordinated properly and data collection and analysis is not conducted in a scientific manner, which affects decision-making.
- Canks credit services and government incentives (subsidies) for the fisheries sector are lacking.
- Insurance schemes are not extended to the fisheries sector as they are to the agriculture sector.

OPPORTUNITIES

- With the participatory preparation of the "Conception of Aquaculture and Capture Fisheries Development of the Republic of Uzbekistan, 2008–2016", the government initiated discussions with all relevant stakeholders, and increased stakeholders' collaboration and involvement in decision-making seems possible for overcoming constraints in development.
- The proposed "Conception of Aquaculture and Capture Fisheries Development of the Republic of Uzbekistan, 2008–2016" (containing the "Aquaculture and Capture Fisheries Development Policy and Strategy of the Republic of Uzbekistan, 2008–2016"), once approved by the government, will provide a basis for responsible and sustainable development of the sector in the coming years and will allow international donors to support the government in its efforts towards sustainable development.
- There are opportunities for entrepreneurs to adopt cost-effective modern and innovative new technologies and management systems, taking advantage of the lessons learned by other countries and compiling up-to-date information on co-management schemes and programmes.
- Today, the hydrochemical and biological conditions of the waterbodies provide possibilities for the stocking of fishes, cage culture, pen culture and trout culture, in anticipation of an increase in future per capita consumption of animal protein.
- The World Bank agreed to cover the fisheries sector in the Rural Enterprise Support project Phase II, which was implemented in 2008 and will run to 2013.
- Banks have shown interest in providing loans to fishery enterprises, including microfinance support to women entrepreneurs.
- The uniting of international and regional fisheries bodies will provide Uzbekistan with increased access to information and collaboration on fishery resources, research, management, education, technology, marketing and trade.
- There are opportunities for insurance companies to extend insurance schemes to the fisheries sector.
- The increase in employment in the rural areas and the enhancement of socio-economics will facilitate poverty reduction.

THREATS

- Inland waterbodies are not productive during part of the year because they are covered with ice and the water temperature is low in winter; during this period, fish do not consume much feed and grow slowly.
- The overall improvement in economic development has a role to play in the development of fisheries.
- The government needs to act more proactively in facilitating fisheries development by providing financial assistance for research and management of fishery resources.
- As long as the financial institutions do not consider the fisheries sector and its needs, investment in the sector will remain low.
- Unless fishery management is taken seriously in irrigation management for agricultural crops and is provided protection for maintaining the required level of water for fisheries, the level of production will remain low.
- Formal educational institutions, and practical training/capacity-building and extension institutions that address the needs of the fisheries sector are few and this limits the number of people who can be trained in fisheries, thus hindering sectoral development in the near future.

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Annex 1
THE DYNAMICS OF FISH PRODUCTION IN UZBEKISTAN, 1980–2006

TABLE 23
The dynamics of fish production in Uzbekistan, 1980–2006 (in '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
1991	27.2	20.3	6.9
1992	28.1	20.9	7.2
1993	23.4	16.8	6.6
1994	15.3	12.2	3.1
1995	12.5	8.9	3.6
1996	8.0	5.8	2.2
1997	8.4	5.3	3.1
1998	8.8	6.1	2.7
1999	8.2	5.5	2.7
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.

Annex 2
FISH FAUNA IN UZBEKISTAN

TABLE 24
Fish fauna in Uzbekistan

Species scientific name	Common name	Status
ACIPENSERIDAE		
Acipenser nudiventris Lovetzky	Spiny sturgeon	LC*
Pseudoscaphirhynchus kaufmani (Bogdanow)	Big Amu-Darya shovelnose	LC*
Pseudoscaphirhynchus hermanni (Kessler)	Little Amu-Darya shovelnose	LNC*
Pseudoscaphirhynchus fedtschenkoi (Kessler)	Syr-Darya shovelnose	LNC*
SALMONIDAE		
Salmo trutta aralensis Berg	Aral trout	LNC*
Salmo trutta oxianus Kessler	Amu-Darya trout	LC
Salmo ischchan issykogegarkuni Luschin	Sevan (Issyk-Kul) trout	AC
Oncorhynchus mykiss (Richardson)	Rainbow trout	AC
COREGONIDAE		
Coregonus peled (Gmelin)	Peled	AC
Coregonus sardinella Valenciennes	Least cisco, lake herring	AAC
ESOCIDAE		
Esox lucius Linnaeus	Pike	LC
CYPRINIDAE		
Rutilus rutilus aralensis Berg	Aral roach	LC
Rutilus rutilus bucharensis Nikolsky	Bukhara roach	LC
Leuciscus lehmanni Brandt	Zarafshan dace	LNC
Leuciscus squaliusculus (Kessler)	Syrdarya dace	LNC*
Leuciscus idus oxianus (Kessler)	Ide	LNC*
Scardinius erythrophthalmus (Linnaeus)	Redeye	LNC
Ctenopharyngodon idella (Valenciennes)	Grass carp	AC
Mylopharyngodon piceus (Richardson)	Black carp	AAC
Aspiolucius esocinus (Kessler)	Pike asp	LC*
Aspius aspius taeniatus n. iblioides (Kessler)	Asp	LC
Opsariichthys uncirostris amurensis Berg	Three-lips	AANC
Tinca tinca (Linnaeus)	Tench	AC*
Pseudorasbora parva (Schlegel)	Stone morokos	AANC
Gobio gobio lepidolaemus Kessler	Gudgeon	LNC

Species scientific name	Common name	Status
Pseudogobio rivularis (Basilewsky)	Amur false gudgeon	AANC
Varicorhynus capoeto heratensis natio steindachneri (Kessler)	Khramulya	LC
Barbus capito conocephalus Kessler	Turkestan barbel	LC
Barbus brachycephalus Kessler	Aral barbel	LC*
Schizothorax intermedius McClelland	Marinka (snowtrout)	LC
Diptychus maculatus Steindachner	Scaled osman	LNC
Diptychus dybowskii Kessler Russky	Scaleless osman	LNC
Chalcalburnus chalcoides aralensis (Berg)	Aral shemaya	LC
Alburnoides bipunctatus eichwaldi (Filippi)	Riffle minnow (bystryanka)	LNC
Alburnoides taeniatus (Kessler)	Striped bystryanka	LW
Alburnoides oblongus Bulgakov	Tashkent bystryanka	LNC*
Abramis brama orientalis Berg	Eastern bream	LNC*
Abramis sapa (Pallas)	White-eye	LC
Parapramis pekinensis (Basilewsky)	White amur bream	AAC
Capoetobrama kuschakewitschi (Kessler)	Ostroluchka	LNC
Hemiculter leucisculus (Basilewsky)	Common sawbelly	AANC
Hemiculter lucidus (Pub.)	Sawbelly	AANC
Pelecus cultratus (Linnaeus)	Rasorfish	LC
Rhodeus ocellatus (Kner)	Bitterling	AANC
Carassius auratus gibelio (Blochin)	Crucian carp	AC
Cyprinus carpio Linnaeus	Common carp	LC
Hypophthalmichthys molitrix (Valenciennes)	Silver carp	AC
Aristichthys nobilis (Richardson)	Bighead carp	AAC
COBITIDAE		
Nemacheilus strauchi (Kessler)	Spotted stone loach	AANC
Nemacheilus labiatus (Kessler)	Plain stone loach	AANC
Nemacheilus dorsalis (Kessler)	Gray stone loach	LNC
Nemacheilus stoliczkai (Steindachner)	Tibetan stone loach	LNC
Nemacheilus oxianus Kessler	Amu-Darya stone loach	LNC
Nemacheilus kuschakewitschi Herzenstein	Kuschakewitsch stone loach	LNC
Nemacheilus amudarjensis Rass	Bukhara stone loach	LNC
Nemacheilus amudarjensis choresmi Berg	Khorezm stone loach	LNC
Nemacheilus malapterurus longicauda (Kessler)	Stone loach	LNC
Cobitis aurata aralensis Kessler	Golden spiny loach	LNC

Species scientific name	Common name	Status
SILURIDAE		
Silurus glanis Linnaeus	Wels, European catfish	LC
SISORIDAE		
Glyptosternum reticulatum McClelland	Turkestan catfish	LNC
GASTEROSTEIDAE		
Pungitius platygaster aralensis (Kessler)	Aral stickleback	LNC
POECILIDAE		
Gambusia affinis holbrockii (Baird & Girard)	Mosquito fish	LNC
ATHERINIDAE		
Atherina mochon pontica Eichwald	Silverside	ANC
CHANNIDAE		
Channa argus warpachowskii (Berg)	Snakehead	AC
PERCIDAE		
Stizostedion lucioperca (Linnaeus)	Pike-perch	AAC
Perca fluviatilis Linnaeus	Perch	AC
Perca schrenki Kessler	Balkhash perch	LNC
Gymnocephalus cernuus (L.)	Ruff, pope	AANC
ELEOTRIDIDAE		
Micropercops cinctus (Dabry & Thiersani)	Ruff, pope	AANC
GOBIIDAE		
Rhinogobius sp.	Amur goby	AANC
COTTIDAE		
Cottus spinulosus Kessler	Turkestan sculpin	LNC
Cottus gobio jaxartensis Berg	Freshwater sculpin	LNC
Cottus rosalis Berg	Sculpin	LNC

Source: Authors.

Notes: AAC – accidental introduction, commercial
AANC – accidental introduction, not commercial
AC – introduced, commercial
ANC – introduced, not commercial
LC – local species, commercial
LNC – local species, not commercial
* Extremely rare – some fishermen believe the species still exists

Annex 3

PRICES OF SOME ORNAMENTAL FISH SPECIES IN A TASHKENT MARKET IN UZEBKISTAN, OCTOBER 2007

TABLE 25

Prices of some ornamental fish species in a Tashkent market in Uzbekistan, October 2007
(1US$= som1 285)

Russian name	English common name	Latin name	Size (cm)	Price (som)
Лабео разные	Barbel steed	Labeo sp.	5	5 500
Цихлозомма Микка	Firemouth cichlid	Cichlasoma Meeki	2.5	3 500
Барбус суматранский	Sumatra barb	Puntius tetrazona	3	1 000
Скалярии	Angelfish, scalare	Pterophyllum	Diameter 5	2 000
меченосцы	Yellow cichlid	*Thorichthys* helleri	5	1 000
Дискус красный	Discus red	*Symphysodon discus*	10–12	25 000
Днскус коричневый и др.	Discus brown	*Symphysodon aequifasciatus*	7	10 000
Пангасис акулий	Catfish	Pangasius spp.	10 40	10 000 (US$75)
Рыба-попугай	Parrot fish	Scarus spp.	12–13	20 000
астронотусы	Oscar	Astronotus ocellatus	4 14 22	500 15 000 25 000
Петушки	Siamese fighting fish	Betta splendens	–	550
Гурами	Giant Gourami	Osphronemus goramy	4 7	1 200 2 000
Акула-балу	Cichlidae	Species from Cichlidae	4	1 500
Рыба-нож черный	Knife fish	*Chitala chitala*	6–7	6 000
Кои из Сингапура Кои из Малайзии	Koi from Singapore Koi from Malaysia	*Cyprinus carpio carpio*	6–7 10–12	3 500 7 000
Кои местные	Koi from local persons	*Cyprinus carpio carpio*	3–4 10–12 16–18 25–28	1 500 3 000 6 000 20 000
Телескоп	Goldfish	Carassius auratus auratus	6–7 15	3 000 25 000

Source: Authors.

Annex 4

ENACTMENT No. 350 OF THE CABINET OF MINISTERS OF THE REPUBLIC OF UZBEKISTAN

13 August 2003

(Non-official translation)

ON MEASURES TO REMOVE MONOPOLIES AND TO PRIVATIZE THE FISHERY SECTOR

Recently, changes have been made to the enactment in compliance with Enactment No. 499 of the Cabinet of Ministers of 25 October 2004.

With a view to intensifying the process of privatization and developing private property in the fisheries sector, introducing market principles and mechanisms in the organization of the activities of capture fisheries and aquaculture enterprises, removing monopolizes in the sector to create a competitive environment, as well as regulating captures and fish/fish products, the Cabinet of Ministers **ENACTS:**

1. To agree to the suggestions of the Special Committee on the audit of the organization and activity of the joint-stock company Uzbalik, which committee was established by Decree P-1728 of the President of the Republic of Uzbekistan on 18 March 2003:

- on the liquidation of the joint-stock company Uzbalik and the association Karakalpakbalik; and
- on the complete privatization of aquaculture and capture fishery enterprises within the liquidated company Uzbalik mainly.

2. To take into consideration that a Main Department for the Development of Animal Husbandry, Poultry Raising and Fisheries be established within the central apparatus of the Ministry of Agriculture and Water Resources of Uzbekistan, and that departments for the development of animal husbandry, poultry raising and fisheries be established within the regional administrations for agriculture and water resources, and entrusted with the development of the fisheries sector.

3. The Special Committee for the audit of the organization and activity of the company Uzbalik, together with the State Property Committee of Uzbekistan and concerned ministries and agencies, must provide within one month for the liquidation of the joint-stock company Uzbalik in accordance with established procedures, envisaging the transfer of state shares and stockholding in the statute funds of privatized fishery enterprises to physical persons and foreign investors in the stock and non-stock markets in compliance with Attachment 1 to this enactment.

4. To establish a Uzbek Research Center for the Development of Fisheries by merging the research institute Akvakultura and the enterprise Ikhtiomarkaz into the Uzbek Scientific Industrial Center for Agriculture under the Ministry of Agriculture and Water Resources of Uzbekistan.

To assign the State Regional (zonal) Fish Nursery as a daughter enterprise to the Uzbek Research Center for the Development of Fisheries.

To determine the following tasks as the priority tasks of the Uzbek Research Center for the Development of Fisheries:

- to develop scientific recommendations on and a methodology for the development of the fisheries sector and its forage resources;
- to conduct scientific studies on selection-breeding activities and fishery melioration, to develop measures aimed at the prevention and treatment of fish diseases, and to improve qualitative breeding functions in broodstock and acclimatization of new fish species;
- to provide capture fisheries and aquaculture farms with quality selection-breeder material;

and

- to organize retraining and professional development of workers for the fisheries sector.

Within one month, the Ministry of Agriculture and Water Resources of Uzbekistan should develop and approve the regulations of the Uzbek Research Center for the Development of Fisheries and its structure.

5. To establish the procedure by which:

- Natural fisheries waterbodies shall be assigned to fishery enterprises on a competitive basis and according to the terms of a lease for a period of not less than ten years.
- The lease contract for the right to use shall be concluded among the Council of Ministers of Karakalpakstan, the regional administrations (hokimiyats) and a fishery enterprise, the winner of the competition.
- Fish catches in natural waterbodies shall be performed by fishery enterprises that conclude a lease contract and shall be carried out on a quota-free basis, considering the available biological resources, demands and conservation of productivity and reproduction of fish resources at the appropriate level.
- Fishery enterprises renting areas of natural waterbodies shall be obliged to strictly observe environmental law and established rules of capture fisheries in the territory of the republic, to carry out annual stocking and to provide measures for conservation and reproduction of fish resources.

In case of gross and systemic violations of environmental law, the rules of capture fishing and the terms of the lease contract by the fishery enterprise, the lease contract can be annulled before its expiration using the established procedure.

6. To approve the regulations on the procedure for assigning and using natural fisheries waterbodies according to Attachment 2 of this enactment.

7. To establish an Off-budget Fund for the Development of Fisheries within the Uzbek Research Center for the Development of Fisheries for the financing of research and selection-breeder work, for the development of modern formulations of feeds and implementation of other measures to assist the introduction of modern technologies in the fisheries sector, for the prevention and treatment of fish diseases and for the elaboration of investment projects for the development of the sector.

The Ministry of Finance and the Ministry of Agriculture and Water Resources of Uzbekistan shall develop and approve, according to established procedures, the regulation on the formation and use of the revenues of the Fund for the Development of Fisheries of the Research Center for the Development of Fisheries.

Point 8 was invalidated by Enactment No. 499 of the Cabinet of Ministers of 25 October 2004.

8. To permit the State Property Committee of Uzbekistan to allocate to the Fund for the Development of Fisheries revenues obtained from the sale of the government's share of ownership of joint-stock companies in compliance with Attachment 1 to this enactment, but to retain revenues to cover operating expenses and to compensate shareholders for the cost of the shares they previously held in the joint-stock company Uzbalik.

9. The Ministry of Finance of Uzbekistan, together with the Ministry of Agriculture and Water Resources, the State Committee for Nature Protection, the Council of Ministers of Karakalpakstan and the regional administrations, shall develop and approve within one month the regulations on levies and the amounts of lease payments for the use of areas of natural waterbodies of Uzbekistan, according to the terms of the lease contract.

The revenues obtained from the lease of the natural fisheries waterbodies of Uzbekistan shall be allocated at the following rates:

- 60 percent to the respective local budget, including revenues for measures to develop the fisheries sector;
- 25 percent to the Fund for the Development of Fisheries under the Research Center for the Development of Fisheries;
- 15 percent to the State Committee for Nature Conservation of Uzbekistan with the targeted use of funds for measures aimed at the protection and sustainable use of fishery resources.

10. The Ministry of Agriculture and Water Resources of Uzbekistan, together with the Ministry of the Economy, the State Committee for Nature Protection and the state joint-stock company Uzdonmahsulot, shall develop and submit to the Cabinet of Ministers within two months the programme for the development of the fisheries sector and its forage resources for 2004–2006.

11. The Council of Ministers of Karakalpakstan, administrations of the regions and Tashkent City:

- together with the Ministry of Agriculture and Water Resources of Uzbekistan, capture fisheries and fish-breeding enterprises, shall create the necessary conditions for the development of the retail trade of fish and fish products;
- together with the Ministry of Agriculture and Water Resources of Uzbekistan, the state joint-stock company Uzdonmahsulot and other concerned agencies, shall assist capture fisheries and fish-breeding enterprises by providing selection-breeder materials, feeds and other resources;
- together with the State Committee on Land Resources of Uzbekistan, shall exercise strict control over the protection and targeted and sustainable use of fishery resources in natural waterbodies and over poaching and illegal trade in fish and fish products. Quarterly reports shall be submitted to the Cabinet of Ministers of Uzbekistan.

12. Together with the State Committee on Land Resources of Uzbekistan, strict control shall be exercised over the targeted protection and sustainable use of fishery resources in natural waterbodies and over poaching and illegal trade in fish and fish products. Quarterly reports shall be submitted to the Cabinet of Ministers of Uzbekistan.

13. To recognize as invalid:

Enactment No. 289 of the Cabinet of Ministers “On the improvement of the system of fishery sector management” of 6 July 2001, except paragraph 9;

Enactment No. 198 of the Cabinet of Ministers “On measures for the improvement of the use of natural fisheries waterbodies in the Republic and for the strengthening of protection of fishery resources” of 11 May 1998, except point 6; and

Enactment No. 2 of the Cabinet of Ministers “On the approval of the procedure for assignment and use of natural fisheries waterbodies in the Republic” of 2 July 1998.

14. The Ministry of Justice of Uzbekistan, together with the Ministry of Agriculture and Water Resources, the State Committee for Nature Protection and other concerned ministries and agencies, shall submit proposals on changes and amendments to the current law resulting from this enactment.

15. The monitoring of the implementation of the current enactment shall be entrusted to the Deputy Prime Minister of Uzbekistan, R.S. Azimov

Chairman
Cabinet of Ministers I. Karimov

Attachment 1
To Enactment No. 350 of the Cabinet of Ministers of the Republic of Uzbekistan
adopted on 13 August 2003
(Non-official translation)

Enterprises of the liquidated joint-stock company Uzbalik,
the shares and shareholding of which are subject to free transfer preferably to private property through stock market and off-stock market bids

Name of enterprise	**Share of enterprise subject to sale on the stock market (%)**
Andijonbalik (OJSC)	25
Bukhorobaliksanoatsotish (OJSC)	25
Balikchi (OJSC)	25
Navoijbalikchilik (OJSC)	25
Damashchi (OJSC)	25
Jizzakhbalik (OJSC)	25
daryobalik (OJSC)	25
Kazakhdaryobalik (OJSC)	25
Muinok balik konserva kombinati (OJSC)	25
Namanganbalik (OJSC)	25
Nukusbalik (OJSC)	25
Sirdaryobalik (OJSC)	25
Surkhonbalik (OJSC)	25
Toshkent balik (OJSC)	25
Urai (OJSC)	25
Khorazmbalikmakhsulotlari (OJSC)	25
Yangiyerbalik (OJSC)	25
Chinaz plant of granulated feeds (JSC)	25
Aidarkul Ltd	25
Samarkandbalik Ltd	25
Besharikbalyk (JSC)	16.4
Baliksavdo (closed JSC)	10

Sources: The collection of laws of the Republic of Uzbekistan, 2003, No. 15–16, p. 127; The collection of enactments of the Government of the Republic of Uzbekistan, 2003, No. 8, p. 70.
Note: OJSC – Open Joint-Stock Company; JSC – Joint-Stock Company.

Attachment 2
To Enactment No. 350 of the Cabinet of Ministers of the Republic of Uzbekistan
of 13 August 2003
(Non-official translation)

REGULATION
ON THE PROCEDURE FOR ALLOCATION AND USE OF NATURAL FISHERY WATERBODIES IN THE REPUBLIC OF UZBEKISTAN

I. General provisions
II. The procedure for the rental of natural fisheries waterbodies to fishery enterprises
III. The rights and obligations of the lessor
IV. The rights and obligations of the leaseholder

I. GENERAL PROVISIONS

1. This regulation determines the procedure for the rental of natural fisheries waterbodies in the Republic.

2. All natural waterbodies, including the sea, rivers, reservoirs and lakes and their supplementary waterbodies (except pond farms and fish nurseries), that are in use or can be used for the catching or reproduction of fish and other aquatic animals are fishery waterbodies.

Natural fishery waterbodies on which commercial catches are performed or can be performed, are fishery waterbodies. Fishery waterbodies can be used for sport and recreational fishing.

3. Legal entities and physical persons (hereinafter referred to as fishery enterprises) who conclude the contract of tenancy in compliance with this Regulation shall have the right to carry out commercial fishing.

II. THE PROCEDURE FOR THE RENTAL OF NATURAL WATERBODIES TO FISHERY ENTERPRISES

4. Natural fishery waterbodies are rented to fishery enterprises, which as a rule are established as private property by the Council of the Ministry of Karakalpakstan and the provincial administrations, on a competitive basis for a period to be indicated in the contract of tenancy, but for not less than ten years.

5. To deal with the rental of natural fisheries waterbodies to fishery enterprises, special committees shall be established under the Cabinet of Ministers of Karakalpakstan and the provincial administrations and shall be headed by the First Deputy of the Chairperson of the Council of Ministers and by the khokim of the province. The committees shall include representatives of the State Biological Control Agency (Gosbiokontrol), the territorial financial and tax agencies, regional administrations of agriculture and water management, judicial bodies, bodies of interior affairs and other concerned agencies.

6. The assignment of natural water resources to the winning fishery enterprises shall be made on the basis of a contract of tenancy concluded among the Council of Ministers of Karakalpakstan, the regional administrations (lessors) and the fishery enterprises (leaseholders or lessees).

The permit of the assigned natural fishery waterbody or its part, which indicates the name of the waterbody, its location, size and borders as well as other necessary information, is affixed to the contract of tenancy.

7. To participate in the competition to rent the natural fishery waterbody or its part, the potential leaseholder must submit the following documents to the Council of Ministers of Karakalpakstan and the regional administrations:

- a letter of application;
- a copy of the certificate of state registration of the fishery enterprise as a legal entity or as an individual entrepreneur; and
- information on the availability of the material/technical resources needed for commercial fish catching.

8. The Council of Ministers of Karakalpakstan and the regional administrations shall hold a meeting of the commission on competition within one month from the deadline for submission of applications and their accompanying documentation and shall decide on the leaseholder of the natural fishery waterbody or its part. Within ten days of the decision, the contract of tenancy shall be concluded with the winner of the competition and a certificate shall be issued (certificate for capture).

9. Applicants who were refused a contract of tenancy for the natural waterbody have the right to lodge a complaint against the decision of the commission on competition as per the procedure established by the law.

10. The fishery enterprises that conclude a contract of tenancy for the use of natural waterbodies or their parts shall pay rent in the amount and as per the procedure established by the law.

11. The contract of tenancy for the natural waterbody or its part can be cancelled at the request of a fishery enterprise or as a result of gross and systematic violations of the established rules of capture by the fishery enterprise or failure to observe obligations on the conservation and reproduction of fishery resources.

III. THE RIGHTS AND OBLIGATIONS OF THE LESSOR

12. The lessor in the guise of the Cabinet of Ministers of Karakalpakstan and the regional administrations shall have the right:

To suspend the capture of fish and other aquatic organisms and the storage of plants if violations of the current law occur, particularly as regards annual stocking, conservation and reproduction of fish resources; and

To cancel the contract of tenancy as per the established procedure upon systematic violations of environmental laws and established rules of fish catching by the fishery enterprise.

13. The lessor is obliged:

To receive free-of-charge applications and accompanying documents from legal entities and physical persons who expressed their desire to participate in the competition for the lease of a natural waterbody or its part;

To consider the submitted applications and conduct the competition within the established time frame;

To inform participants in the competition in good time about results of the competition;

To conclude within ten days the contract of tenancy with the winner of the competition for the right to use the natural waterbody or its part, and to issue a certificate for capture.

IV. RIGHTS AND OBLIGATIONS OF LEASEHOLDER

14. The fishery enterprise that rents the waterbody shall have the right:

To use the assigned natural waterbody or its part in accordance with the concluded contract of tenancy;

To perform commercial fish catching on a quota-free basis and sell the produce at its discretion;
To establish its own hunting estate/fishery enterprise; and
To have other rights in conformity with the law.

15. The fishery enterprise is obliged:
To catch fish according to established law and not to violate the environmental laws;
Not to sublease the assigned waterbody;
To restock fish annually, improve the waterbody, conserve the juveniles of commercial fish species and take other measures to provide the safety and reproduction of fish resources;
To submit in December of each year information on the state of fish resources in the natural waterbodies and on measures necessary for the reproduction of fish resources to the State Committee for Nature Protection of Uzbekistan and the Research Center for the Development of Fisheries;
To record in standard logs all fish caught;
To transport fish with an accompanying proper invoices;
To record all boats used and safety measures observed during the catching of fish;
To submit statistical reports according to approved forms; and
To pay for the lease of the natural waterbody in a timely fashion.

16. The catching of fish and other aquatic animals can be performed only within the limits of the natural waterbodies or their parts indicated on the permit of the assigned fishery waterbody or its part, which is affixed to the contract of tenancy.

17. Upon gross and systematic violations of established environmental law and rules of catching by a fishery enterprise, the contract of tenancy can be cancelled by decision of the Council of Ministers of Karakalpakstan and the regional administrations.

18. Upon violation of the terms of the contract of tenancy by the lessor or leaseholder, each party bears responsibility as prescribed by the law.

19. Trade in fish and fish products, as well as in other aquatic animals, by legal entities and physical persons can be conducted only in places determined by town and district authorities (hokimiyats) according to the established procedure and upon presentation of documents confirming the validity of the catch or the purchase of the produce as well as the quality certificate of the produce.

Annex 5

HUNTING AND FISH CATCHING REGULATIONS IN THE TERRITORY OF THE REPUBLIC OF UZBEKISTAN

Adopted by Order No. 27 of the Chairman of
The State Committee for Nature Protection of the Republic of Uzbekistan
on 22 March 2006

Registered at the Ministry of Justice
of the Republic of Uzbekistan
on 2 May 2006
No. 1569

SELECTED CHAPTERS RELATING TO FISHERIES
(Non-official translation)

Chapter IV: Fish Catching Regulations

28. The present Regulations apply to all rivers and their tributaries and channels, lakes, reservoirs and other fishery waterbodies in the Territory of Uzbekistan (regardless of the departmental jurisdiction under which they lie) but excludes preserves, fish hatcheries and pond farms and their observance is mandatory for all persons and enterprises, regardless of the departmental jurisdiction under which they lie.

29. The present Regulations for fish capture regulate commercial fish capture, procurement of water invertebrates, sport and recreational fishing, rearing, scientific research and other work connected with fish catching.

30. Commercial fish catching on fishery ponds is done by those organizations and enterprises with agreements concluded according to an established procedure. Fishery organizations, enterprises and firms must have the necessary, precise permit to perform fish catching.

31. Waterbodies that are used or can be used for commercial fish catching, or are significant for fish resource reproduction, are considered fishery waterbodies.

32. Fish-capture enterprises, fish farms, societies of hunters and fishers, and other fishers are obliged:

a) to prevent violations of nature protection regulations;
b) to mark the farm boundaries;
c) to show to nature protection inspectors upon demand their certificates for fish capture that grant the right to carry out commercial fish capture, their journals recording commercial operations and other documents related to the fishery, and not to impede inspection as per the established procedure; to allow inspection of production areas, fish-capture gear (on the coast as well as in the water), natatorium and reception facilities, and fish yields; and also to allow inspection of entries in commercial journals with information characterizing fishery operations;
d) to provide each fisher on the catch with documents identifying his/her affiliation to the fishery organization;
e) to mark fishing gears with their affiliation;
f) to use the fishing gears that are authorized;
g) to keep specific coastal areas and waterbodies in sanitary condition as required;
h) not to carry out work on the waterbodies or their areas that would alter the natural condition of the waterbodies without the permission of the nature protection agents;

i) in accordance with nature protection agents, to carry out tasks to upgrade the fishery (e.g. improve fish reproduction conditions, combat fish kills, mow aquatic plants, save fingerlings of commercial fish);
j) to stock waterbodies with those fish species that are caught in volumes sufficient for reproduction of the fish catch;
k) to refrain from commercial fishing on waterbodies assigned to societies of hunters and fishers for sport and recreational fishing or on waterbodies that are the sites of protective and reproduction activities, without the permission of the societies;
l) to protect fish resources and the fisheries allotted to fish farmers;
m) to accompany nature protection officials when on duty at their night-time work stations on their rounds to check on businesses and possibly to provide vehicles for their use;
n) to present nature protection officials with monthly information about the quality and quantity of fish captured by anglers in the waterbodies;
o) to refrain from fishing within 100 m of the coast, as this zone is prohibited for commercial fishing and can be used only for sport and recreational purposes;

33. Nature protection agents have the right:
a) to correct, in accordance with scientific organizations, and to change terms of a fishing ban of up to 15 days, depending on hydrometeorological conditions (the terms of a fishing ban take effect on the first and last days of the prohibition);
b) during a fishing ban, to limit motor-boat traffic on waterbodies;
c) when necessary, to permit fishing in kill waterbodies with any type of capture gear and at any time by fishery enterprises and organizations;
d) to permit, in accordance with the Institute of Zoology of the Academy of Sciences of Uzbekistan, the catching of weed-bed inhabiting, low-value, predator fish species with low growth rates, and also sport fishing or casting for records, which species commercial fishers are not permitted to catch by current regulations;
e) to issue permits to fish for the purposes of scientific research, acclimatization, stocking, rearing and monitoring of stocks with all types of fishing gear in all waterbodies and in all seasons of the year according to the prescribed procedure.

§1. Prohibitions

34. Physical and juridical persons are prohibited:
a) from fishing with fishing gear or other means beyond two-thirds of the width of a river, brook or channel, and at the same time or in turn, casting seines and launching floating nets from the opposite banks;
b) from accepting (or releasing) fish catches of species with names other than their actual names or without an indication of their names;
c) from keeping books and from presenting calculated data that intentionally distort yield size and type of fishery;
d) from capturing fish using explosives, toxic or chemical substances, electric current and various electronic fishing gear (electric fishing rod), thrust weapons, firearms and pneumatic units, and throw-on nets;
e) from using other new types of gears and new methods of fish capture unless in agreement with the nature protection agents;
f) from stocking and acclimatizing new fish species without the permission of the nature protection agents and without a sign off by the Institute of Zoology of the Academy of Sciences;
g) from capturing fish listed in the Red Book of Uzbekistan. When caught by fishing gear, such fish should be released alive back into the waterbody;
h) from selling any fish species outside the norm, as set out in Articles 40–43 of the present Regulations. Fines at fixed rates will be charged for damage caused by illegal catching,

gathering or destroying of a fish species as well as eggs and any other fish products. If fish are caught in accordance with Article 42, documents confirming the legitimacy of the fish catch should be presented;

i) from diverting the flow from the fishery waterbodies for the needs of enterprises and for irrigation without fish-protection structures;
j) from being on a waterbody or close to it with fish catching tools, the use of which in this territory and at the present time is prohibited by fishery Regulations;
k) from carrying out activities that change the natural conditions of the fishery waterbodies, including activities using explosives, but excluding activities such as those dealing with sanitation, hydrotechnology and improvements that have been agreed upon with the nature protection agencies;
l) from throwing various types of fishing gear that have been used in waterbodies with pestholes of parasites and infectious fish diseases into other waterbodies without a preliminary decontamination of the gear;
m) from allocating and using insecticides and pesticides within 500 m of the coastal zone;
n) from destroying or damaging posts and floating signs that indicate boundaries of fish catching areas and zones prohibited for fish catching;
o) from using all types of double-walled purse seines and trap nets;
p) from setting fishing gear in a chessboard arrangement with a distance of less than 100 m between the vertical and horizontal lattices;
q) from setting stationary nets at depths of less than 1 m and within 500 m of the boundaries of coastal, non-aqueous zones;
r) from setting commercial fishing gear at less than 1 000 m from dams, sluice, bridges, the mouths of rivers and the confluences of channels into water ponds;
s) from emptying dirty and untreated sewage water from industrial and communal enterprises and also waste harmful to fishes into fishery waterbodies on the coasts and onto the ice of these waterbodies;
t) from emptying silt collected during dredging operations and the cleaning of beds of waterbodies into spawning areas and wintering pits, and emptying retting flax, hemp, filament and leather into fishery waterbodies;
u) from storing aquatic plants without the consent of the nature protection agents;
v) from commercial fishing outside the boundaries of designated areas;
w) from importing, exporting and transporting fish products without documents identifying the legitimacy of a catch or acquisition of a product.

35. Commercial fishing is prohibited during the entire year:

a) at protected bridges and dams, cage lines, and also in irrigation and overflow channels for a distance of 200 m from the boundaries of fish hatcheries, ponds and other aquaculture areas;
b) at the mouths of rivers and irrigation canals for a distance of 1000 m on both sides and along a river or a canal for a distance of 500 m from sore to upper stream;
c) on newly created waterbodies, unless allowed by appropriate authorities, and on the wintering pits of fishes;
d) on channels and on channels connecting lakes or connecting a lake and a river;
e) in the Amudarya River and the Syrdarya River; and
f) from using nets made from fishing line.

36. Commercial fishing during the spawning period is prohibited:

a) in the Amudarya River and the Syrdarya River from 10 March to 31 May;
b) on waterbodies in Karakalpakstan and the Khoresm region from 25 April to 10 June; and
c) on all other waterbodies from 16 April to 31 May.

§2. Commercial size of a fishery catch

37. It is prohibited to produce a fish catch and to accept fish objects that are not fresh and that do not meet the minimum length requirements (in cm) as prescribed by the present Regulations (Attachment 4 below).

38. Notwithstanding Article 37 of the present Regulations, as regards commercial fishing on fishery waterbodies, the following quantities of small-sized bycatch are allowed (figures are in percentages of total catch):

common carp – 5
bream – 5
pike perch – 5
asp – 5
shemaya – 5
varicorhinus – 7
schizothorax – 7
roach – 10
pelecus cultratus – 10
crucian carp – 10

When the number of small-sized fish in a catch exceeds the norm, fishing in the present location must cease or the fishing gear must be substituted for gear with a larger mesh size. Live fish should be released back into the waterbody, and for those fish that are no longer alive, fees for damage are imposed at a fixed rate.

§3. Mesh size of fishing nets

39. Use of fishing gear with mesh that is less than the following sizes (in mm) is prohibited:

a) draught beach lake seines and scrapers:
   in purse – 36
   in driving gear – 44
   in vanes – 50
b) gillnets (in coppers) – 40
c) river seines: 40
   in purse – 40
   driving gears – 45
   in vanes – 55
d) fixed nets – 50
e) floating nets – 50
f) gillnets for catching varicorhinus – 45
g) gillnets for catching roach – 36
h) trap nets – 40

The mesh size of a fishing gear is defined by measuring the distance between 11 knots by braid and dividing the number by 10. The mesh size of a wet fishing gear produced from vegetable fibres can be 5 percent smaller than the standard sizes.

Fishing gear with small-sized mesh (36 and 45 mm) can be used only with the permission of the nature protection agents in compliance with the Academy of Sciences of Uzbekistan, and where massive stocks of varicorhinus and roach occur.

§4. Sport and recreational fishing

40. Sport and recreational fishing is allowed:
a) on waterbodies used by all citizens and without charge (for a catch up to 5 kg), but excluding natural reservations, fish hatcheries and aquaculture ponds, or for a fee in the areas reserved to the hunters' and fishers' societies by virtue of passes issued by these societies;
b) in periods of spawning, to hunter and fisher society members, each with a maximum of 5 hooks; and
c) under water and without oxygen tanks.

41. A catch produced using fishing rods must not exceed the following limits: 5 kg if fished on waterbodies in common use; and 10 kg if fished on waterbodies reserved to hunters' and fishers' societies .

42. A catch fished on waterbodies reserved to hunters' and fishers' societies can exceed the Regulation by a maximum of 5 kg for an additional fee.

43. Rules on fishing are fixed in principle. However, it is acceptable if one fish weights more than the amount established by the Regulations.

44. Use of the following fishing tools and methods is prohibited:
a) nets of all kinds, drag nets, seines, trap net and capes;
b) thrust fishing gear (fish forks and others);
c) kiddle with more than 15 hooks (per person);
d) electric current, chemicals, drugs, biological substances and explosives;
e) firearms; and
f) handmade, electric fishing gear.

45. To hold sport and recreational fishing tournaments during the spawning period is allowed in designated places on waterbodies and with fishing rods that have a maximum of 5 hooks.

Chapter V: Concluding statement

46. Persons who violate the Hunting and Fish Catching Regulations are subject to administrative and criminal proceedings and disciplinary action.

Attachment 4

To the Hunting and Fish Catching Regulations on the territory of the Republic of Uzbekistan

The commercial size (in cm) of a fish catch is the following:

Common carp
Zarafshan River basin – 30
Kashkadarya River basin – 26
Surhandarya River basin – 28
Sirdarya River basin – 28
Amudarya River – 29
Amudarya River basin, lakes – 24

Bream
Khorezm region waterbodies – 28
Syrdarya River basin – 26
Zarafshan River basin – 24
Amudarya River – 25
Amudarya River basin, lakes – 20
Tashkent region waterbodies – 20

Khramulya
Zarafshan River basin – 24
Kashkadarya River basin – 22
Surhandarya River basin – 23

Aral asp
Amudarya River basin – 45
Surhandarya River basin – 38
Khorezm River basin – 36
Sirdarya River basin – 36

Silver crucian carp in all basins – 26

Shemaya
Amudarya basin – 19
all other waterbodies – 16

Rasorfish in all waterbodies – 22

Pike perch (Zander)
Syrdarya basin – 36
Surkhandarya basin – 38
Tashkent region waterbodies – 36
All other waterbodies – 37

Marinka (snowtrout) in all basins – 18
Roach in all basins – 17
Herbivorous fishes in all basins – 55

The commercial size of a fish is determined by measuring its length from the top of the head (at the closed mouth) to the base of the tailfin. The commercial size of a processed fish (salty, dried, smoked) is 4 percent less than a fresh fish.

Source: The collection of laws of Uzbekistan. 2006. No. 18, pp. 158.

Annex 6

THE LAW ON FARMS OF THE REPUBLIC OF UZBEKISTAN

30 April 1998

(Unofficial translation)

(New edition as revised August 2004)

I. General statements

Article 1. Purpose of the present law

The purpose of the present law is to regulate relations in the sphere of establishing, managing, reorganizing and liquidating farms.

Article 2. Legislation on farms

Legislation on farms consists of the present law and other legislative acts. In the event that an international agreement signed by Uzbekistan establishes rules other than those envisaged by the legislation on farms of Uzbekistan, the rules of the international agreement shall prevail.

Article 3. Farm

A farm is an independent, economic entity that produces agricultural products using rented land.

Article 4. Head of farm

The head of a farm is its founder – the farmer. The farmer can be represented by a person over 18 years of age who has qualifications or work experience in agriculture. The head of the farm represents the farm in relations with other legal entities and individuals.

II. Founding a farm

Article 5. Conditions for founding a farm

A farm is founded primarily on lands and territories where farm workers are in short supply.

A farm specializing in cattle breeding is founded upon condition that there are no less than 30 head of cattle. The minimum size of the land area leased to a farmer shall be 0.3 ha per head of cattle on irrigated lands in the Andijan, Namangan, Samarkand, Tashkent, Ferghana and Khorezm regions, 0.45 ha per head of cattle on irrigated lands in other regions of the country and in Karakalpakstan, and 2 ha per head of cattle on non-irrigated (dry) lands.

A farm specializing in crop cultivation shall be allowed an area with a minimum size of 10 ha for growing grain and cotton, and 1 ha for gardening, viniculture and vegetable growing, as well as cultivation of other crops.

Upon the receipt of land, a farmer is obligated to provide a crop yield (based on a three- year average) of not less than the amount designated in an assessment of the land by the office of the land register. This obligation is written in the land lease agreement.

Article 6. Procedure for founding a farm

A farm is founded by a farmer who provides the land for the farm and approves the farm charter.

To establish a farm, the farmer must receive land in accordance with the established procedure.

Article 7. State registration of a farm

A farm is recognized as being established at the moment it is registered with the state in accordance with the prescribed procedure. At the time of state registration with the authorized body, a farm assumes the status of a legal entity and the farmer has the right to establish a settlement, to open various types of bank accounts and to have his/her own seal with the farm name on it.

A farm may be refused state registration if the procedure for establishing a farm as prescribed by the present law is violated or if the farm charter does not comply with the law.

Refusal of registration by the state and/or failure by the farmer to observe registration deadlines may be contested in court.

Article 8. Farm charter

A farm shall act on the basis of a charter. A draft of the farm charter is approved by the Cabinet of Ministers of Uzbekistan.

Article 9. Contents of a farm charter

A farm charter should contain the following information:

- the name of the farm;
- the first name, the last name, the patronymic and the address of the head of the farm;
- the farm location;
- the farm mailing address;
- the crop specialization and the basic types of activity on the farm; and
- the amount of authorized capital.

The farm charter may contain other statements provided they do not contradict the law.

III. Allotment of land for farming and land and water use

Article 10. Land allotted for agricultural purposes

Land for agricultural purposes is allotted from:

- land reserves;
- agricultural land that is not allotted to legal entities or individuals;
- reorganized or liquidated agricultural cooperatives (shirkats) and other agricultural enterprises, establishments and organizations; and
- agricultural cooperatives and other agricultural enterprises, establishments and organizations.

The amount of land allotted to farms is deducted from the total land allotment allocated to agricultural cooperatives and other agricultural enterprises, establishments and organizations.

Land belonging to scientific research facilities, higher educational institutions, academic lyceums, professional colleges, schools and lands assigned to the water fund cannot be allotted to farms.

Land located along the state border of Uzbekistan, along large and small rivers and around reservoirs is allotted for farming in compliance with the procedures established by law. Land within 500 m of the state border of Uzbekistan cannot be alloted for cattle breeding, poultry farming, and farming activities related to the reproduction, grazing and raising of animals (cattle, poultry, fur-bearing and other animals, fish, bees) or for activities related to animal zoology parks and vivariums.

Article 11. Procedure for allotment of land for farming

Land is leased for farming on the basis of a tender and for a maximum period of 50 years and a minimum period of 30 years.

In allotting land for farming, preference is given to persons living in the area close to the farm.

Land belonging to land reserves or agricultural land not allotted to legal entities or individuals is allotted by the district hokim on the basis of the results of a tender organized by the district commission on issues of allottment (sale) of land.

Land of reorganized or liquidated agricultural cooperatives and other agricultural enterprises, establishments and organizations is allotted by the district hokim on the basis of the results of a tender organized by a special commission.

Land of an agricultural cooperative and other agricultural enterprise, establishment and organization may be allotted to members (workers) for the purpose of farming by the district hokim on the basis of the results of a tender organized at the general meeting of the agricultural cooperative, or agricultural enterprise, establishment or organization by the authorized body of another agricultural cooperative, enterprise, establishment or organization.

The decision of the district hokim on the allotment of land for farming enters into force upon the approval of the allotment by the regional commission on issues of allotment (sale) of land, which is headed by the hokim of the region.

A general meeting of an agricultural cooperative (shirkat) and the authorized body of another agricultural enterprise, establishment or organization may define land areas to be allotted to a farm, without defining the farmer. In this case, the land is allotted to a farm in compliance with the procedure provided in paragraph three of this Article 11.

A land lease agreement is signed by the head of the farm or the hokim of the district.

The decision of the general meeting of the agricultural cooperative, the authorized body of another agricultural enterprise, establishment or organization and the hokim of the region to reject a land allotment, as well as the decision of the regional commission on issues of allotment (sale) of land to reject a land allotment approved by the decision of the district hokim, may be appealed to a court or official of a higher standing body. Persons who receive land for farming and own a house in the rural, built-up area shall keep the right of ownership of the land adjoining the house.

Boundaries of the farm are established on site by a land surveyor paid from the local budget.

Article 12. Specifications of farm organization by members of agricultural cooperatives

A member of an agricultural cooperative who wishes to relinquish his/her membership and share of a farm has the right to receive the monetary equivalent of his/her share of the property and profit (revenue), the amount of which is determined with consideration for the contribution of labour of the cooperative member.

The decision of the general meeting of the agricultural cooperative serves as a basis for granting a specified person the right of land lease for farming in compliance with the procedure defined in Article 11 of this law. At the same time, the granting of a land lease should not deprive an agricultural cooperative of land resources and basic production funds necessary for its activity.

Article 13. Land use

The rights and obligations of a farm regarding ownership and utilization of land are defined by law.

Land allotted to a farm shall be used in strict accordance with the specified purpose. It cannot be privatized, purchased, sold, pawned, gifted, exchanged or subleased.

A farm can use the right of land lease as a guarantee for securing credit.

Land allotted to a farm may be divided during the reorganization of the farm upon condition that the newly formed land areas are not less than the minimal size specified by Article 5 of this law.

The size of the land area and its boundaries may be changed only with the approval of the head of the farm.

In the event that the head of the farm dies, the right of land lease shall transfer in accordance with the law and for the duration of the land lease agreement.

Upon expiration of the land lease agreement, the farm shall have the right to extend the agreement for a further period. In the event that the head of the farm dies, the right to extend the agreement for a further period shall be inherited by the lawful heir.

A land lease agreement may be changed or annulled by mutual agreement of both parties, or by the court in the case of disagreement of the parties.

In the event a farm is liquidated, the land lease agreement shall be subject to annulment in compliance with the procedure established by the law.

Article 14. Payment for the use of the land

Payment for the use of the land allotted to a farm is in the form of an annual rental fee paid to the local budget in the amount specified by the single tax rate, which is determined by the quality, location and water supply of the land as well as the cadastral assessment of the land.

The farm shall be exempt from the payment of the rental fee for use of the land for a period of two years after the registration of the farm by the state.

The farm shall be exempt from the payment of the single tax for that part of the land developed at the farmer`s own expense and for the duration of the land development as specified in the corresponding project or for a maximum of five years from the start of development.

Article 15. Water use

The limits on the use of water for farming are defined by the authorized bodies.

IV. Rights and obligations of a farm and farm property rights

Article 16. Rights of a farm

A farm shall have the right to:

- organize farming production on allotted land in compliance with the crop specialization envisaged by the charter and land lease agreement;
- distribute agricultural varieties with consideration for its crop specialization and on the basis of signed contractual agreements;
- sign future contracts with pre-payment for products procured;
- market goods produced, including the right to sell to consumers at the farmer’s own discretion;
- set prices for goods produced, jobs performed and services provided;
- sign agreements for the supply of electricity, combustive-lubricating materials, mineral fertilizers and chemicals for plant protection and for services;
- receive revenue (profit) from entrepreneurial activity in an unlimited amount subject to taxation as established by law;

- disburse revenue (profit) earned and manage monetary funds in its bank accounts;
- purchase stocks and other securities;
- receive credits, attract investment funds and property of other legal entities and individuals on the basis of an agreement, and direct these funds into production and reproduction;
- use its property as well as its right of land lease to secure credit;
- take advantage of all types of benefits and preferences given to small and private enterprises;
- purchase or lease needed equipment, production means and other property, and construct and repair buildings and structures; and
- submit claims to court for the protection of its rights and legal interests.

Farms may have other rights in accordance with the law.

Article 17. Obligations of a farm

A farm must:

- provide for purposeful, effective and rational utilization of land under conditions defined by law and a land lease agreement;
- comply with ecological requirements and other rules of environment protection;
- organize measures for the improvement of land and preservation and improvement of its fertility as well as provide for allocation of funds for these purposes in the business plan;
- begin to utilize the land within one year from the time of its allotment, unless another period is agreed in the land lease agreement;
- supply agricultural products upon government request in compliance with signed contractual agreements and within the limits of envisaged volumes;
- comply with the established requirements on by-sort-distribution of cotton and grain crops;
- utilize water resources in accordance with the agreed limits;
- conduct clean-up and repair of the on-farm network of irrigation canals and ditches;
- comply with conditions of land-burdening and servitude;
- provide a safe work environment for its workers;
- pay taxes, dues and other obligations in a timely manner and in compliance with the procedure established by the law;
- comply with agro-technical requirements during the production of agricultural products; and
- protect crops from plant pests, diseases and weeds.

A farm may bear other obligations in accordance with the law.

Article 18. The authorized fund of a farm

The authorized fund of a farm is defined by the head of the farm.

Contributions to the authorized fund of a farm may be made in the form of money, securities, buildings, constructions and other property or property rights having pecuniary value.

If the head of the farm transfers a common (shared or joint) property of family members to the authorized fund of the farm, then a notarized agreement signed by all of the property owners is required.

The increasing or decreasing of the authorized fund of a farm is based on the decision of the head of the farm and on changes in the farm charter.

Article 19. Farm property rights

Farm property rights are protected by the state.

A farm has the property right to buildings, constructions, agricultural crops and plantings, cattle, poultry, processed products, agricultural technology, inventory, equipment, transportation means,

monetary funds and objects of intellectual property as well as other property, which property right is included in the farm assets.

Farm property may consist of monetary funds and material resources of the head of the farm, revenue (profit) received from the sale of goods (labour, services), revenue from securities, and other sources not prohibited by the law.

A farm has the right to establish a settlement, expand, purchase, lease or take for temporary use property in compliance with the procedure established by the law.

Article 20. Farm's funds and accounts

A farm has the right to open bank accounts, to conduct monetary transactions and to save funds as well as to disburse funds at its own discretion. Funds may be withdrawn from the farm's account only by agreement of the head of farm or by a court decision.

Article 21. Farm property inheritance

Farm property is inherited in compliance with the law. Heirs who carry on the farming are exempt from paying the state dues for the issuance of the right to inherit.

V. Organization of farming activity

Article 22. Farm production activity

A farm independently defines the directions of its activity and the structure and the volume of production in compliance with crop specialization as envisaged by its charter and the land lease agreement. It has the right to engage in any type of agricultural production, except for agricultural production prohibited by the law. It may also process and sell agricultural products.

A farm is obliged to comply with normative acts and quality standards for products and to comply with ecological, health and other requirements and rules established by the law.

Government intervention or intrusion of other bodies and organizations or their officials in the farming activity of a farm is prohibited. Losses, including missed profits, incurred by the farm as a result of unlawful decisions by the state and other bodies and organizations or actions (dereliction) by their officials and nationals, shall be eligible for compensation in compliance with the procedure established by the law.

A farm conducts foreign economic trade in compliance with the established regulations.

Article 23. Labour on a farm

Labour relations between the farm (employer) and its employees are regulated by a labour agreement (contract) in compliance with the law.

The head of the farm decides on the organization of its employees in compliance with the law.

A record of the activity of the farm workers must be kept.

By mutual agreement between the head of the farm and the employees, farm workers' wages are defined in monetary and material terms and are not lower than the minimum wage established by the law.

The head of the farm and the employees are subject to state social insurance regulations. The granting and payment of state social security allowances and pensions are made in compliance with the procedures and conditions established by the law.

Article 24. Procedure for selling farm products

A farm has the right to sign contracts with juridical persons and individuals for the sale of farm products, including to the government (e.g. state agencies). In the case of a violation of contractual obligations, the parties have responsibilities as established by the law or the agreement.

Farm products for export are managed in compliance with the procedure established by the law.

Article 25. Joint activity among farms

Upon mutual agreement, a farm may unite or join unions or other associations for production, procurement, processing and sale of its products, provision of material and technical resources, construction, technological water management and veterinary, agrochemical and consultancy services.

Article 26. Credit to and insurance of farms

Long-term credit for construction to meet purposed production objectives and for procurement of basic production means, and short-term credit for ongoing farming activity are arranged on the basis of a credit agreement.

Credit with beneficial terms is extended to farms in compliance with the procedure established by the law.

A farm insures against the risk of complete loss (destruction), partial loss and damage to its own or rented means of production, to crops and crops plantings, to multi-annual crops and to processed products, raw materials and materials. It insures against entrepreneurial risk and risk of liability for breach of contract on a voluntary basis, and receives insurance compensation in compliance with procedures and conditions established by the law.

Article 27. Taxation of farms

A farm pays taxes and dues and makes other obligatory payments to the state budget of Uzbekistan and state funds-in-trust in compliance with the law.

The profit of the farm after payment of taxes, dues and other obligatory fees is disbursed at the discretion of the head of the farm and is not liable to tax.

Article 28. Record keeping of farming activity

A farm keeps records on the results of its activity and provides reports to the local statistics and taxation bodies in accordance with the established procedure.

VI. Concluding statements

Article 29. Government support and other support to farms

The state guarantees the rights and protection of the legal interests of farms.

State bodies are responsible for assisting farms in their development and improvement.

Republican and local executive bodies, citizen self-governmental bodies of communities, kishlaks (villages) and auls (settlements) in compliance with the legal procedure shall:

- carry out infrastructure development (building roads, electric mains and communication lines, supplying water and gas, installing telephones, building radio broadcasting stations, organizing the use of land, improving land) as farms are being established on territory where there has been no previous production and/or social activity;
- provide assistance to farms on building production facilities and housing;

- provide services to supply sorted seeds and agricultural planting material, organic and mineral fertilizers, agricultural plant protection against plant pests, diseases and weeds, and provide technical services;
- provide assistance with the procurement of agricultural technology, equipment and inventory on a lease basis;
- provide assistance with the procurement of pedigree cattle and poultry as well as mixed fodder;
- create the necessary conditions for zoo-veterinary check-ups for farm cattle;
- provide assistance with storage and marketing of agricultural products grown on farms;
- motivate farmers to organize production of non-agricultural goods; and
- provide consultancy and other types of services and information.

Other forms of support envisaged by the law for the development of private entrepreneurship are applicable to farms.

Article 30. Limitations on inspections of farming activity

Inspection of farming activity is conducted according to the established procedure and is concerned only with the issue of the rational use of leased land in compliance with the land lease agreement in the event that agreed obligations regarding the sale of products on government requests are not fulfilled or that proof of a violation of the law on land and a delay in the payment of the single tax is presented.

Article 31. Farm reorganization

Reorganization of a farm (merger, affiliation, demerger, segregation, reformation) is conducted according to the procedure established by the law.

Article 32. Basis for the liquidation of a farm

A farm is liquidated in the following instances:

- voluntary rejection of the right to rent land;
- recognition of the bankruptcy of a farm, including systematic failure to settle accounts with the suppliers of material-technological resources, labour and services;
- the death of the head of a farm and the absence of an heir who wishes to continue to farm; and
- rescinding of the land lease agreement as per the established procedure in light of the need of the state for land for public purposes or in light of a violation of the law on land, including the use of land for purposes other than farming and the sowing of agricultural crops not specified in contractual agreements.

Article 33. Procedure for liquidating a farm

A farm is liquidated on the basis on a decision by:

- the head of the farm;
- the court in cases specified by the law.

Liquidation of the farm is executed according to the procedure established by the law.

Article 34. Resolution of disputes

Disputes over founding, managing, reorganizing or liquidating a farm are resolved in accordance with the law.

Article 35. Liability of a farm for its obligations

A farm is liable for its obligations, including the provision of agricultural products upon state request in compliance with signed contractual agreements and in the amounts envisaged, as well as timely payment for supplies of material-technological resources, and provision of services on its property, which may be withdrawn in accordance with the law.

In accordance with law, the head of a farm bears additional liability for the obligations of the farm in the event that farm property is misused.

In the case of a lack or insufficiency of funds of a reorganized or liquidated farm, the liability for damage caused by the death or illness of an employee on the job is assumed by the state in accordance with the procedure envisaged by the law.

Article 36. Accountability for the violation of the law on farms

Persons guilty of violating the law on farms are accountable in accordance with the law.

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 km^{2,} 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 feed[4].

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 policy[5] 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 2007[6].

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 adopted[7]:

- **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 objective[8].

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 and 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	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.
	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.
	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.
	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.
	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.
	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.
	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.
	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.
	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.
	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.
	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.
	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 implemention.

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/m^3 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/m^3 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/m^2, 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
Economic 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).
Social 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.
Ecological 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

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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