INNOVATIONS IN FISHERIES MANAGEMENT FOR KAZAKHSTAN

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CURRENCY EQUIVALENTS

(As of January 15, 2004)
Currency Unit = Tenge (KZT)
US$1 = KZT 142

FISCAL YEAR
January 1 to December 31

ACRONYMS AND ABBREVIATIONS

ACP Agricultural Competitiveness Project
APPAP-II Agricultural Post Privatization Assistance-II
B/Z Bukhtarma/Zaisan
CEP Caspian Environment Program
CFP Common Fisheries Policy
CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora
CN Concept Note
EEZ Exclusive Economic Zone
EU European Union
FAO Food & Agriculture Organization of the United Nations
FC Fisheries Committee
FMIS Fisheries Management Information System
FPIP Fisheries Program Implementation Plan
FRPC Fisheries Research and Production Center
<table>
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<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tr>
<td>FSST</td>
<td>Fisheries Sector Study Team</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GEF</td>
<td>Global Environment Facility</td>
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<tr>
<td>GIS</td>
<td>Geographic Information System</td>
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<td>GOK</td>
<td>Government of Kazakhstan</td>
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<tr>
<td>HACCP</td>
<td>Hazard Analysis Critical Control Points</td>
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<tr>
<td>IUU</td>
<td>Illegal, Unreported and Unregulated</td>
</tr>
<tr>
<td>JERP</td>
<td>Joint Economic Research Program</td>
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<tr>
<td>JSDF</td>
<td>Japanese Social Development Fund</td>
</tr>
<tr>
<td>KZT</td>
<td>Kazakhstan Tenge (KZT 150 = US$ 1)</td>
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<tr>
<td>LIL</td>
<td>Learning and Innovation Loan</td>
</tr>
<tr>
<td>MCS</td>
<td>Monitoring, Control and Surveillance</td>
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<tr>
<td>MEP</td>
<td>Ministry of Environmental Protection</td>
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<tr>
<td>MOA</td>
<td>Ministry of Agriculture</td>
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<tr>
<td>MOEBP</td>
<td>Ministry of Economy and Budget Planning</td>
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<td>MOF</td>
<td>Ministry of Finance</td>
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<tr>
<td>MOT</td>
<td>Ministry of Transportation</td>
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<tr>
<td>mt</td>
<td>metric ton</td>
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<tr>
<td>NGO</td>
<td>Non-Government Organization</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
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<tr>
<td>SOE</td>
<td>State Owned Enterprise</td>
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<tr>
<td>TURFS</td>
<td>Territorial Use Rights Fishery System</td>
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<tr>
<td>UK</td>
<td>United Kingdom</td>
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<td>US</td>
<td>United States</td>
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<td>WTO</td>
<td>World Trade Organization</td>
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FOREWORD

This study is part of the Joint Economic Research Program (JERP) between the World Bank (the Bank) and the Government of Kazakhstan (GOK) and is a collaborative effort. The study was requested by GOK in Agreement on Technical Cooperation #1285 signed by the Prime Minister on December 5, 2002. The study is part of a larger collaboration between the Bank and GOK on natural resource management that also includes forestry, water and rangelands. Funding for the study was also provided by the Japanese Global Trust Fund for Sustainable Fisheries. The study was carried out by the Fisheries Sector Study Team (FSST) composed of both international and Kazakh experts, and based on extensive fieldwork in Kazakhstan including discussions with all key stakeholders, review of background literature, and international good practice.

This report was written by William Sutton (Task Team Leader), Simon Diffey and Tomislav Petr (international consultants). Dinara Akhmetova was responsible for coordination of the Kazakh team, and background reports were prepared by Boris Chaikin, Sergey Galushchak, Zhannat Makhambetova, Igor Mitrofanov, and Zhanibek Suleimenov. Hiromi Isa participated in the main mission and provided input (World Bank). Irene Bomani and Kathy Sharrow also provided inputs during preparation of the report.

The report was prepared under the guidance of ECSSD Sector Managers Marjory-Anne Bromhead and Benoit Blarel. Cornelis de Haan provided assistance under the Japanese Trust Fund. Peer reviewers are William Lane, Thomas Moth-Poulsen, Gert van Santen and Ronald Zweig. Anthony Cholst, Amy Evans, Maurizio Guadagni, Toru Konishi, Jessica Mott, Pedro Rodriguez, and Tjaart Schilthorn van Veen provided valuable advice and comments. The work would not have been possible without the valuable assistance of the World Bank Country Office staff in Kazakhstan, including Loup Brefort, Bulat Utkelov, Talimjan Urazov, Anara Akhmetova, Ilyas Sarsenov and Evgeny Tytyshtny, and the World Bank Central Asia Regional Office staff, including Aitolkyn Kourmanova, Kubat Sydykov and Sholpan Khassenova. Zaituna Gaisina provided the bulk of the Russian translation and interpretation.

The authors would like to thank representatives of the Ministry of Agriculture and the Fisheries Committee for their inputs and assistance, including Askar Myrzakhmetov, First Vice Minister of Agriculture, Murat Mussatayev, Fisheries Committee Chairman, and Rafik Suleimenov, Fisheries Committee Deputy Chairman. Thanks are also extended to Almaz Ilkeyev, who acted as liaison between the FSST and Fisheries Committee. We are grateful for the valuable assistance and advice provided by the management and staff of the Fisheries Research and Production Center and its branches. We also wish to express our gratitude to the many representatives of fishers, the business community, NGOs, other ministries, and international agencies for their valuable time and assistance, and for sharing with us their intimate knowledge of the industry. Special thanks are extended to SeaWeb/Pew Institute for Ocean Science and the Dutch project Fisheries Resource Management for Lake Balkhash for sharing their experiences.

Initial findings of the FSST and a draft report outline were presented to the Fisheries Committee and discussed at a workshop held in Astana in November 2003. The FSST also prepared three draft Concept Notes for implementation of key recommendations of the study at the request of the Fisheries Committee, but due to space considerations they were not included in the Final Report. The three Concept Notes covered the following topics: (i) development of a Fisheries Management Information System; (ii) Sturgeon Stock Enhancement, including construction of a new sturgeon hatchery and renovation of existing facilities; and (iii) provision of Legal Expertise for drafting of a fisheries-specific legal framework.
EXECUTIVE SUMMARY

1. The Kazakh fisheries sector has good potential to contribute to economic development and environmental sustainability, but it could benefit from more government attention and resources. The sector is much more important than is commonly acknowledged, and can help advance the development of the country, particularly in rural areas. Yet this potential is at risk of being squandered if management of the sector is not improved. And it is primarily the responsibility of Government to take the actions required to ensure the sector’s sustainability and growth.

2. The fisheries sector has significant value in terms of income, growth, employment, agricultural exports, opportunities, and biodiversity. This value is not always reflected in official statistics. The reason for this is that fish are different from other agricultural products. They are largely invisible in the wild, they cross national and international boundaries, and it is difficult or impossible for individuals to enforce property rights over them. As a result, they are largely public goods, and in Kazakhstan they are the property of the State. But if Government does not enforce its rights over fish resources and manage them efficiently by limiting off-take, the resources will be over-exploited. This is in effect what is happening today. The lack of enforcement is reflected in the fact that the majority of landings are thought to go unrecorded.

3. Because most landings go unrecorded, the majority of activity in the fisheries sector takes place in the underground economy and does not register in official data. For example, the Fisheries Sector Study Team (FSST) estimates that actual production is 3-4 times declared landings. As a result, the true contribution of fisheries to GDP is likely around 0.75%, as opposed to the 0.2% official figure. The same is true for employment in the sector. While official figures indicate that the sector employed only 13,200 people in 2002, the FSST estimates that this figure could be as high as 110,000, more than the oil and gas sector. Most of this employment occurs in rural areas where there are few other jobs. Fisheries also contribute to rural livelihoods by providing an alternative activity to agriculture in winter and by furnishing an important source of animal protein.

4. It is perhaps because much of the sector’s activity goes unreported that much of its importance is unrecognized. The main policy documents on development of Kazakhstan’s rural sector, agriculture and food security generally do not address the development of the fisheries sector, despite its importance. For example, neither the State Agricultural and Food Program for 2003-2005 nor the President’s recent address to the Republic updating the status of the program discusses the fisheries sector (though they do mention land, water, and forest resources; livestock; wheat; etc.). The Participatory Rural Sector Planning and Development Report only mentions it in passing, although it does cite its significance among agricultural exports. One positive sign is that in December 2003 GOK approved the Fisheries Development Program for 2004-2006 prepared by the Fisheries Committee, whose objectives include improving the legislation, protection, reproduction and science for fisheries resources. This is already helping to increase the visibility of the sector and the support it receives from Government. However, the three-year period encompassed by the Program is relatively short in comparison to the development needs of the sector, and this study takes a medium- to long-term approach instead.

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1 One possible reason is that fisheries did not become a part of MOA until 2003.

2 To Competitive Kazakhstan, Competitive Economy, Competitive Nation, Address of the President to the Kazakh Nation, Astana, March 19, 2004.

3 Participatory Rural Sector Planning and Development, Final Report, February 2003, Scanagri, ADB and GOK
5. The fisheries sector also contains the seeds for strong growth in the future. As with the data on production, the FSST estimates that per capita fish consumption is 8.6 kg/person/year, more than twice as high as the official figure, and even official data show that total retail fish sales in the country have doubled over the past decade. However, even this per capita consumption figure is only half what it was during the Soviet period, and the FSST believes there is plenty of room for growth in demand. Current consumption is only half of the world average, and evidence from other countries with rapidly growing incomes, such as China, demonstrates that fish consumption tends to follow suit. There are also good opportunities for expanding exports. While sturgeon caviar remains the most valuable fish product on world markets, the total value of Kazakhstan’s pike-perch fillet exports (mostly to the EU) now surpasses the value of caviar exports. Partially as a result, Kazakhstan currently enjoys a fish trade surplus in value terms. There are also increasing regional opportunities in the rapidly growing and fish-loving economies of Russia and China.

6. Unfortunately, many of the opportunities for growth may never be realized due to the precarious state of Kazakh fish stocks and their management. While catches are undoubtedly higher than the official figures, they have been steadily decreasing over time (even during the Soviet period). Though the reasons are diverse, the increasing pressure on stocks from fishing is certainly one of the primary causes. This is particularly true for high-value species such as sturgeon, pike-perch and common carp, the landings of which have dropped considerably over time. Meanwhile, lower-value species such as bream are largely avoided and as a result their numbers now make up approximately 80% of stocks.

7. Other threats to fish resources are environmental in nature. These include changes in water quality and quantity and introduction of exotic species. Due to its wealth of inland water environments, Kazakhstan is blessed with a high fish diversity of 151 species. However, many of the indigenous species are now under threat (the Red Book of Kazakhstan lists 16 fish species as threatened). One of the biggest reasons has been the large-scale environmental changes wrought by construction of dams and reservoirs, and changes in the hydrologic regime, the destruction of the Aral Sea commercial fishery being the prime example. The decimation of local species has often been followed by the introduction of exotics, whose impact on the ecosystem, and in particular on other fish species, is often unknown. Water pollution from oil, heavy metals, phenols, pesticides and other industrial chemicals have also been taking their toll. In important fisheries such as the Ural-Caspian basin where oil is also extracted, the oil and fishing sectors must learn to live together.

8. In a market economy, the productive roles such as catching, processing and marketing of fish should rightly be played by the private sector. However, the significant actions necessary to combat the threats to fish stocks are mostly beyond the capacity and scope of the private sector (though the private sector can help). Rather, this is primarily a role for government. The objective of this study is to work with GOK to assess the need for improved public policies, institutions and investment in order to facilitate the establishment of demand-driven production and marketing systems that contribute to economic growth, poverty reduction and food security, particularly in rural areas, while ensuring the sustainable management of fisheries resources. The study was carried out under the Joint Economic Research Program (JERP) between the World Bank and the GOK, and also received support from the Japanese Global Trust Fund for Sustainable Fisheries. In addition to this report, the study also includes stakeholder workshops and capacity building for the team of Kazakh specialists.

9. During the course of this study, the FSST has carried out extensive field visits to all the major fisheries of Kazakhstan and has held discussions with hundreds of stakeholders representing
all facets of Kazakh fisheries, including administrators from the republican, basin and oblast levels; researchers; fishers and fishing cooperatives; processors and traders; inspectors; fish farmers and hatchery operators; local and international NGOs; foreign agencies active in the fisheries sector; and representatives of other relevant ministries (including MOEBP, MEP, MOT, and MOF). The FSST also met on several occasions with officials of the Ministry of Agriculture (the main ministry responsible for fisheries), including the First Vice Minister, and presented initial results of the study at a workshop with the Fisheries Committee (FC) in November 2003. The FSST consisted of a team of Kazakh and international experts, and collected background information from many sources. The recommendations presented here are the result of that work, and reflect the FSST’s extensive knowledge of local conditions and international best practice. In response to the FC’s requests and the sector’s needs, the FSST has also prepared concept notes for implementing some of the study recommendations, and these have already been shared with Government. The results of this study were presented and discussed at a stakeholder workshop in Astana, Kazakhstan in October 2004.

HOW CAN THE SECTOR REACH ITS POTENTIAL?

10. In order to combat the threats to Kazakh fisheries and enable the sector to achieve its significant potential, Government should:

(i) Improve the institutional framework for fisheries management;
(ii) Enhance marketing of fish products and access of fishers and processors to markets; and
(iii) Increase investment in technology for the sector.

IMPROVE MANAGEMENT

11. The most important challenge is to improve fisheries management by addressing the following issues:

- The legal environment;
- The system for allocating use rights;
- Monitoring, Control and Surveillance; and
- Decentralized decision-making and co-management.

12. The first priority is the creation of a legal framework for fisheries. Currently, Kazakhstan has no fisheries law, but instead manages the sector based on a patchwork of old laws on protection of fauna, and sections of various codes (including Water, Forest and Land Codes). These laws are insufficient and lead to confusion between different government agencies, weak capacity for controlling fisheries activities, and the inability to decentralize decision-making (co-management). The FC has recognized this and has already begun drafting a new law. This law should be developed in consultation with fisheries stakeholders to the greatest extent possible. The FC has requested the help of the FSST to incorporate international best practice, and the FSST has responded with guidance and with an outline Concept Note for the task.

13. The allocation of use rights is an important feature of fisheries management that should be spelled out in the new law. Since fish are essentially a public resource, it is the responsibility of Government to define access. The current system of allocating catch quotas is based on “tenders” that are not determined by price bids, but instead on a combination of rather unobjective criteria. As a result, the system lacks transparency, is inefficient, marginalizes produc-
ers, and does not maximize resource rents for Government. Alternatives to the current system should be explored that utilize a combination of input and output management techniques driven by the primary policy objective of GOK: efficiency or equity. For efficiency, a public auction with minimum threshold would produce improved results and increased rents for GOK. For equity, a different approach, for example only allocating quota to fishers’ associations, could spread the benefits more evenly.

14. **The next priority is to improve Monitoring, Control and Surveillance (MCS).** Without improved MCS, it will be impossible to implement, enforce and monitor the impact of the new law (or even the current regulations) and improve management of the sector. An important aspect of improved MCS for Kazakhstan will be the development of a proper Fisheries Management Information System (FMIS) to provide timely and accurate data upon which sound management decisions can be based. The FMIS should also include an “Information Analytical Center” for analysis and dissemination of the data. The FC has recognized the importance of such a center, and the FSST recommends that it be integrated into a comprehensive FMIS. The FSST has provided a Concept Note with guidelines and requirements for developing an FMIS. Improved MCS should also include increasing the maximum fines for infringement of regulations and rationalizing the judicial system for prosecuting offenders. Improving MCS is a long-term process that is related to and can begin simultaneously with improving the legal environment and allocation of use rights.

15. **The final priority in improving the institutional framework for fisheries management is to gradually decentralize decision-making by moving towards a system of co-management.** Co-management is an innovative approach that involves the sharing of responsibility and authority over management between the State and local resource users. This is in contrast to the current system, which takes a “top-down” approach whereby all of the decisions are made at the central government level. This approach cannot be maintained in Kazakhstan because it is very resource intensive, and is largely ineffectual due to the great distances involved, low capacity and corruption among inspectors, and inadequate resources. The result is a largely open-access fisheries sector. Co-management in contrast confers legitimacy and fosters compliance by allowing fishers to participate in decision-making. Co-management is also less resource-intensive to implement. However, it does require considerable building of capacity in both Government and among fishers. In addition, there are different degrees of co-management that are appropriate for different situations, and it will likely work best on smaller water bodies. The FSST recommends a gradual and differentiated approach depending on the fisheries system. It could begin with a pilot on a mid-sized water body. In contrast, sturgeon are treated as a special case due to their high value and threatened status, and therefore re-nationalization of the sturgeon fishery is recommended.4

**ENHANCE MARKETING**

16. **In parallel with ensuring the sustainability of capture fisheries, Government has a role in enhancing the marketing of fish products and market access of fishers and processors.** Investment is increasing in the sector, particularly in high-value-added activities like frozen pike-perch fillet production for the export market. While the private sector should take the lead in marketing and processing, Government still has an important role to play in creating a healthy business environment by implementing the recommendations on improved management. In relation to the processing sector, roles for GOK also include improving sanitary and veterinary standards in order to reassure consumers, thereby increasing demand and consumption, and also facilitating increased access to export markets. GOK could also fund research on technology for small-scale farming of sturgeon could still be carried out by the private sector, although this would require strict controls and monitoring of trade to avoid any “leakages”.

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4 Farming of sturgeon could still be carried out by the private sector, although this would require strict controls and monitoring of trade to avoid any “leakages”.
value-added canning of abundant low-value species like bream and kilka. Business and marketing skills are also lacking in the sector, and GOK could help to enhance these by establishing fisheries business advisory services, perhaps in combination with the more general advisory services provided to small and medium enterprises through the Small Entrepreneurship Fund (though fisheries enterprises have special needs). Government could also spur investment in new technology through matching grants for private investments in demonstration processing facilities and marketing infrastructure like cold storage.

17. **Government also has a role to play in increasing returns to fishers from the market.** Currently, fishers appear to be marginalized by the market and do not receive fair returns for their efforts, often getting paid 25% or less of the market value of catch. This is particularly true in the cases where processors have monopsony power on purchases for a water body. This is reinforced by the quota system, which fishers typically cannot participate in. Strengthening their bargaining power through co-management can increase returns to fishers. This would help to reduce rural poverty in fishing communities. GOK can also help by investing in improved infrastructure for the sector. Fishers are currently dependent on seasons and proximity to cities because transportation infrastructure is often poor and few have access to cold storage. Returns to fishers would be increased through paving access roads, constructing wholesale markets and landing facilities, improving the marketing information system, and encouraging development of micro-finance institutions in rural areas to enable fishers to invest in their own storage and processing technology.

**INVEST IN TECHNOLOGY**

18. **With growing demand, and fish stocks already under pressure, Kazakhstan will have to develop alternative, competitive sources of fish production if it does not wish to fill the gap with imports.** The obvious alternative is to promote aquaculture production, as well as enhance capture fisheries with hatchery production of stocking material and increase the harvest of under-exploited aquatic resources. While Kazakhstan formerly had a well-developed and productive aquaculture sector, the sector has fallen on hard times and production has plummeted. Government can encourage the development of the sector through privatization of the existing large-scale hatcheries to increase their efficiency, itself only running small pilot hatcheries to develop and promote new technologies, such as production of salmonid species like trout, and the strategically important sturgeon hatcheries.

19. **Government could also encourage aquaculture by sponsoring pilot studies on production of high-value species** like common carp and sturgeon in lakes. Aquaculture of species like trout could be promoted by lowering the costs of feed through development of a formula based on locally available materials, including under-exploited fish food organisms (e.g., artemia, gammarus, zooplankton). GOK could open the use of discharged thermal water from power plants for fish culture, which proved highly productive in the past. GOK could also improve the climate for investment in pond culture by clarifying tenure laws. Finally, underutilized resources such as crayfish hold much promise for the export market, if local producers can be provided with information and contacts in the lucrative EU market. These are long-term efforts, while privatization of large-scale Government hatcheries is a more immediate need.

**REFORM THE ADMINISTRATIVE ORGANIZATION**

20. In order to effectively carry out responsibilities and implement the innovations outlined above, **one requirement that cuts across all the others is administrative reform.** The current administrative organization is overly complicated, making it difficult to take the actions necessary for the
fisheries sector to reach its potential. Currently, at least four departments within MOA and twelve additional government agencies are involved in managing different aspects of the sector. While stakeholder participation should be encouraged, there appears to be no representative body coordinating the activities of the various agencies. This leads to unclear divisions of authority and slow decision-making.

21. The major recommendations of the FSST are that fisheries administration should be consolidated within one department, the Fisheries Committee, and that management decisions should be decentralized more to involve the fishers by moving towards co-management. There have been several organizational changes in fisheries management over the past 5 years and this process continues, with the re-introduction of the Fisheries Committee and basin directorates in 2003. These are positive developments, but the current arrangements remain complex and more needs to be done to improve and simplify them. However, in order to carry out its responsibilities effectively, the FC will have to increase its own capacity for management and research.

INCREASE PUBLIC SUPPORT TO THE SECTOR

22. Implementing the recommendations contained in this report, and allowing the fisheries sector to reach its potential, requires money. It requires sufficient and sustained funding from the public sector. Of course, this funding should be based on the principles of cost-benefit and cost-effectiveness analysis, should result in measurable improvements in the quality and efficiency of public service delivery, and should be increased gradually only as the FC demonstrates the capacity to use the additional resources effectively and efficiently. While there are many factors that influence the cost of the main components of fisheries services and their relative budget allocation within a country, analysis of international good practice suggests that the current level of public funding for fisheries services in Kazakhstan is insufficient. The average expenditure on general fisheries services across OECD countries is 13% of the value of landings. The relative level of funding in Kazakhstan is below this, particularly when the true volume and value of landings is considered. In addition, Kazakhstan is now in a period of transition to improved fisheries management, and the investments necessary to complete this transition will require an even higher level of funding in the short term. For example, the recommendations for the drafting of a fisheries legal framework, development of an FMIS, increasing research capacity and other specific investments entail substantial initial outlays. However, with the great potential exhibited by the fisheries sector in Kazakhstan, these are considered necessary and appropriate investments to support the future of the sector.

23. The sequencing of the recommended interventions should be discussed among Government and other stakeholders, and will depend on political and economic realities. However, the effective implementation of all other recommendations will depend on the reform of the administrative organization of fisheries management, and it is therefore strongly suggested that this be the first order of business. The creation of a legal framework for fisheries is the next activity that should be undertaken (and a draft law has reportedly already been prepared and is being considered by GOK). The legal work will take time, and other recommended actions can begin simultaneously. These include improving Monitoring, Control and Surveillance, developing a Fisheries Management Information System, improving access to markets, and privatizing large-scale hatcheries. While trials of co-management can begin in the near term on a pilot basis using, for example, a presidential decree, in the long term a sound basis in law will be required for dissemination of the practice on a wider scale (using lessons learned from the pilots). Investment in technology for aquaculture will also be a long-term effort.

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5 The provisional FMIS development budget (see Annex) is KZT 75 mil. (US$ 500,000). If GOK decides to go ahead with a proposed new sturgeon hatchery, based on World Bank experience with the construction of a modern facility in Azerbaijan, this could cost KZT 1,350 mil. (US$9 mil.), or nearly 4 times the total 2002 fisheries budget.
1. SETTING THE SCENE

1.1 The objective of this study is to assess the need for improved public policies, institutions and investment in order to facilitate the establishment of demand-driven production and marketing systems that contribute to economic growth, poverty reduction and food security, particularly in rural areas, while ensuring the sustainable management of fisheries resources.

1.2 The stated objective of GOK is to restore consumption of fish to pre-independence levels of 17 kg/person/year⁶ (compared to a current official figure of 3.5 kg).⁷ They would also like to meet as much of the demand as possible with domestic production. While it is of course impossible to prescribe consumer behavior in a market economy, the Fisheries Sector Study Team (FSST) believes that GOK’s objective can be achieved over time, particularly if incomes continue to rise as rapidly as they have over the recent past (per capita GDP increased by 50% from 1999-2003).⁸ The fisheries sector is more significant than it seems, and shows good potential. However, achieving GOK’s objective will require: i) ensuring the sustainability of capture fisheries; ii) enhancing marketing and market access; and iii) increasing investment in technology. For these three priorities to be realized, more public involvement will be necessary.

A. THE SECTOR HAS GOOD POTENTIAL

THE SECTOR IS MORE SIGNIFICANT THAN IT SEEMS

1.3 The sector has significant value in terms of income, growth, employment, agricultural exports, and opportunities, and this is not always reflected in official data. While official figures show a gradual decrease in the volume of catches over the last decade from 68,600 mt in 1990 to 36,700 mt in 2000, there is plenty of evidence that much of the actual catch goes unrecorded. Household survey results indicate that per capita consumption of fish is actually in the region of 8.6 kg/person/year.⁹ Summing fish consumption across the population and netting out imports, the FSST estimates that actual production is 3-4 times declared landings, or about 121,000 mt for 2002.¹⁰ This is equivalent to a true contribution of fisheries to national GDP of 0.75% (as opposed to the official 0.2% figure), or nearly 8% of the value of production from agriculture, hunting, forestry and fisheries. Contrary to the official figures,¹¹ it is also estimated that a national average of 10% of the rural economy may be involved directly in the sector, and in some areas this figure may be as high as 30%. With a nationwide working rural population of 1.1 million, this means that 110,000 are employed by the sector, almost twice as many as the 58,000 employed by the oil and gas sector. Most of this employment occurs in rural areas where there are few alternatives for income generation. Officially, fish and fish products are the fourth most important agricultural export (ahead of

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⁶ As communicated to the FSST by the FC Chairman during the workshop of November 2003.
⁷ This compares to an estimated world average consumption of 15.8 kg/capita/year in 1996, with a range from less than 2 kg/capita/year in a number of sub-Saharan African countries (e.g., Ethiopia, Sudan) to 70.9 kg/capita/year for Japan (Yimin Ye, 1999, Historical Consumption and Future Demand for Fish and Fish Products, FAO).
⁸ Living Standards Assessment in Kazakhstan, the World Bank, 2004.
¹⁰ 127,000 mt total consumption + 26,000 mt exports – 32,000 mt imports = 121,000 mt total domestic production (2002, State Statistics Agency).
¹¹ The official employment figure for the sector is 13,500 (2002, State Statistics Agency)
livestock), and the third most important agricultural export to non-CIS countries after grain and cotton (and unofficially, this figure is probably even higher).\(^1^2\) (See Annex H for a summary of key statistics used in this report.)

1.4 The sector is an important part of diversified livelihood strategies in rural areas, contributes to poverty reduction, and also provides an important source of animal protein. Given that 110,000 rural residents may be employed by the sector, this implies that +300,000 people are dependent on it for their livelihoods nationwide.\(^1^3\) Most fishers operating in the sector nationwide are artisanal, working on small vessels or in small groups using beach-seines, and many appear to be marginalized, operating at or near the poverty line.\(^1^4\) In the approximately 150 fishing communities in Kazakhstan, virtually every household is in possession of some fishing gear, and those not engaged in commercial fishing as a primary profession will still participate in subsistence fishing to augment their incomes and add animal protein to their diets. Many households that engage in agricultural production, which is only possible during summer months when fishing is much reduced, will fish during the winter. The FSST estimates that the size of the subsistence fishery alone is at least 2,000 mt per year.\(^1^5\) Given that the incidence of rural poverty is twice that of urban poverty at 21.7% of the population, and that food constitutes 67% of expenditures by poor households, this represents an important contribution to rural livelihoods and food security. Food security is the major goal of the 2003-2005 State Agricultural and Food Program (though it does not specifically address the contribution of fisheries).\(^1^6\) Increasing incomes of rural households through livelihood diversification using high-value products with export potential like fish is also a key recommendation of the World Bank’s global strategy for reducing rural poverty.\(^1^7\)

1.5 The sector could generate significantly higher revenues for Government than is currently the case. Government is currently only receiving in the region of KZT 110 million (US$ 0.73 million) per year from fish quota revenue. However, taking into account the significant value of unreported landings, and assuming that the value of quota revenue directly reflects the true value of resource rent, the FC could be receiving 3-4 times what it is currently receiving in payments for quota—between KZT 330-445 million (US$ 2.2-2.9 million). In addition, the Fisheries Committee has recently proposed increasing quota (or “bioresource user”) fees by up to five times for some species. This combined with improved management (MCS) has the potential to significantly increase GOK’s share of the resource rents (although care must be taken not to “squeeze” fishers to the point where they cannot earn a living). Other revenues would be generated from taxes on increased incomes in the service sector providing support to fisheries (e.g., outboard motor repair, net mending, fish food, ice manufacturing, transport, etc.).

\(^{12}\) State Statistics Agency.

\(^{13}\) Using a conservative multiplier effect for households of 1 economically active person supporting 3 dependants

\(^{14}\) Artisanal fisheries are defined by the FAO as traditional fisheries involving fishing households (as opposed to commercial companies), using relatively small amounts of capital and energy, relatively small fishing vessels (if any), and making short fishing trips close to shore. Artisanal fisheries can be subsistence or commercial, providing for local consumption or export. They are sometimes referred to as small-scale fisheries.

\(^{15}\) In 2002 the national average salary for a fisher was KZT 5,962 per month compared with a declared minimum salary (by the GOK) of KZT 4,181 per month and a national average salary (across all sectors) of KZT 21,266 per month. Anecdotal information from interviews conducted with fishers in several regions suggests that the annual incomes of fishers vary widely between KZT 53,000-180,000.

\(^{16}\) This figure is crudely calculated based on a per capita consumption of 8.6kg multiplied by 75% of the estimated number of people directly and indirectly reliant on the fisheries sector (300,000). It does not take account of informal trade in fish within the rural economy.

\(^{17}\) The State Agricultural and Food Program of the Republic of Kazakhstan for 2003-2005, Presidential Decree #889, June 5, 2002, Astana

\(^{18}\) Reaching the Rural Poor I: Strategy and Business Plan, Agriculture and Rural Development (2002), the World Bank.
Kazakh fisheries are rich in biodiversity, with several distinct fisheries basins. While Kazakhstan is a land-locked country, it is still blessed with a diversity of rich fisheries in numerous water bodies and basins (see map, Annex I). The Ural River-Caspian Sea fishery is the best known and most important, officially contributing about 40% of the total harvest from capture fisheries in 2003, but other significant fisheries include the Balkhash-Alakol basin (approximately 31% of total) and the Bukhtarma/Zaisan reservoir (21%) (see Figure 1.1). In addition, each of the basins has a unique fish fauna, and this contributes to a high fish species diversity of 151 species for Kazakhstan. The best known of these is the Caspian sturgeon, whose caviar is the most valuable wildlife product in the world (worth up to $3,000/kg). But other valuable species include the pike-perch, several species of carp, catfish, perch, roach, sprat and crayfish. Based on physical and production features, Kazakh fisheries can be divided into the following five basins:

(i) **Ural-Caspian Basin** includes the Caspian Sea, part of the Volga delta, the Ural, Kushum and Emba Rivers and their floodplain lakes.

(ii) **Aral-Syr Darya Basin** includes the northern Aral Sea, the Syr Darya River, the Shardarya Reservoir, smaller irrigation reservoirs on tributaries of the Syr Darya, and lakes and reservoirs of the Talas and Chu basins.

(iii) **Balkhash–Alakol Basin** includes the lakes of Balkhash and the Alakol system; deltas of the rivers Ili, Tentek, Aksu and Lepsy; the Kapchagay Reservoir; and a number of smaller reservoirs on the rivers flowing into Balkhash and Alakol.

(iv) **Irtysh–Zaysan Basin** includes the Irtysh River; delta of the Black Irtysh River and floodplain lakes; steppe lakes of the right bank of the Irtysh; and the Reservoirs of Bukhtarma, Ust-Kamenogorsk and Shulba.

(v) **Steppe region (Northern and Central Kazakhstan)** includes about 7,000 lakes up to 15 km long.

The FC has decided to take a basin approach to fisheries management and has formed, or is in the process of forming, Interoblast Basin Departments for four of these basins. They are to be commended for this. The exception is the steppe region, which has received little management attention even though the local population catches significant quantities of fish—reportedly up to 20,000 mt/year or about the same as in Balkhash–Alakol or Irtysh–Zaysan basins.

**Figure 1.1: Capture fisheries in Kazakhstan by basin, share of total volume (2003)**

![Capture fisheries in Kazakhstan by basin, share of total volume (2003)](image)
THE SIZE OF THE DOMESTIC MARKET FOR FISH

1.7 Demand is difficult to assess, but seems to be increasing, and differs greatly by region. Problems associated with estimating the demand and consumption of fish are well illustrated by the fact that registered retail sales of fish and fish products have doubled from approximately 27,000mt in 1992 to 52,000mt in 2002 (see Figure 1.2). This is contrary to the view of the Fisheries Committee (as reported in the Development Program 2003-2007) that fish consumption has declined over the past decade and is equivalent to a current per capita consumption of approximately 3.5 kg/year. As mentioned above, true consumption is probably in the region of 8.6 kg/person/year. If correct this means that given a population of 14.8 million, the total consumption of fish may be in the order of 127,000mt. As in virtually every other country in the world, these figures are expected to increase as incomes increase in Kazakhstan.

Figure 1.2: Total retail sales of fish and fish products in Kazakhstan, mt (1992-2002)

1.8 The supply of fish to local markets is probably much greater than official figures indicate. GOK import statistics specify that 32,800mt of fish and fish products were imported in 2002, 50% of which was value-added and 50% frozen fish (primarily marine species). If we assume that these imports are ready to consume products rather than raw material, then the domestic market was supplied with approximately 95,000mt (127,000 less 32,800) of fish and fish products from local production. This is 80% more than the reported retail sales, 50% more than the allocated quotas and between 150-250% more than the declared catches. Furthermore, as some of the domestic consumption and 25% of the exports are in the form of processed (value-added) products, the supply in landings of fresh fish equivalent is likely to have been even higher, possibly by as much as an additional 10%, or a total of over 100,000mt.

INCREASING DOMESTIC CONSUMPTION

1.9 Current patterns of consumption: Kazakhs do eat fish. Although further research is required on ethnic patterns of fish consumption, it is considered a misconception by the FSST that the Kazakh population does not eat fish. Fish marketing data provided and analyzed for the study

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19 Source: official data from the Fisheries Committee, Ministry of Agriculture
clearly indicate that many ethnic Kazakhs include fish as a normal part of their diet, and it plays an important role in traditional cuisine.\textsuperscript{21} Further, the Atyrau Region has the highest per capita fish consumption, and also has a majority ethnic Kazakh population. The key problems for the sector are more related to matching demand with supply;\textsuperscript{22} the species mix of fish landed and the fact that consumer demand (and preference) in the urban economy varies by season. In addition certain locally produced value-added products (in particular frozen pike-perch fillets) have an opportunity cost on the domestic market in relation to export, where there is a ready market, particularly within the EU.

1.10 **Consumption is likely to increase naturally over time with incomes, and more rapidly in urban areas.** According to the household survey conducted in 2002 the average consumption in rural areas was 7.5 kg/person compared with an urban consumption of 9.4 kg/person\textsuperscript{25} (see Figure 1.3). Consumer purchasing power in rural communities is generally low when compared to consumers living in the towns and cities. The actual (and potential for increasing) consumption of value-added products in the urban environment is therefore likely to be significantly higher than in the rural economy, and will continue to grow as incomes rise. For the population as a whole, incomes have been rising by more than 10% per year, and experience from other countries with rapid income growth shows that fish consumption tends to follow suit.\textsuperscript{26} There has been little or no demand-stimulating activity by the market participants, so it is likely that demand has plenty of potential for growth.

**Figure 1.3: Consumption of fish and canned fish, kg/capita/year (1998-2002)**\textsuperscript{27}

![Bar chart showing consumption of fish and canned fish, kg/capita/year (1998-2002)](image)

1.11 **Consumption and market access seem to depend to a large extent on the proximity of communities to water bodies and availability of infrastructure, including roads and a cold chain.** Consumption patterns vary greatly by region: from 16.8 kg/person in the West KZ Oblast, to 4.8 kg/person in Almaty Oblast and 1.2 kg/person in South KZ/Mangistau Oblast. Consumers prefer fresh fish, and there is little cold storage available, so fishers must get their catch to market as soon as possible. This is only possible when transport infrastructure is good

\textsuperscript{21} Recorded as a total quota of 63,493mt in 2002 (data provided by the Fisheries Committee).

\textsuperscript{22} Dependent on which data is more accurate – the Fisheries Committee states that the declared landings were 37,161mt in 2002 whilst the GOK Statistics Agency state only 27,000mt.

\textsuperscript{23} *National Kitchen of the Kazakhs*, Almaty, 1990.

\textsuperscript{24} This is because many small co-operatives/enterprises do not have sufficient cold storage capacity for handling large landings (often of low valued species that have limited potential for value-adding). This may partly explain why 75% of the official fish exports (based on 2002 data) are frozen fish (primarily to Russia, where there is a large market for low valued species).

and population centers are nearby. Incomes and per capita fish consumption are highest in the oil-rich Atyrau Region (the Ural-Caspian basin), which also has the highest fish production, although Almaty remains the largest market due to its larger population. If transport and cold chain infrastructure improves, markets will expand away from water bodies.

INCREASING VALUE-ADDED EXPORTS AND REGIONAL MARKETS

1.12 The current situation in fish products trade is not as bad as is thought. The FC has expressed concern that more needs to be done to increase the value-added of exported fish and fish products from Kazakhstan. An analysis of data by the FSST however suggests that although exports are less than imports in volume terms, their market value is greater due to the more expensive export portfolio, resulting in a trade surplus of nearly US$ 6 million (see Figure 1.4). Most of the imports are marine fish, which are not found in Kazakhstan. Of the total exports, 25% is value-added (such as pike-perch and caviar) and 75% is frozen fish. The latter is primarily low-value fish (non-common carp and bream) that is surplus to local demand and difficult to add value to through processing. This fish is purchased by mostly Russian traders for export. In fact, regional exports are growing, especially from those basins bordering Russia. Russia is the most significant trading partner for Kazakhstan, accounting in value terms for 69% of exports and 56% of imports of fish and fish products. Demand in Russia is likely to continue to increase as incomes grow there as well. In addition, neighboring China presents a huge and largely untapped market for Kazakhstan. China dominates world fish consumption, accounting for 36% of the market (with most growth coming from freshwater fish), but represents less than 1% of Kazakhstan’s exports. Overall, according to official GOK statistics the most valuable export in 2002 was not caviar but rather pike-perch fillets stimulated by strong demand in the European Union countries, mainly Germany. WTO accession will have little impact on the fisheries sector as there are currently no tariffs or other major trade barriers.

Figure 1.4: Trade in Fish and Fish Products (1995-2002)

C. PRIORITIES FOR DEVELOPMENT

1.13 In order to allow the sector to reach its potential, the priorities are to: (i) ensure the sustainability of capture fisheries; (ii) enhance marketing and market access; and (iii) increase investment in technology. More public involvement is necessary to address these priorities.

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28 C.L. Delgado et al., 2003, Outlook for Fish to 2020: Meeting Global Demand, IFPRI/WorldFish Center.
29 Source: Statistics Agency of Kazakhstan.
i) Ensure Sustainability of Capture Fisheries

1.14 Capture fisheries are under threat. While production from capture fisheries appears to have stabilized for the moment, there is evidence of increasing pressure on high-value species like sturgeon, pike-perch and common carp, and this will only increase with the expected growth in demand. Combating these threats requires improving the institutional framework for fisheries management by enhancing the allocation of use rights, MCS (Monitoring, Control and Surveillance), and the legal framework. Potentially, the efficacy of these changes could be increased and their costs decreased by moving towards a system of decentralized decision-making, or co-management, where appropriate.

ii) Enhance Marketing and Market Access

1.15 In a market economy, the private sector should take the lead in marketing and processing, because commercial activities are carried out more efficiently by private rather than state owned enterprises. But there are still some important roles GOK can play in promoting fish consumption by providing public services. Areas of appropriate intervention for the State include the generic promotion of fish consumption (including in export markets), improvements in data collection and accuracy, the establishment of a marketing information service, and the regulation of quality standards. Encouraging foreign direct investment, and improving domestic infrastructure, is probably more important than increasing exports.

iii) Increase Investment in Technology

1.16 Aquaculture has the potential to increase production to help meet the growing demand. As demand for fish grows, and wild fish stocks are exploited to their sustainable limits, a gap in supply will develop that will either have to be met by imports or by domestic aquaculture production. But in order to develop aquaculture and fisheries in general, investment in research and development of technology is required.

D. MORE PUBLIC INVOLVEMENT IS NECESSARY TO ADDRESS THESE PRIORITIES

1.17 Fish can be managed as a common property resource to maximize the economic benefits to society, or left in a state of open access such that rents are dissipated. Fisheries resources, particularly in capture fisheries, are unlike other agricultural products. In the wild, they are largely invisible, they cross national and international boundaries, and it is difficult or impossible for individuals to enforce property rights over them. As a result, they are largely public goods, and in Kazakhstan they are the property of the State according to the Constitution of the Republic. If Government or another entity does not enforce its property rights over fish resources and manage them efficiently by limiting off-take, the resource will be over-exploited and the potential economic benefits will be squandered.

1.18 For the sector to reach its potential, and be sustainable, Government has important roles to play. These include Monitoring, Control and Surveillance (MCS), allocating use rights and responsibilities, creating a good legal, policy and planning environment, promoting information collection and sharing, providing public infrastructure, funding research into widely appropriable technologies, safeguarding the environment and protecting strategic resources, and establishing grades and standards (see Table 1.1). All of these functions require sufficient and sustained funding from the public sector.

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30 The commercial catch of common carp ("sazan") in Lake Balkhash dropped from over 12,000mt per year in the 1960s to less than 40mt in 2002.
### Table 1.1: Fisheries roles within a market economy in Kazakhstan

<table>
<thead>
<tr>
<th>Activity within the Sector</th>
<th>Role of Government</th>
<th>Role of Private Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capture Fisheries</td>
<td>Management, data collection, regulation and structural support</td>
<td>Fishing activity to remain solely within the private sector</td>
</tr>
<tr>
<td>Fisheries MCS (monitoring, control and surveillance)</td>
<td>Primary responsibility of government to enact and enforce fisheries legislation. Strengthening/re-organisation of Fisheries Inspectorate Possible future partnership with fishing communities through a co-management regime</td>
<td>Limited capacity unless supported by voluntary compliance through a fisheries co-management regime</td>
</tr>
<tr>
<td>Environmental Protection</td>
<td>Lead responsibility of government (through regulation, monitoring and promotion of environmental awareness)</td>
<td>Private sector to be regulated and encouraged to internalise environmental issues</td>
</tr>
<tr>
<td>Fisheries Research (stock assessment)</td>
<td>Agree research strategy with private sector. Primary responsibility of FRPC through government contract</td>
<td>Fishing enterprises to work with FRPC to provide reliable data</td>
</tr>
<tr>
<td>Fisheries Restocking (stock enhancement of non-sturgeon species)</td>
<td>Agree restocking strategy with FRPC State to prepare and administer restocking contracts with hatcheries and number of state-owned hatcheries to be reduced</td>
<td>Currently no involvement Hatchery operations to be commercialised (and eventually privatised over a 5-10 year period)</td>
</tr>
<tr>
<td>Fisheries Restocking (stock enhancement of sturgeon species)</td>
<td>Agree restocking strategy with FRPC and international stakeholders (CITES etc) Hatcheries to remain under public ownership (but operate according to an agreed management plan)</td>
<td>No role for private sector other than supply of specialist goods and services (such as equipment, auditing of accounts etc)</td>
</tr>
<tr>
<td>Fish Processing and Food Safety Chain</td>
<td>Regulation, data collection and provision of Inspection Services</td>
<td>Respond to market forces and compliance with legislation</td>
</tr>
<tr>
<td>Domestic Fish Marketing Chain</td>
<td>Regulation, data collection and provision of Inspection Services Generic promotion of fish consumption</td>
<td>Wholesale and retail outlets respond to market forces Compliance with legislation No government owned wholesale markets</td>
</tr>
<tr>
<td>Export Fish Marketing Chain (for non-sturgeon species)</td>
<td>Regulation, data collection and provision of Inspection Services</td>
<td>Exporters respond to market forces Compliance with legislation</td>
</tr>
<tr>
<td>Export Fish Marketing Chain (for sturgeon)</td>
<td>Atyrau-Balyk to be re-nationalized and operated as a government-controlled monopoly (according to an agreed management plan)</td>
<td>Limited role for private sector because of strategic value and scarcity of resource</td>
</tr>
</tbody>
</table>
Organization of the Report

1.19 The rest of this report is organized into four chapters:

- Chapter 2 provides recommendations for ensuring the sustainability of capture fisheries;
- Chapter 3 provides recommendations for expanding markets for fish and fish products and increasing value added processing;
- Chapter 4 provides recommendations on investing in technology for the development of aquaculture, hatcheries and heretofore underutilized aquatic resources; and
- Chapter 5 discusses an issue that cuts across all the others—the reform of the administrative organization of the sector.

Annexes containing detailed information and case studies follow in Chapter 6.
2. ENSURING SUSTAINABILITY OF CAPTURE FISHERIES

2.1 In order for the Kazakh fisheries sector to reach its potential, the sustainability of capture fisheries must be ensured by reducing threats from overexploitation and environmental hazards. This will require improving the institutional framework for fisheries management. Specifically, the following aspects of fisheries management will have to be addressed:

- The system for allocating use rights;
- The legal environment;
- Monitoring, Control and Surveillance (MCS); and
- Decentralized decision-making and co-management.

2.2 First, it is important to have a good, clear and generally agreed upon definition of sustainability. One of the main causes underlying the decline in capture fisheries around the globe has been the narrow scientific focus of management. “Sustainable” yield has been the key goal of fisheries management efforts over the last few decades. However, this sustainability concept was applied—often in its most extreme form, seeking the Maximum Sustainable Yield (MSY)—to single fish stocks, particularly in temperate climate areas. These efforts failed for several reasons:

- Other aspects of the natural, human and management system were left out of the equation;
- The MSY approach largely ignored the risks of natural and human disasters;
- The single objective proved insufficient to provide a sustainable solution in the complex, multi-species realities of ecosystems; and
- Stakeholders did not participate in the management process.

2.3 In practice it is usually not easy to determine where the MSY is located until after substantial investment in fishing activity has already taken place. This illustrates the paradox of fisheries development in an open-access unregulated small-scale fishery (as is the case in most of the fisheries in Kazakhstan). Unless appropriate management measures are taken, the end result of any development will be an over-utilization of the fish stock, which is not biologically or economically sustainable, and an expansion of capacity (labor and capital) to exploit it. That is why an alternative definition of sustainability, such as Maximum Economic Yield (MEY) or Maximum Socio-economic Yield (MSEY), is usually preferred (see Box 2.1 for further discussion of sustainability definitions).

Box 2.1: What do we mean by sustainable fisheries management?

In simple terms, Maximum Sustainable Yield (MSY) is a theoretical point where the sustainable catch is the greatest—in other words the amount of fish caught is at a maximum volume for the amount of fishing effort used in the fishery. For species with fluctuating annual recruitment, the maximum might be obtained by taking fewer fish in some years than in others. MSY is also sometimes referred to as the maximum equilibrium catch. However, for reasons discussed in the main text, MSY is difficult to determine in practice, and does not normally maximize economic benefits.

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A more appropriate management objective is therefore to aim for the **Maximum Economic Yield (MEY)**. This is the sustainable yield where there is the greatest difference between the costs of inputs (fishing effort) and the value of outputs (catch), or where marginal cost equals marginal revenue. Thus, it is the yield where the difference between total revenue and total cost is at a maximum, and is therefore the most cost-effective sustainable yield (tons per unit of effort). The MEY is usually (but not always) attained at a sustainable yield less than the MSY, and therefore is an economic optimum for the management of the fishery. In other words, catching less fish means more marginal revenue to the fishermen.

Whilst MEY is the most appropriate economic goal for fisheries management, a state may alternatively wish to aim for some other policy goal(s) for its fisheries sector. These could include for example:
- The need for a redistribution of income (or minimum income) within fishing communities
- The need to reduce unemployment
- Maximizing contributions from fish exports to balance of payments

These issues do not concern the fisheries sector alone. In the case of unfavorable social conditions within a state, they can generally be dealt with through transfer payments or a change in policy. Therefore a country may wish to choose a policy objective to operate its fishery at a level other than MEY. This is called the **Maximum Social Yield (MScY)** or **Maximum Socio-economic Yield (MSEY)**. There is no precise method for determining MSEY. One approach is to use MEY as a starting point and move from it only when gains from policy objectives are felt to be worth the loss in economic efficiency. MSEY is invariably attained at a sustainable yield less than MSY but greater than MEY.

Source: FSST

2.4 **In general, management should strive for consistency with the FAO Code of Conduct for Responsible Fisheries**, and the FC should familiarize fisheries organizations and companies with its contents and with the supporting guidelines on inland fisheries and aquaculture. (see Box 2.2).

**Box 2.2: Code of Conduct for Responsible Fisheries**

The FAO Governing bodies recommended the formulation of a global Code of Conduct for Responsible Fisheries which would establish non-binding principles and standards for the conservation, management and development of fisheries. The Code, which was unanimously adopted on 31 October 1995 by the FAO Conference, provides a framework for national and international efforts to ensure sustainable exploitation of living aquatic resources. The Code recognizes the nutritional, economic, social, environmental and cultural importance of fisheries and the interests of all those concerned with the fishery sector. The FAO has a mandate to assist member states with the implementation of the Code. The objectives of the Code can be summarized as:

- Maintain or restore stocks at levels capable of producing maximum economic yield or maximum socio-economic yield (see Box 2.1).
- Remove excess fishing capacity
- Establish consultation mechanisms.
- Ensure biodiversity of aquatic habitats and ecosystems.
- Protect endangered species.
- Allow depleted stocks to recover.
- Assess and correct adverse environmental impacts of human activities.
- Introduce gear and techniques that minimize pollution, waste, discards, catch by lost or abandoned gear, and catch of non-target species.

http://www.oecd.org/document/2/0,2340,en_2649_33901_2346690_1_1_1_1,00.html

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32 The term "marginal" refers to the incremental costs and revenue associated with producing one additional unit (for example ton) of fish.
A. THREATS TO CAPTURE FISHERIES

LEVELS OF EXPLOITATION

2.5 Recorded catches have generally been declining over time. Capture fisheries has focused on achieving levels of catches close to allocated quotas, especially for the valuable fish species. But recently, the quotas have not been fulfilled. For 2003, there was a total quota limit of 58,662mt, but only 38,576mt were reported caught. However, as mentioned earlier, much of the actual catch goes unrecorded (see Figure 2.1). Most (if not all) of the fisheries under report their catch numbers both to the Statistics Agency and to the Inspectors in order to avoid taxes and other fees. So actual catches are probably several times higher, and likely exceed quotas. The lack of reliable data makes management difficult. Meanwhile, competition in production is increasing.

Figure 2.1: Official fish catches in Kazakhstan (1997-2003) and estimated true catch for 2002, '000 mt

2.6 Over-fishing is not an across the board problem, but limited to certain high-value species, while other less valuable species remain underutilized. While information is lacking, investigations by the FSST reveal that exploitation of less valuable, but common species, has been at a low level and in some water bodies they have not been exploited at all. Meanwhile, the stocks and sizes of valuable species keep declining due to unregulated selective fishing of valuable species with gill nets. For example, there is selective fishing for pike-perch in Bukhtarma/Zaisan (B/Z) and for sturgeon in the rivers entering the Caspian Sea, but under-exploitation of bream in B/Z and no fishing for small pelagic fish stocks in the Caspian Sea. From 1980 to 1997, the share of (valuable) large non-sturgeon species in catches decreased from 72% to 50%. Overall, the FSST estimates that low-value species such as bream currently make up about 80% of stocks. This is having a negative impact on fishers’ incomes.

2.7 Sturgeon and its caviar are the most valuable wildlife products in the world, and as a result are the frequent target of poachers. Other threats include damming of rivers, degrada-

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33 Although tax evasion probably occurs in all sectors of the economy, including other agricultural sectors, it is likely worse in fisheries because of the resource’s public good nature, and the use fees charged by government.

34 For example, in East Kazakhstan Oblast (Zaisan basin) alone, 80 fishing enterprises took part in a tender for quota in 2002.

tion of spawning grounds, and pollution (particularly phenol substances and pesticides). While there continues to be debate about the status of sturgeon stocks in the Caspian, and the sturgeon fishery is likely characterized by high IUU\textsuperscript{36} catches, what is clear is that recorded catches have been decreasing over time, and often do not even meet the quota (see Figure 2.2). The risk of doing too little to combat these threats may result in sturgeon coming close to extinction, especially the most valuable species—beluga (*Huso huso*).\textsuperscript{37} There are economic risks as well. CITES (Convention on International Trade in Endangered Species) has threatened a ban on international trade in caviar unless the Caspian states comply with the Paris Agreement of 2001.\textsuperscript{38} The U.S. has recently announced that beluga will be placed on its threatened list.\textsuperscript{39} According to FAO, methodologies of stock assessment for sturgeon and other valuable fish in the Caspian Sea may need to be improved as they were developed when fish stocks were abundant. As reproduction from wild stocks diminishes, hatchery production of fingerlings is becoming increasingly important. Kazakhstan currently has two sturgeon hatcheries producing 6 million fingerlings a year. However, the technology employed by these hatcheries is somewhat outdated, they do not have the capacity to maintain broodstock throughout the year, and there is currently no system in place to evaluate the impact of their activities.

**Figure 2.2: Sturgeon quotas and actual catches in the Ural-Caspian basin Kazakhstan, mt**

<table>
<thead>
<tr>
<th>Year</th>
<th>Quota</th>
<th>Actual Catch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>1750</td>
<td>1112</td>
</tr>
<tr>
<td>1993</td>
<td>1220</td>
<td>634</td>
</tr>
<tr>
<td>1994</td>
<td>1020</td>
<td>573</td>
</tr>
<tr>
<td>1995</td>
<td>716</td>
<td>368</td>
</tr>
<tr>
<td>1996</td>
<td>425</td>
<td>480</td>
</tr>
<tr>
<td>1997</td>
<td>480</td>
<td>491</td>
</tr>
<tr>
<td>1998</td>
<td>560</td>
<td>260</td>
</tr>
<tr>
<td>1999</td>
<td>435</td>
<td>309</td>
</tr>
<tr>
<td>2000</td>
<td>304</td>
<td></td>
</tr>
</tbody>
</table>

2.8 While sturgeon is the best-known case, Government also needs to be vigilant about overexploitation and the spread of disease with other high-value species, like pike-perch and crayfish. This requires carefully balanced exploitation. For example, the desire to increase stocks of pike-perch in Buktarma/Zaisan reservoir, where bream is the dominant fish, may be a problem because at high densities stocks are known to be vulnerable to the disease dermatofibrosarcoma (see Annex B). Recently, the percentage of infected fish in B/Z has reached 25-30% in protected areas where fishing is banned. This has shown that in such areas controlled fishing should be used to remove the affected fish, but at the same time the areas should not be fully opened for commercial fishing. The present statistics, compared with historical data, suggest that fish production in B/Z has stabilized, as the percentages of pike-perch and bream in today’s catches are close to those during the period 1976-1991. Unreported catches of pike-perch may, however,

\textsuperscript{36} Illegal, un-reported and un-regulated

\textsuperscript{37} With the exception of bastard sturgeon, these species are not listed as endangered by GOK (this would impose a fishing ban).

\textsuperscript{38} The Paris Agreement which commits the Caspian countries to make significant improvements in science, management and enforcement related to sturgeon populations.

substantially increase the percentage in the total catches, and if this is so, a careful re-evaluation of the possible impact of overfishing should be done as soon as possible.

ENVIRONMENTAL THREATS

2.9 Kazakhstan has high species diversity, but the fish fauna has been greatly modified by human activity. Kazakhstan is a land-locked country with numerous water basins and water bodies. Each of the basins has a unique fish fauna, and this contributes to a high fish species diversity of 151 species for Kazakhstan, of which 125 are indigenous, 50 are endemic, and 37 are endemic sub-species. In some basins the fish fauna has been greatly modified during the last 50 years as a result of human activities. These include 16 species listed in the Red Book of Kazakhstan, such as the Caspian trout, bastard sturgeon, Syrdarya shovelnose, Aral barbell, Turkestan barbell, pike-asp, and taimen (see Annex E for a complete list).

2.10 Besides fishing pressure, the major factors affecting fish stocks are changes in water quality and quantity, disturbances of the natural cycle of hydrological and biological events through damming and poor irrigation practices. Until recently, fisheries were only the fifth priority in water use for reservoirs constructed on major water bodies. International rivers shared by two or more states have been subjected to water flow modifications, irreversible uptake and pollution, leading to changes in biodiversity and requiring urgent measures for rehabilitation of some fish species on the verge of extinction. Damming of rivers has been a major problem, resulting in cutting the migratory path for some fish, loss of spawning grounds, and changing almost completely the biodiversity of the aquatic environment. Fish passes to assist in migration have proved largely ineffectual. Major fish losses also take place when fish pass through unprotected water intakes into irrigation systems. Protecting riverine fish species has proved to be costly and fisheries management has concentrated more on replacing such species rather than on protecting them from the impact of human activities. Though fisheries managers have had difficulties in their dialogue with colleagues from other sectors, GOK is now more aware of the need to support fisheries, and the sector has reportedly moved to second priority after power among water users. The World Bank is also working with GOK to improve the environment for fish along the Syr Darya River and in the northern Aral Sea (see Box 2.3).

Box 2.3: The Syr Darya Control and Northern Aral Sea (SYNAS) Project

The “Syr Darya Control and Northern Aral Sea Phase 1 Project” is the first phase of the rehabilitation of the Syr Darya basin in Kazakhstan. With a total cost of almost US$ 86 million (with World Bank financing of US$ 65 million), it aims to sustain and increase agriculture and fish production in the basin, and secure the Northern Aral Sea (NAS) existence by improving ecological and environmental conditions in the delta area, human and animal health and biodiversity conservation. Particular effort to improve fish fauna and fisheries in the NAS is ongoing through a component on aquatic restoration and fisheries development (total cost US$ 2 million). The component aims to ensure the maximization of benefits from additional fisheries in the NAS as a result of the stabilization of the sea’s level and salinity, and improved flow of water to the delta lakes. It includes: (i) technical assistance for a community driven approach for preparation and implementation of a detailed resources and fisheries development plan; (ii) investments for rehabilitation of existing hatchery facilities for cyprinid and other forms of freshwater aquaculture and sturgeon production; (iii) importation of sturgeon fingerlings, if needed; (iv) credit for fishermen for the

40 Source: FSST

purchase of boats and fishing equipment and small scale aquaculture development; (v) training for fishermen in fishing technology; (vi) establishment of fish collection points; and (vii) development of fish freezing, processing and marketing facilities.

Additional funds of up to US$ 2 million are being sought from the Japanese Social Development Grant Fund to complement the fisheries component. The proposed grant would focus on fishing communities in the Aralsk region which are among the most affected by the Aral Sea environmental catastrophe and the collapse of former state-owned fishing enterprises following the breakup of the Soviet Union. If approved the grant would aim to build capacity among poor fishermen in this region who are now forming fishermen’s organizations, to: (a) develop opportunities for employment and income generation through the creation of small businesses; and (b) manage the resource base in order to improve their livelihoods and promote sustainable economic growth in the region. This could be a potential opportunity to pilot co-management in Kazakhstan (see Section 2.E).

Source: World Bank

2.11 Water pollution further aggravates the situation. Drilling of more than 300 oil wells in the Kazakhstan sector of the Caspian Sea has resulted in pollution of the sea bottom near Atyrau and Mangistau, and with oil extraction increasing there is always the potential for a catastrophic spill. The impact on bioresources is being studied. Pollution has also been entering Lake Balkhash, with analyses of heavy metal concentrations in fish showing that the pollution is high but still within allowable limits. Phenol substances and pesticides in the Ural River have been shown to negatively impact sturgeon stocks.

2.12 The introduction of exotic species has the potential to disrupt the ecosystem. Fish stocks in numerous water bodies in Kazakhstan have been modified by introduction of new species. Enhancement through introductions of fish and fish food organisms became inevitable when the native riverine fish species withdrew from the new reservoirs created after damming. Today, Lake Balkhash, northern Aral Sea, Bukhtarma/Zaisan water body, Kapshagay and Shardara reservoirs have fisheries which are based almost entirely on introduced species (see Box 2.4 and Figure 2.3). Introductions have often been followed by repeated stocking of juveniles produced in state-run hatcheries. This practice continues, with cyprinid species, especially the common carp (sazan, *Cyprinus carpio carpio*) and Chinese carps, regularly released into reservoirs and some lakes. The cost of the regular stocking is high, and the impact often unclear. Uncontrolled introductions also take place in some transboundary rivers, such as Ili and Irtysh, which are invaded by fish species and escapees from fish farms in China.

<table>
<thead>
<tr>
<th>Box 2.4: Case study—Lake Balkhash fishery</th>
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<tbody>
<tr>
<td>Lake Balkhash, delta of the Ili River, Kapshagai reservoir and Alakol system of lakes support some of the most important Kazakhstan fisheries, with 14 fishing companies allocated quota in 2002. Balkhash Lake fish resources have been greatly affected by introductions. The original fish species included three endemics: Balkhash marinka (<em>Schizothorax argentatus</em>), Balkhash perch (<em>Perca schrenkii</em>), and Tibetan stone loach (<em>Triplophysa stoliczkae</em>). The wild form of common carp (<em>Cyprinus carpio</em>) was the first species introduced in Lake Balkhash in 1905. This was followed by further introductions throughout the 20th century, including: bastard sturgeon (<em>Acipenser nuidventris</em>), roach (<em>Rutilus rutilus</em>), common dace (<em>Leuciscus leuciscus</em>), grass carp (<em>Ctenopharyngodon idella</em>), asp (<em>Aspius aspius</em>), Aral barbel (<em>Barbus brachycephalus</em>), bream (<em>Abramis brama</em>), Gibel carp or goldfish (<em>Carassius auratus</em>), Wels catfish (<em>Silurus glanis</em>), pike-perch (<em>Sander lucioperca</em>), and Volga pike-perch (<em>Sander volgensis</em>). Other species were introduced incidentally.</td>
</tr>
</tbody>
</table>


43 Of the 151 species found in Kazakhstan, 26 are introduced; source: FSST.
Officially, commercial fishing on Lake Balkhash started in 1929. When GosRybTrest (then Balkhash fishery industrial complex, now “Balkhashbalyk”) was organized, usage of seine-nets started. From independence to 1998 the fishery stagnated, but since 1999 the number of fishers, nets and other gear have been increasing. The present number of fishers is difficult to estimate.

Carp dominated catches during the period 1932-1972, after which it was replaced by bream (see Figure 2.3). Pike-perch became common during the peak of carp from 1963, but have since diminished. Nevertheless over the period 1991-2003 pike-perch represented 7.2% in the total catch, and Volga pike-perch 2.3%. The dominant bream formed 76.6%, while carp only 1.7%. Asp, roach and Wels ranged from 2.6% to 4.9% of the total catch, which varied from 3,409-10,276 mt/year. Over the period of 13 years the ratio among the species has hardly changed, but concern has been expressed that pike-perch stocks may be overexploited as shown by the predominance in catches of young fish. Interviews with fishers and businessmen suggest that all species are overexploited, with catches of pike-perch and Volga pike-perch exceeding official figures 4-5 times, roach 4 times, and catfish, pike-asp and bream 1.5 times. It is a matter of concern that the existing special protection areas are also fished. While the stocks of bream appear to be fished above the quota, much more bream could be exploited on sustainable basis, up to 10,000 mt per year. The question is what to do with it, as without processing the fish has a low value. If canned it could be marketed domestically, but recently processing of fish in the Balkhash area has not been successful.

Heavy metal industries contribute to the pollution of Lake Balkhash, but the pollution load is considered not to be serious. The copper, zinc and cadmium concentrations in fish are below the maximum allowable concentrations (MAC) for food. However the lead concentration in all fish species slightly exceeds the MAC.

It has been suggested to use the Lake Balkhash bays for fish farming. High summer temperatures and low winter temperatures present an obstacle for survival of many species, but it is believed sturgeon, pike-perch and Volga pike-perch would be able to tolerate such conditions.


FishBase: http://www.fishbase.org/home.htm

Figure 2.3: Species composition of catches in Lake Balkhash, mt (1930-2000)44

44 From Timirkhanov, 2003; FSST.
2.13 The introduction of *Mnemiopsis* to the Caspian Sea is a potential threat to fish stocks, and must be monitored and controlled. While the ctenophore *Mnemiopsis leidyi* is largely confined to the southern and central sectors of the sea, its competition for planktonic food with kilka (Black Sea sprat, *Clupeonella cultriventris*) and other clupeids has resulted in reduction of these fish stocks and seals in Caspian waters of Iran, Azerbaijan and Russia. During the past five years kilka catches in the Caspian Sea have dropped from 400,000mt/year to less than 150,000mt/year. In the Kazakhstan sector of the Caspian Sea there is currently no commercial fishing for pelagic fish (kilka) due to lack of gear, and *Mnemiopsis* is present in low numbers. Nevertheless, Kazakhstan should join the other states in monitoring the distribution, migration and condition of pelagic fish stocks with a view to assessing the possible impact of *Mnemiopsis* on them (see Box 2.5).

**Box 2.5: Case study—Mnemiopsis in the Black Sea and its impact on fish**

In 1982, the ctenophore *Mnemiopsis leidyi* was first recorded in the Black Sea, where it probably arrived in ballast water from Atlantic Ocean coastal waters of North America, between 30 and 45° N. The ctenophore feeds on zooplankton, including larvae of mollusks, crustaceans and fish of up to 1 cm length. In the Chesapeake Bay, the ctenophore and the eggs of the bay anchovy *Anchoa mitchilli* reach seasonal and localized abundance together, thereby providing the ctenophore a ready source of food. In the Black Sea mass development was recorded by 1988, especially in brackish water in the northwest, then along the western shores, including Bulgaria, and eventually entering the Sea of Marmara and the northern Aegean. Its average biomass was 3.5 g under one m². As a result of its presence the zooplankton biomass drastically declined resulting in a food shortage for fish feeding on plankton, especially anchovy *Engraulis encrasicolus*. The biomass of this fish sharply declined, with an estimate in 1992 of a loss to pelagic fisheries of the former Soviet Union of some $200 million, and similar losses to fisheries of the other countries fishing the Black Sea. When the *Mnemiopsis* entered the Marmara Sea, by 1993 it encountered there its predator *Beroe ovata*, another ctenophore. Gradually, *Beroe ovata* entered the Black Sea, feeding on *Mnemiopsis*, whose biomass drastically declined by the end of the 1990s. It has been suggested that *Beroe* will die out in the Black Sea rather than find another food source, as indicated already by the increase in zooplankton and recovery of pelagic fish stocks, suggesting that *Beroe* does not feed on them. With the invasion of *Mnemiopsis* especially in the southern half of the Caspian Sea, the Iranian Fisheries Organization has been experimenting for the last two years on how to breed *Beroe ovata* and acclimatize it to the less salty waters of the Caspian.

Source: FSST

2.14 In order to effectively combat the threats to capture fisheries from overexploitation and environmental problems, changes are required in the institutional framework for fisheries management. The system for allocating use rights is one of the priority areas where change is needed.

**B. THE SYSTEM FOR ALLOCATING USE RIGHTS**

**INCREASING INCENTIVES FOR SUSTAINABLE USE**

2.15 The current system for allocating use rights should be reviewed and changes made. The system attempts to manage output based on an annual process of “tendering” that is not determined by price bids, but instead on a combination of rather unobjective criteria. There is considerable evidence from experiences in the international community to suggest that management regimes which rely primarily on one single input or output management technique –

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45 As reported in *Towards Sustainable Fisheries – Economic Aspects of the Management of Living Marine Resources*. OECD, 1996
such as the quota system in Kazakhstan – yield poor results when used in isolation (see Box 2.6). The main reason for this is that such regimes reduce the efficiency of producers and reduce the incentive to report catches accurately.

**Box 2.6: Examples of various fisheries control techniques**

There are a number of internationally accepted mechanisms, or “tools”, for managing a fishery resource. No one single mechanism can provide the answer to managing the resource and regulating offtake; the answer lies in a combination of mechanisms based on an agreed set of objectives, policy and plan for the sector, generally categorized as follows:

- **Input Control**: typically this means limiting entry to a fishery by means of a licensing system.
- **Output Control**: this is done by quota control, for example by the setting of a Total Allowable Catch (TAC) for specific species. An important variant of this method is the system of ITQ (Individual Transferable Quotas), where a TAC or quota allocation is apportioned (divided up) between individual vessels, companies or possibly even fishermen.
- **Indirect Control**: these include conservation or technical methods such as closed areas and seasons, mesh size regulations, limitations on the discarding and/or landing of by-catches, minimum landing size regulations, etc.
- **Fiscal Control**: these include both taxes or royalties on inputs and/or outputs of the industry – for example VAT on inputs such as fuel and fishing gear, and a border tax on outputs such as the export of fish or fish products. These mechanisms are used to influence the way the industry operates economically. The converse can also be applied through the use of government subsidies to the sector, by for example supporting the decommissioning of vessels to reduce the size of the fleet (and so limit fishing effort).

These tools can be viewed in two major, but very contrasting, systems of ownership. The most usual is where common property rights prevail, as is the case with most of the fisheries throughout Kazakhstan. The other is where there is an element of ‘community use rights’ (ie, effectively private property) within a system usually referred to as TURFS (Territorial Use Rights Fishery System). No such rights system currently exists in Kazakhstan.

Source: FSST

2.16 **The considerable under-reporting of catches undermines the quota system as a management tool.** The breakdown of quotas by species is also reportedly not based on good science, the whole tendering system lacks transparency, and producers are marginalized in the tendering process as quotas are primarily allocated to fishing enterprises (or even worse to businesses un-connected with the fishing communities). It is also clearly evident that the State is not receiving the maximum resource rent from the tendering process. The FSST estimates that the potential loss in resource rent (based on declared landings versus actual landings, catch quota composition and the cost of quotas for different species) may be in the region of 220-335 million KZT (US$1.5-2.3 million). The fact that quotas have to be paid for in advance each month is also administratively expensive and this, along with other requirements, puts fishers at a disadvantage in obtaining quota. Finally, delays in the tendering process have sometimes caused effective unnecessary, even if temporary, closures of fisheries.

**Recommended Actions:**

2.17 **Alternatives to the current quota system should be explored.** A major problem in establishing a fishing quota system that is both accessible to fishers and transparent is in making

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46 Because if only one management technique is used to manage a common property resource (and particularly one that is poorly managed), producers will compete against each other in the ‘race to fish’ and also ‘high grade’ their catches – in other words it is rational for producers to try and get the best return for their quota allocation. This leads to inefficiency in use of the resources available to producers.
decisions as to whom and how the quotas should be allocated. There are several internationally recognized methods for determining the allocation of quotas, such as on the basis of historic participation in the fishery, on the basis of size of catch records, on the basis of socio-economic considerations, on the basis of an auction or on the basis of a lottery (see Annex D with quota allocation examples). But ultimately the chosen method will depend on whether the policy objective is efficiency or equity in the distribution of fish resources:

- **For efficiency**, consideration could be given to introducing a public auction system, where market forces are used to determine the value of the resource (above a minimum value, perhaps linked to the current resource rent costs). This would encourage greater efficiency in the use of fish resources by the private sector, as the most efficient producers would be able to bid the highest prices at auction. This method also has the advantage that GOK would maximize resource rents. Consideration should also be given to allocating quotas not by species but by fishing zone and species. This approach is recommended for fisheries systems where co-management is not appropriate (see Section 2.E).

- **For equity**, allocation of quotas by auction may not be the best solution, unless appropriate selection criteria for participation in such quota allocations were established, such as for example only allocating quotas to registered fishers associations. Such changes will involve addressing not only the quota system itself but also the way fishing entities are registered to ensure that associations are truly representative of their membership. One compromise approach to achieving the FC’s stated priority policy objective of “creating an effective state system of fishery sector management” but reducing the burden on the State is through the introduction of a system of fisheries co-management (see Section 2.E).

C. THE LEGAL ENVIRONMENT

2.18 **Kazakhstan needs a fisheries law: there is currently no framework fisheries law, and existing laws are insufficient.** There is no single (framework) fisheries law governing the management of and policy towards the sector in KZ. The FC is empowered to administer the sector through a presidential decree and by numerous government resolutions. The old law (from 1993) on the protection, culture and utilization of fauna is still being used as it contains a number of clauses that deal with fisheries. There are also fishery policy issues covered in several government codes, such as the Water Code, Forest Code and Land Code.

2.19 **The law should address the crucial issues of allocation of use rights and co-management.** If the allocation of use rights is not clearly codified in law, it leads to confusion in fisheries management. There is also uncertainty concerning the division of responsibilities between the Ministry of Agriculture (MOA) and Ministry of Environmental Protection (MEP) on enforcement procedures for the management of resources (protected areas, quotas, etc.) and protection of the environment. Although such institutional problems are not un-typical of newly independent former soviet republics, resolving these issues remains an important pre-requisite to improving the policy environment and management of the sector. Further, the current legal framework does not allow for co-management, so the development of a fisheries law would have to provide for this form of decentralized decision-making (see discussion of co-management in Section 2.E). The GOK should therefore consider the drafting and enactment of a new fisheries law as the first priority.

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47 As presented to the FSST by the FC in November 2003.
48 Government resolutions are understood to be sub-laws equivalent to a ministerial order.
49 International consultants on the FSST have experienced similar situations in countries as geographically diverse as Mongolia, Georgia, Latvia and Poland.
2.20 The FC has recognized that this is a priority and is preparing a new law; the Bank can help. The FC has confirmed that the preparation and enactment of a new fishery law and legal framework to protect aquatic resources is one of its five priority areas for improving the management of, and investment within, the sector. The FC is currently planning to draft a new law and to implement the law in 2004, and has requested the Bank’s help with this. The Bank can help by bringing in international best practice, and may be able to fund the activity as part of the Agricultural Competitiveness Project (ACP) now under preparation.

GUIDELINES ON PREPARING A NEW FISHERIES LAW

2.21 The law should adhere to international best practice as described in the FAO Code of Conduct for Responsible Fisheries, and should be applied according to norms and standards of, for example, fisheries legislation within the European Union (see Box 2.7). The approach taken by the FC should be to ensure that there is a sound framework (or “basic”) fisheries law that covers each of main policy components of a coherent fisheries management program. Preparation and enactment of subsidiary (or “daughter”) regulations can then be considered at a later stage.

Box 2.7: International best practice—10 steps to follow in implementing European Community legislation in a Candidate Country

1. Identify a national competent authority or authorities to implement the regulation.
2. Identify what legislation (if any) is necessary (e.g., to prescribe sanctions or designate competent authorities).
3. Establish a legislative timetable (as appropriate).
4. Prepare administrative instructions and procedures to the relevant authorities.
5. Consult with other concerned government departments and with the groups affected by the regulation (e.g., fishing associations and fishing companies).
6. Provide staff and resources for implementing the law.
7. Train staff.
8. Inform affected sectors and companies etc. of what is required.
9. Provide the relevant documents, forms and certification to the groups concerned.
10. After accession, monitor implementation and report to other Member States and to the European Commission as needed.

Source: Guide to the Approximation of European Union Environmental Legislation

2.22 Drafting of a new law requires considerable consultation with other stakeholders. Examples include other departments within the Ministry of Agriculture dealing with water management and fish as food quality control issues, the Ministry of Environment and Ministry of Transport in relation to the fishing vessel registry. The FC will also have to consider the key roles and responsibilities of the State compared to the private sector, as these should be stated in relevant articles of the law. Finally there is the training of staff and state budget planning to implement the law.

2.23 A very important issue in the control of national fisheries is the extent to which fisheries law and subsidiary regulations can be enforced. If such legislation places an unacceptable economic burden on fishers and fishing enterprises/quota holders, then the incentive for
non-compliance is likely to be very high. Legislation that is too complex will be contravened, and as with poor or limited legislation of the sector, will discourage inward investment. The fisheries law and regulations should therefore be kept simple, effective and enforceable. The same argument applies to the cost/benefit of enforcement from the government’s perspective. One way of achieving this is possibly through the introduction of a system of co-management (described below).

2.24 Irrespective of the final format of the new legislation, which will be determined by legislative drafting requirements within Kazakhstan, it is important that the new law establishes a sound basis for harmonization of the management of the fisheries sector, incorporating the following broad policy areas:

- The protection of, and control of access to, fish stocks (ie, conservation issues);
- Organization and administration of the fishery sector, including aquaculture as well as capture fisheries;
- Balancing of fishing capacity and investment with available fish stocks (referred to as structural issues);
- The commercial and quality assurance aspects of fish processing and product marketing;
- Fishery research (particularly in relation to obligations towards regional fisheries management in the Caspian Sea);
- The socio-economic development of fishing communities (in particular if provision is made for establishment of a system of fisheries co-management);
- Co-operation in international frameworks (in particular with regard to the Caspian Sea and trans-boundary water management issues).

2.25 The FSST has prepared detailed guidelines for designing the new law, case studies of international best practice and a draft Concept Note for drafting the new legislation. The Concept Note contains a detailed list of the technical and management issues that need to be considered when preparing such legislation, as well as a description of the personnel capacity required.

D. MONITORING, CONTROL AND SURVEILLANCE

2.26 For effective implementation of the fisheries law, improvements in Monitoring, Control and Surveillance, and a modern Fisheries Management Information System are required. The implementation of MCS activities is an area of particular weakness in Kazakhstan. One of the main ways of reversing the under-reporting of catches and enhancing the value of the nation’s fisheries is through effective MCS. This emphasizes the importance of enforcing a new fisheries law and increasing the maximum fines for infringement of regulations, including revocation of permits for serious offenders (as recommended by FAO). Issues that require attention include:

- The data collection system (the Monitoring aspect of MCS) is weak and information for management of the sector unreliable; a new Fisheries Management Information System is required (see below).
- There is no single fisheries law (related to the Control aspect of MCS). See legal section above.
There are no standards or norms for fisheries enforcement (the Surveillance aspect of MCS).

There appears to be a high degree of confusion between the two responsible ministries – MOA and MEP – concerning who is actually responsible for fisheries enforcement. Inspectors are recognised as being poorly trained, under-equipped and have limited power of arrest. They are also poorly paid and have little opportunity for advancement. There have been several cases of Inspectors prosecuted for taking bribes.

There are reportedly 600 Fisheries Inspectors regulating an industry officially landing between 27-37,000mt and officially employing only 13,200 people (of which only 5,200 are fishers).

There is no enforcement unit (or Senior Inspector) within the FC.

The system for prosecuting illegal fishers is very lengthy and the upper level of fines that can be imposed by the Courts for illegal fisheries activities too low.

Poor MCS results in reduced revenue collection by Government.

Improved MCS should also help to enhance data collection and allow the FC to more accurately assess market potential, as well as assess the importance of recreational and subsistence fisheries and aquaculture and how to manage them.

**Recommended Actions:**

**2.27 Improving MCS is an urgent and important priority for the FC and other stakeholder ministries and government departments.** Developing appropriate strategies for improving MCS will depend on a number of factors, including:

- The political will to improve MCS capacity and budget available from the State
- The MCS capacity: current status and development of an asset register of resources available to the State, including both physical and human resources (for example, trained inspectors, patrol vessels, vehicles, night vision goggles, etc.)
- Defining which institution(s) are responsible for protecting the aquatic environment and their roles and organizational relationships
- Human resource capacity (of the Inspectorate)
- Objectives and policy for the sector
- Economics of the fishery and cost-benefit analysis of various MCS strategies (including policy towards cost recovery from fishers to pay for MCS)
- Management tools in use (input/output controls) and acceptance of new approaches to management, in particular co-management (see Section 2.E)

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50 The FAO Technical Guidelines for Responsible Fisheries (No.6–Inland Fisheries), 1997 reports that this is not an unusual problem in freshwater fisheries management. Responsibility for the protection of aquatic ecosystems usually lies outside (with for example a Ministry of Environment) the role of fisheries management (which is usually covered by the equivalent of a Ministry of Agriculture). States therefore need to plan for the conservation of aquatic environments in the context of their multiple uses. The recent shift to a basin approach to management of the aquatic ecosystem by the GOK is therefore to be applauded.

51 Dependent on whether the Statistics Agency or Fisheries Committee (FC) data is used. It is likely that the data held by the FC is more accurate as the FC receives the catch data whereas the National Statistics Office only receives economic data from processors, which is likely to be unreliable for reasons of tax evasion.

52 According to State Budget data from the Fisheries Committee.

53 The maximum fine is reportedly only 45,000 KZT (equivalent to approximately US$300), or less than the value of 1kg of sturgeon caviar.

54 It is understood that the budget for the FC will be more than doubled over the next year—from a level of 272 million KZT in 2003 to 629 million KZT in 2004. This is a positive sign, but nevertheless additional funds will be needed in the short term for the necessary investments. See Section 5.D.
2.28 Some of this information is already available to the FC but further work is required on the economics and institutional organization of MCS strategies. As an aid to developing such a strategy, an explanation of what does and does not constitute MCS, its general importance and its role in fisheries management is provided in Annex C. One immediate priority is improving the Fisheries Management Information System (FMIS).

IMPROVING THE FISHERIES MANAGEMENT INFORMATION SYSTEM

2.29 Presently, there is almost no cohesion in the various programs collecting data on the sector, and the range of data currently collected is inadequate to meet the needs of an industry that is increasingly under stress. The availability of timely and accurate data on important parameters of the sector is necessary for monitoring of the sector and making informed management decisions, and is integral to an effective MCS system. Further, there is a need to involve the Interoblast Basin Divisions (of the FC), Regional Fisheries Research and Production Center (FRPC) Offices and Oblast Akimat Fisheries Departments in the system.

2.30 The establishment of an integrated Fisheries Management Information System should be a top priority in the mid-term program envisaged by the FC to 2006. Such a system will be a major undertaking to design and to implement. However, once the structures of the system are in place then the data and information requirements to satisfy the needs for a wide range of users can be met (such as for example detailed GIS mapping) and marketing information. An example of how to develop a good FMIS is illustrated with a case study from Turkey (see Box 2.8).

Box 2.8: Case study on a Fisheries Management Information System in Turkey

A project was designed and proposed for Turkey in 2003 with funding by the EU entitled “Fisheries Sector Institutional Strengthening and Development Project – Alignment to the Fisheries Acquis.” The objectives of this project are, in summary, to strengthen the institutional capacity of MARA (Ministry of Agriculture and Rural Affairs) and to facilitate the legislative alignment of the sector to the components of the CFP (EU Common Fisheries Policy). One of the main features is a computerized fisheries vessel registration, vessel monitoring and statistical information system in compliance with current relevant EC legislation.

If Turkey is to meet EU requirements for the supply of “fisheries information” it is essential that procedures be in place to gather a wide range of fisheries information. To improve the provision of data three information-based “centers” will be established within MARA that collectively form a Fisheries Information Center (FIC): a Data and Information Unit (DIU), a Fisheries Monitoring Center (FMC) and a Fishing Vessel Registration Unit (FVRU). It is intended that the DIU will be the focal point for a Turkish Fisheries Information System (FIS), with data being relayed from port offices. Initially the FIS will be built to meet EU legal data supply obligations, but eventually the FIS will expand to accommodate a wide range of fishery and related marine considerations, by linking to a GIS. The functions of the three centers are:

- **DIU**: The FIS will operate at both a local and national level. At the local level it will be implemented in 30 major port offices. These offices will function as collection points for fisheries logbook, landings and fisheries sales data. These three data types (plus data on aquaculture) form the minimum data needed under EU fisheries regulations.

- **FMC**: The main activity is the monitoring of the fishing fleet using VMS (vessel monitoring system). The FMC will share key databases with the FIC, transmit VMS data to regional offices, and provide analyses of the pattern of fishing activities for research and planning purposes.

- **FVRU**: The main activity is to develop and implement a computerized Fisheries Vessel Registration System in compliance with EC legislation, International Law (including the United Nations Convention on the Law of the Sea) and Turkish Law. The FVRU will also provide verification services as part of MCS at central, provincial and (selected) port level and ensure, through field visits, that the fishing vessel registration system is working and the registry itself is accurate and up-to-date.

Source: FSST

55 The Acquis refers to the body of law of the European Union.
2.31 The FC already recognizes the importance of improving the quality and quantity of data received on the sector and wishes to establish an “Information Analytical Center.” The FSST supports this initiative, but would like to recommend that a broader approach be taken to develop a full FMIS, of which an information center could be a part. It is envisaged that it will take 2-3 years to design and implement nationwide a basic FMIS that provides the infrastructure and trained staff for the competent and comprehensive management of the sector to international standards. The FC has requested the help of the Bank with this matter.

2.32 The World Bank is interested in supporting such an initiative, and the FSST has prepared an outline Concept Note (CN) for discussion with the FC and MOA. Development of the CN follows on from the analysis of the sector undertaken during this study and has been prepared in line with best practice concerning international fisheries law and policy. The CN includes an outline rationale for project support that meets management, scientific and compliance needs, an outline logical framework for the design and implementation of a national FMIS, and cost estimates. One possible lending instrument for an operation of this kind, assuming there is support for it from the Ministry of Economy and Budget Planning, is a Learning and Innovation Loan (LIL), which is specially designed for this sort of pilot activity and has streamlined processing requirements.

E. AN INNOVATIVE APPROACH TO MANAGEMENT: CO-MANAGEMENT

2.33 Government is no longer able to maintain top-down control over the sector. While the above changes could be implemented under the current system of decision-making, they will be expensive and could still prove largely ineffectual. The “top-down” approach to management is characterized by centralized decision-making and is very resource-intensive for government, including the cost of staff, equipment and capacity. Due to the great distances covered, low capacity and corruption among inspectors, and inadequate resources it is nearly impossible for GOK to enforce regulations on the use of fish resources using the top-down approach (even with the other management improvements recommended in this chapter). It is an approach that has been tried throughout the world and which is invariably adjudged to have failed. The result is open access and over exploitation of fish resources. This is evidenced by the large IUU landings in Kazakhstan, which the FSST has estimated at 3-4 times recorded landings. This in turn leads to overcapitalization, dissipation of economic benefits and reduced fisher incomes in the long run. One possible solution is to involve the users of the resource in its management by moving towards a system of co-management.

RIGHTS AND RESPONSIBILITIES SHOULD BE SHARED

2.34 Co-management is the sharing of responsibility and authority between the State and local resource users to manage fisheries resources. Co-management is also a means of re-organizing the system by which fisheries are managed. Government and the resource users (e.g., communities, cooperatives, producer associations, etc.) share the responsibility for management of the fisheries resources, so that the resource users have influence on the decisions made concerning resource management and allocation. As such co-management is an alternative to the traditional top-down management approach (i.e., the government makes all the decisions without consulting the resource users) which has failed to resolve the inherent problems faced in the management of open access fisheries in Kazakhstan.

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56 For example, each fisheries inspector must supervise on average 354,000 ha of reservoir area.
2.35 **Co-management** represents an innovative approach to fisheries management that **empowers fishers and increases their incentives to comply.** It is based on the principal that participation in decision-making confers legitimacy and fosters compliance. It allows fisheries laws and regulations to be kept simple, effective and enforceable. Compliance with locally agreed plans will allow reduction in the costs of MCS by the FC, and can also increase returns to fishers (see marketing chapter). Further, consultative decision-making holds out the possibility of reaching longer-term decisions concerning the sustainability of the resource and fishers’ livelihoods. Involving fishers in the monitoring of stocks also increases their awareness of these issues. In general the spectrum of management arrangements for any fishery ranges from one extreme: the “top-down” management approach referred to earlier; to the other: a “bottom-up” approach (where all decisions are made at the local level). Between these two extremes there are several approaches to a system of co-management:

- **Instructive/Consultative** – the closest arrangement to the ‘top-down’ approach, whereby the State (i.e., MOA) instructs, or consults with, resource user groups and fishing communities but all decisions are taken ultimately by the state.
- **Co-operative** – the State and user groups/fishing communities co-operate together as equal partners in the decision-making process and management of the resources.
- **Advisory/Delegated** – management authority (including enforcement) is delegated to user groups/fishing communities and the State is only advised on the decisions taken (hence the reason why this approach is also called ‘Advisory’). This approach is the closest to a fully decentralized and devolved ‘bottom-up’ form of resource management.

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2.36 **Co-management is a long-term process that requires Government to relinquish some control over the sector, and there are limitations.** Co-management is not a “one-size-fits-all” solution. The degree of delegation of responsibility can vary significantly even within a country, and depends on factors including geography and the capacity and social cohesion of fishing communities. For example, co-management can be applied to both industrial and small-scale fisheries, but is particularly useful in small-scale fisheries. Further, the capacity of both fishing communities and Government has to be strengthened to apply the co-management system. Co-management also typically requires the amendment of the law (or a decree) to confer legal rights to stakeholders (see Section 2.C).\(^\text{97}\) The institutional process of co-management is long-term, can take various forms, and can evolve over time, and therefore should not be viewed as a single strategy to solve all the problems of fisheries resource management (**see Table 2.1** for a summary of management approaches for different types of fisheries). However, given the country’s recent history and today’s realities on the ground, a co-management approach is probably the most realistic and appropriate for many of Kazakhstan’s fisheries.

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\(^{97}\) A problem common to many countries based on research reported in *Co-management in small-scale fisheries – A synthesis of Southern and West African experiences.* Sverdrup-Jensen S & Nielsen JR, IFM, North Sea Centre, Denmark, 1998
Table 2.1: Summary of management approaches by fishery type

<table>
<thead>
<tr>
<th>MANAGEMENT/RIGHTS DISTRIBUTION SYSTEM</th>
<th>FISHERIES SYSTEM</th>
<th>STATUS &amp; ISSUES RELATED TO CURRENT SYSTEM IN USE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regional (Caspian Sea)</td>
<td>Large lake and river systems (+ Aral Sea)</td>
</tr>
<tr>
<td>Input Controls</td>
<td>Registration of fishing vessels but enforcement limited</td>
<td>Licensing of cooperatives for auction of quotas but no licensing of fishermen</td>
</tr>
<tr>
<td>Output Controls</td>
<td>Quota control for sturgeon species. Not applicable for other species.</td>
<td>Quota control by species used for larger lake systems and by Oblast (region)</td>
</tr>
<tr>
<td>Indirect Control (Technical Measures)</td>
<td>Mesh size regulations and closed seasons applicable to a variety of species but enforcement/compliance is limited</td>
<td>Fiscal Control</td>
</tr>
<tr>
<td>TURFS (Community Rights System)</td>
<td>Not in Use</td>
<td>PROPOSALS FOR IMPROVED FISHERIES MANAGEMENT</td>
</tr>
<tr>
<td>Input Controls</td>
<td>Establish vessel registry and licensing of fishers and their associations Strengthening of MCS regime</td>
<td>Long term leases for small water bodies</td>
</tr>
<tr>
<td>Output Controls</td>
<td>Stricter monitoring of national quota for sturgeon species. Changes in fisheries law to increase penalties for poaching.</td>
<td>Allocation of quotas by fishing zone and not species. Allocation of quotas to registered fishery associations and coops only Use auction system to improve quota allocation</td>
</tr>
<tr>
<td>Indirect Control (Technical Measures)</td>
<td>Strengthen MCS to improve compliance. Work with regional organization on technical measures</td>
<td>Strengthen MCS to improve compliance (research required to identify spawning grounds as protected areas)</td>
</tr>
<tr>
<td>Fiscal Control</td>
<td>Re-nationalize Atyrau-balyk to break monopoly of the company Incentives to de-commission vessels (river/sturgeon) and encourage investment in Kilka fishery</td>
<td>Probable not applicable unless incentives required to improve fishing gear technology?</td>
</tr>
<tr>
<td>TURFS (Community Rights System)</td>
<td>Not Applicable</td>
<td>Introduction of a co-management regime (on a pilot basis)</td>
</tr>
<tr>
<td>Fisheries Research</td>
<td>More investment required in the stock assessment of all main commercially valuable species as a basis for determining the status of the stocks and therefore appropriate MCS strategies and management regime</td>
<td></td>
</tr>
</tbody>
</table>
Recommended Actions:

2.37 The Government of Kazakhstan should consider practical development of the co-management concept an important part of any support to the sector. It could first be implemented on a pilot basis for an appropriate water body. The World Bank has recent and very relevant experience with introducing the principles of co-management into a former centrally planned and recently emerged market economy and can help—see Box 2.9. One possibility would be to introduce co-management along with other capacity-building interventions for Aral Sea fishing communities that could be applied for under a Japanese Social Development Fund (JSDF) grant (see Box 2.3 on the SYNAS project).

Box 2.9: Case study—Co-management experience in Albania

The World Bank has been supporting the rehabilitation of the fisheries sector in Albania since 2001 through the funding of a US$5.5 million Pilot Fishery Development Project (PFDP). The key objectives of this project are to:

1. Improve the operation and management of marine fishing ports and inland lake fish landing sites through rehabilitation and the introduction of community-based fishermen’s organisations (to be called Fisheries Management Organisations, or FMOs);
2. Introduce an effective institutional framework for community-driven co-management of marine resources by involving FMOs and strengthening the public sector’s capacity; and
3. Restore the country’s previous capacity in aquaculture, and explore the potential for further development of aquaculture, particularly for high value species.

The approach to fisheries management in Albania was, until recently, very traditional. Management rules concerning access to fisheries were set centrally by the state, largely on the basis of scientific criteria. These rules, which included a requirement for licenses and registration, were then in theory enforced by the state through the use of penalties for non-compliance. However this is a “top down” approach that the State cannot afford to implement properly, leading to wide-scale illegal fishing. This is because the failure to involve fishers in rule setting means that rules are often inappropriate and lack legitimacy. Consequently they are not followed. To improve the management of the country’s aquatic resources, the establishment of a network of FMOs was considered vital. The first priority was to amend the existing fisheries law. A new chapter on FMOs was introduced to provide for their establishment and operation as bodies of public law.

A number of FMOs have now been established to undertake two main tasks. First, to take responsibility for the operation and maintenance of the improved fishing ports and landing sites, which are in the process of being transferred under their control. Second, to actively participate in the management of fisheries resources in partnership with the Fisheries Directorate of the Ministry of Agriculture and Food. This will follow completion of management plans for each major fishery. The State, FMOs and other stakeholders will jointly agree on these plans, which will set out the management measures to be taken, such as the use of licenses, restrictions on types of gear, closed seasons and areas, etc. These measures will be enforced by the FMOs against their own members through self-policing and by the State against non-members, such as illegal fishermen. The co-management approach therefore leads to the making of better and more enforceable management decisions. It has already galvanized the local fishing community on a freshwater lake in Albania to protect a rare endemic species of trout, as the fishing community now realizes it has a legal basis on which to take action (and not be solely reliant on the State).

FMOs are community-based public bodies that operate on a non-profit basis. The membership controls each FMO, and is also responsible for paying the FMO operating costs as well as a membership fee. The main decision-making body is a General Assembly. The consensus among boat owners, captains and other crew members consulted is that boat owners (license holders) should certainly be members of the FMOs, but that captains, engineers and professional fishermen should also be allowed to join. However the voting rights are not equal, as the boat owners are entitled to 75% of the votes and the crew members 25%. The effect of this arrangement will be that the boat owners will hold a majority of the votes but the vessel crews still have a say in FMO operations.

So far there has been a positive response from coastal, inland lake and small reservoir fishing communities to the principles of co-management and a total of 11 FMOs have been legally established throughout the country, with a total membership of 710 fishers. The aim is to double this membership over the next two years and to hand over management of the main fishing ports to the coastal FMOs. The World Bank financed project will continue supporting this development process until at least 2007.

Source: World Bank and FSST
F. PRESERVATION OF THREATENED STOCKS

While the long-run sustainability of capture fisheries will depend on the priority improvements to the institutional framework for governance suggested in Sections B-E, **there are specific actions that GOK can take in the short run to reduce the threats to stocks** described in Section A. Of course, implementation of these recommendations will be facilitated by the improvements to the institutional framework.

**Recommended Actions Regarding Exploitation of Capture Fisheries:**

- Establish protected areas for fish reproduction in the Caspian, Balkhash, Bukhtarma/Zaisan and other selected water bodies, where not yet present, and impose in such areas total bans on fishing and other activities disturbing the natural environment. Fisheries are already closed during spawning seasons. This should be continued, and more research on spawning habits of major species carried out to gain a more detailed understanding.

- Stocking pike-perch in reservoirs where they are common and under intensive fishing pressure would most probably not result in an increase in pike-perch harvest, and it may even lead to increasing the incidence of fish disease now already prevalent in the pike-perch stocks. For controlling the disease intensive fishing pressure on pike-perch may have to be maintained.

- The fishery for common carp (sazan) and silver carp must be strictly controlled, and spawning and nursery areas of these fish species fully protected. Only fish that have spawned at least once should be allowed to be caught. On the other hand, there should be no catch limits for bream, roach and crucian carp.

- Fishery resources (e.g., kilka, herring, mullet) along some sections of the Kazakh Caspian Sea coast are underutilized due to lack of appropriate vessels, gear and repair facilities. Low interest loans for purchase or repair of boats and fishing gear from Russia, or introduction of gear leasing, would enable Kazakhs to enter this fishery in an effective way.

- Research to develop selective and environmentally friendly fishing gear is also a priority in modern fisheries management to reduce discard percentages and negative bottom impacts. Such research must be done by the public sector because the private sector has no incentive to do it, and because such research has public good characteristics.

**Recommended Actions Regarding Sturgeon: A Special Case**

**Industry structure:** The Atyrau-Balyk Company has a government-awarded monopoly on the production and marketing of Kazakh sturgeon products, while the GOK maintains control over the sturgeon hatcheries. The legal status of Atyrau-Balyk was that of a closed joint-stock company, with GOK as the majority shareholder. However recent information received by the FSST suggests that the company has since been privatized as an open joint-stock company with no government-owned shares (though details of current ownership are still unclear). There are now reports that an additional, foreign company (TPS Company of Poland) has been promised a share of the sturgeon quota in the future. Contrary to the general advice throughout this report promoting private sector participation (and ownership) in fisheries, the FSST believes there is a case for the re-nationalization of the sturgeon industry for the following reasons:

Farming of sturgeon could still be carried out by the private sector, although this would require strict controls and monitoring of trade to avoid any "leakages".
(i) As both a monopoly and monopsony, there is strong evidence that Atyrau-Balyk is not paying producers the market price for fish (see Section 3.C).

(ii) The market for caviar is operating imperfectly, with significant illegal catches of sturgeon and smuggling (exporting) of caviar. There may also be a case of transfer pricing in the export of caviar, so that not all profits are being retained within Kazakhstan. ²

(iii) As a result the State is losing export revenue and incurring increased MCS costs.

(iv) Sturgeon is internationally recognized as a threatened species (see Section 2.A) and as such the fishery requires strict management to re-establish sustainability. Iran (and in the past the Soviet Union) successfully used 100% state-controlled caviar industries (from hatcheries to production to marketing) as part of their strategy to preserve stocks.

(v) The sturgeon caviar industry is too important (and too political) to be retained in the hands of a private-sector operator. As sturgeon species are slow-growing, a long-term strategy is required to ensure the future of the stocks, fishery and biodiversity of the Caspian Sea. Such a strategy is not consistent with the profit motive of private capital and ownership.

2.40 Additional recommended actions for sturgeon are:

- The proposal for construction of a third sturgeon hatchery in Atyrau should be considered, with the condition that the hatchery uses the latest technology and is proven to be economically viable. The reconstruction of infrastructure (ponds and other holding basins) in the existing two hatcheries in Atyrau should be given a priority. The survival rate of especially female broodstock needs to be increased by using improved egg extraction methods (podushka, Caesarian) and constructing facilities for keeping them year-round. The Atyrau sturgeon hatcheries should become both producers of stocking material as well as research centers for sturgeon investigations. The FSST has produced a Concept Note for sturgeon stock enhancement. Also see Box 2.10 on the Bank’s sturgeon hatchery experience in Azerbaijan.

- Genetic implications of current hatchery stock enhancement need to be assessed in collaboration with international organizations (like FAO).

- Full cycle sturgeon aquaculture should be encouraged, both in the Ural-Caspian basin and in other suitable water bodies in Kazakhstan. This would help preserve the threatened species and reduce pressure on wild stocks, as well as producing valuable caviar and meat.

- A standardized framework for tagging, tag recovery and data processing should be established based on the results of the current experiments carried out jointly between the FC, the international NGO SeaWeb and the Pew Institute for Ocean Science. Tagging should be conducted regularly to improve the knowledge of dispersion, migration and mortality rates and quantifying the contribution of hatcheries.

² It is very difficult to prove whether transfer pricing is taking place. Official data states that 153.3mt of cooked/canned fish and caviar and caviar substitutes with a value US$3.815 million were exported in 2002. This is equivalent to a fob value of approximately US$25/Kg or US$ 25,000/mt. The international retail value of caviar varies between US$1-3 million per mt (depending on species) and even the domestic retail value in Kazakhstan is reportedly US$ 100/kg (which may reflect the opportunity cost for exporting?). Aside from any issue related to the actual declared volume of exports, the declared export value appears very low (unless the volume of exported cooked/canned fish products is significant, which is doubtful). This leads the FSST to suspect that there may be some form of transfer pricing taking place to both avoid the 100% export duty and to transfer profits overseas.
Recommended Actions Regarding Environmental Threats:

On biodiversity

- To protect fish biodiversity, research is urgently needed on fish species entered in the Red Book of Kazakhstan. This should include assessing their abundance and distribution, suggesting more effective protection practices, and designing methodologies for hatchery production for stock enhancement (including potential transfer abroad for development of techniques). This could be carried out with international assistance (e.g., GEF).
- There is no international agreement on biodiversity protection in the Balkhash-Ili ba-

Box 2.10: Case study—Construction of a modern new sturgeon hatchery in Azerbaijan

Over the last three years a new state-of-the-art sturgeon hatchery has been built in Azerbaijan for the Ministry of Environment and Natural Resources with funding and international technical assistance from the World Bank. The new facility is situated 35 km upstream from the mouth of the Kura River near the town of Neftchala and occupies a previously undeveloped site of 15 ha. The site was chosen for its proximity to the sea and safe elevation above the potential floodplain of the river and Caspian Sea, plus good road access and electrical power.

This investment project had a budget of approximately US$6.0 million but in the end cost close to US$9.0 million. The project comprised the construction and supply of:

- A primary and secondary pump station, sedimentation ponds and quay for vessels;
- Brood-stock, fry and fingerling buildings and equipment, and zooplankton rearing tanks;
- Effluent treatment ponds, potable water treatment plant, septic tank, header tanks and interconnecting pipe-work;
- Guard house, workshops, administrative building and laboratories;
- Power generation building, electrical services, alarms, roads, vehicles and other equipment.

The hatchery aims to produce 15 million fingerlings per year of beluga, ship, osietra and sevruga species, 80% of which will be osietra and sevruga. The hatchery has been designed based on a proven tank-based system and includes a temperature controlled brood-stock holding facility that allows for manipulation of spawning times. The aim is to produce two full batches of fingerlings during spring and early summer and a third batch in autumn. The hatchery will therefore require a total of 12 tonnes of brood-stock per year and facilities have been built to keep several tonnes of brood-stock alive for stripping or egg removal by caesarean section before returning the adult females to the river. The need for such a volume of brood-stock to make the hatchery economically viable is proving to be a major constraint since it opened in mid-2003. Uncontrolled poaching is recognised as a major factor contributing to the shortage of brood-stock.

Based on current management plans for the hatchery, the annual operating costs will be approximately US$400,000. This includes staff, operating and maintenance costs and represents about 10% of the annual wholesale value of caviar exports from Azerbaijan. The financial sustainability of the hatchery is therefore directly linked to the sustainable management of Caspian sturgeon resources and the world caviar market. Important lessons learnt from this project include addressing the need for economies of scale in a sturgeon stock enhancement program (in terms of the size of the hatchery), the need for complementary capacity building in national and regional fisheries management, and particularly enforcement, and the need for international expertise in the design and construction supervision phases.

Source: World Bank

There are long-standing concerns in countries throughout the world regarding the effects of the introduction of non-indigenous aquatic species into lakes, rivers, estuaries and the seas. Many country’s concerns have compounded with the rapid growth of aquaculture in recent years.

This document, prepared jointly by the International Council for the Exploration of the Sea (ICES) and the European Fisheries Advisory Commission (EIFAC), addresses some of the concerns and provides advice related to introductions. Areas covered are inspection and certification, quarantine, pathology, genetics and ecology. Universal concerns in these areas which are common to any introduction or transfer are outlined, as are those related to importation or other movements which are part of established commercial practice or those related to scientific study at research facilities. Scientific examples of protocols, mainly related to controlling disease organisms spread, are included either at the national or international level. A review and decision model for evaluating proposed introductions of aquatic organisms is included to provide informed recommendations. A scientific advisory group may however wish to suggest additional research if important questions remain regarding the proposed introduction.

A number of developed and less developed countries have already adopted this Code as a guiding tool for their decisions on introductions of exotic fish and other aquatic organisms.

Source: FAO

On water resources management

- Actively seek agreements with other sectors using the same water resources on the best practices for maintaining aquatic biodiversity.

- Using regular contacts, conventions, workshops and discussion at the highest professional and political levels, as well as assistance of international bodies, reach agreements with neighboring countries on aquatic biodiversity protection in shared water resources. One example of this that seems to be working is the Caspian Environment Program (CEP). This sort of cooperative engagement over trans-boundary resources should be encouraged (see Box 2.12).

- Fish protection devises should be required on water uptakes into irrigation canals and power plants, improved where already in existence, and their maintenance strictly enforced. There is a need to equip the Tasmurun irrigation channel and Balkhash power station with fish protection devices and to monitor their effectiveness in preventing fish from entering the uptakes.
Box 2.12: Caspian Environment Program in Kazakhstan

Kazakhstan is an active participant in the CEP, whose overall goal is “environmentally sustainable development and management of the Caspian environment.” Azerbaijan, Iran, Russia and Turkmenistan also participate in the CEP, together with the World Bank, UNDP, UNEP and the EU. Kazakhstan has committed to support implementation of the Caspian Strategic Action Program (SAP), which identifies the interventions needed to address four priority regional environmental concern areas:

- threats to biodiversity, including those from invasive species;
- unsustainable use of bioresources;
- pollution; and
- unsustainable coastal area development.

Kazakhstan’s National Caspian Action Plan (NCAP) for 2003-2012, prepared with CEP support, specifies a number of interventions for improved fisheries management, with emphasis on recovery of sturgeon stocks. The NCAP identifies measures to reduce pollution, conserve biodiversity, and ensure sustainable coastal zone management.

Through the CEP, the Bank and Kazakh counterparts have identified a Ural River bioresources protection project that would focus on recovery of the sturgeon population, and assessment and protection of other biodiversity. The project would consist of four elements: i) dredging delta branches to permit upstream migration and rehabilitation of spawning grounds for sturgeon; ii) expanding and upgrading the two Ural river sturgeon hatcheries; iii) significantly improving the capacity of the FRPC to monitor the environment, with particular attention to sturgeon and other fish; iv) upgrading equipment of the Poaching Control Department. The project is still under preparation. In addition, Kazakhstan is currently implementing a project under the Caspian Matched Small Grants program to increase the depth and improve sturgeon spawning grounds of the Ural river in the West Kazakhstan Oblast.

Source: World Bank
3. EXPANDING MARKETS AND INCREASING VALUE ADDED

3.1 In order for the Kazakh fisheries sector to reach its potential, the marketing of fish products and the access to markets of processors and especially producers should be enhanced. This will help to increase domestic consumption towards the levels desired by the FC, and will also help to ensure that as much of this increasing demand as possible is supplied from domestic production. It could also help to expand export markets and increase the value added to domestic sales. While the private sector should take the lead in marketing and processing in a market economy, there is still an important role for government to play in creating a healthy business environment.

A. DEVELOPMENT OF THE PROCESSING SECTOR

3.2 Many former SOEs were overcapitalized with out-dated equipment after independence. Most of the former SOEs operating in the productive sector (fishing, processing and marketing) have been privatized already. These factories now often use only about 30% of their design capacity. Natural wastage (closure) and downsizing of such SOEs is an inevitable consequence of operating in a free market economy and the State should therefore not intervene to subsidize these former SOEs.

3.3 Processors are now emerging from the transition period. There are a number of new processing facilities with modern equipment financed as joint ventures with European partners to service the lucrative market for pike-perch fillets in the EU, primarily Germany. The total volume of processed fish doubled from 27,683mt in 1999 to 62,582mt in 2002 (see Figure 3.1), driven mostly by cooked/canned fish production (according to official statistics). Site visits by the FSST, and analysis of official and anecdotal data suggest that fish-processors (which effectively act as middlemen in the absence of any wholesale market) are making normal, and in some cases, super-normal, profits. However in many cases such profits are not visible in the national statistics as enterprises use dubious accounting procedures to evade corporate taxation.

Figure 3.1: Volume of processed fish, mt (1998-2002)

3.4 Local products are competitively priced against substitutes, but are lacking in quality, packaging and variety. Price increases in fish have been notably lower than total inflation and price increases in other food categories, including meat and poultry. There is evidence that the
market for fish is reasonably well developed in Kazakhstan, with consumers demanding a variety of product forms. Several processors reported intentions to expand operations into “deep” processing of fish (canning, cutlets, and other highly processed products) because there is high consumer demand. However, there is a general lack of marketing capacity in the sector, and consumers complain of limited selection and low quality of products. Most fisheries enterprises do not conduct any marketing activities or consumer research. This is partly due to the lack of business education among fish enterprise managers, but also to poor marketing information supplied by GOK and undeveloped information infrastructure.

3.5 Harmonizing sanitary and veterinary standards could expand markets. The European Union banned the import of fish products (including caviar) from Kazakhstan from 1998 to 2002 due to unsatisfactory sanitary and veterinary standards. There have also been reports of shipments of caviar being rejected from the U.S. for similar reasons. Since then improvements have been made, and as a result there are currently five processors that are certified to export fish to the EU. As the Competent Authority, the GOK has a duty to ensure that quality standards are adequately designed and enforced to meet international requirements, and that there is coordination among government agencies. But quality concerns also affect the domestic market. Based on focus group interviews conducted by the FSST, consumers cited the unsanitary treatment of fish in local bazaars and the occurrence of spoilage in locally produced canned products as disincentives to purchase. Traceability is also an issue, as consumers in Almaty reported limiting their consumption out of fear that fresh fish sold in local markets came from the polluted Sary Bulak reservoir, despite assurances by sellers to the contrary.

3.6 There is potential to pursue a policy of import-substitution in canning of abundant, low-value fish. There is a seasonal demand for canned fish, which is currently largely serviced by imports of a generic canned sprat product imported from Latvia. Import substitution strategies were proposed in the Kazakhstan Fisheries Development Plan, but it is not clear that there would be a net economic gain from such a strategy. This is particularly true since large amounts of imported capital goods (processing equipment) and input supplies (such as steel for cans) are required. In such cases, encouraging inward investment from overseas is one way of overcoming such barriers. Nevertheless Balkhash bream (leshch, Abramis brama), a very common (and currently low-value) fish in many lakes in Kazakhstan, can be canned. In addition the company Atyraubalyk has a cannery and has estimated the demand for canned kilka (Black Sea sprat, Clupeonella cultriventris) products in Kazakhstan at 24 million cans (8,000 mt processed-weight) per year. But the cannery is not currently operational due to a lack of investment in the kilka fishery (in particular in fishing vessels and gear).

RECOMMENDED ACTIONS:

3.7 The role of the State in supporting the processing sector could include the following:

- Fund research to investigate the potential for small-scale value-added canning operations for low valued species (in particular bream).
- Fund research into the economic and biological feasibility of re-establishing a kilka fishery.

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60 Press Release, European Union, “The European Commission authorizes the import of caviar from Kazakhstan to EU Countries”, Almaty, 2002

61 There are two government bodies outside the FC that are responsible for quality control: Sanitary Inspection and Veterinary Control.

62 For example, one private company on Lake Balkhash has received a grant (from a Dutch investor) to build a processing plant for pike-perch fillets with up-to-date technology.
Box 3.1: Case study—The consequences of ignoring product traceability issues

The term “traceability” refers to the process introduced into a fish processing factory and the distribution system so that an individual product can be traced from the point of capture/harvesting to the point of sale. There is an increasing amount of legislation within developed markets (such as the EU) in relation to building effective traceability systems.

There was a “suspected” case of pesticide contamination affecting fish harvested from Lake Victoria in the mid-late 1990s. This resulted in the banning of some 250,000mt of fishery products (primarily Nile perch frozen fillets) from the EU market. Speculative and inaccurate media reports suggested that these fishery products were contaminated, although no positive results were ever reported. However, the direct economic impact for one country alone—Uganda—was estimated at US$ 40 million in lost export sales, with some 700,000 people in the fisheries chain and community affected. With a local purchasing power parity ratio of 12.95 this represented a US$518 million relative loss to the local economy. At the same time the ban on exports resulted in 15% devaluation in the Ugandan Shilling. The inability of the Competent Authority in Uganda to prove that they could “trace” raw materials through the production chain and have traceability and control of “authorized” samples resulted in a 1.5-year delay in re-accessing the EU market.


B. INCREASING PRIVATE INVESTMENT

3.8 There is evidence that the more successful enterprises are prepared to invest in the sector, primarily to service the development of value-added export markets with the help of foreign partners. There is some foreign direct investment, and access to foreign exchange does...
not appear to be a problem. However, officially fisheries currently have lower investment than other agro-industrial sectors, and it is estimated that investment in the sector dropped from KZT 237 million in 2002 to 10.4 million in 2003. There are reportedly an increasing number of entrepreneurs looking for investment into fisheries, after most investment opportunities into wheat and livestock production have already been taken, although this may be because the sector is less regulated and undeclared profits can be made.

3.9 Capacity is a constraint. The capacity among private producers, processors, and researchers is lacking and should be increased. The general decline of the fisheries sector in Kazakhstan has been accompanied by outsourcing specialist manpower to other areas, even abroad. With the opening of the fisheries sector to private initiatives, some enterprises have become owned by non-specialists, who require scientific and economic advice on the profitable running of their enterprises and sustainable exploitation of the resource base. This need is greatest to improve the management of the fish-farming sector (see Chapter 4).

3.10 The priority for Government should be to create the right policy environment to encourage investment through improved management and proper regulation, so that investors will invest for the long term. This includes the creation of a proper fisheries law supporting improved management and control of the exploitation of resources (see Section 2.C). Tax policy should also be examined to ensure that it is not discouraging investment, as some enterprises complain that taxes eat up more than 45% of income. Transparency in the marketing of fish and fish products should also be increased, along with improvements in the reliability and scope of statistical data on fish sales. A good example of the benefits of publicly strong management of the sector can be found in Namibia, which post independence started with a high-profile MCS campaign (arresting vessels, investing in deep-sea patrol vessels and aircraft for surveillance). As a result, foreign companies are prepared to invest in the long term as they see the sector being well managed. If a co-management regime were to be introduced to support producers, then creation of a program to increase the availability of micro-credit and extension services should be considered (such activities could be eligible for loans under the Bank-financed Agricultural Post Privatization Assistance-II, or APPAP-II, project now under preparation).

C. INCREASING RETURNS TO FISHERS FROM THE MARKET

3.11 There are a number of determinants of prices received by fishers. These include the harvesting techniques used and how the fish is handled (for example through the use of ice and time between capture and marketing), the way the fish is processed and presented to consumers, grading procedures, product quality and traceability, distribution system in use, consumer attitudes and the price of substitutes.

3.12 Currently, fishers appear to be marginalized and are not receiving fair returns for their efforts. Where fishers are members of a production co-operative (which is the case for approximately 50% of the fishing workforce) then boat crews receive between 25-40% of the market value of the catch, plus a share of the annual profits of the co-operative. If the boat crew were supplied with a fishing boat, gear and all other inputs (fuel, oil etc) then these returns might be considered

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64 For the period 1999-2001, fisheries officially accounted for 1.6% of total agricultural GDP, but only 0.4% of investment. The difference would be even greater taking into account IUU catches.

65 From State Statistics Agency.

66 Of increasing importance to consumers in developed markets is also the certification (promoted by bodies such as the UK-based Marine Stewardship Council, MSC) that fish products are caught from sustainable sources. This is often referred to as eco-labeling.
It is reported that caviar retails locally for approximately US$100/kg and local (un-official) middlemen pay US$50/kg for un-processed caviar. However, Atyrau-Balyk only pays fishing co-operatives an average of KZT 300/kg (approximately US$2.00/kg) by weight for landed sturgeon, irrespective of whether the fish has caviar or not.

Source: FSST

3.13 **Returns to fishers can be improved through co-management.** The structure of the industry puts fishers at a disadvantage. Fishers have low bargaining power as a result of their disadvantaged position in the distribution chain. Most co-operatives appear not to be working in the best interests of fishers, that is they are not true co-operatives. There is also limited social security for what is generally a seasonal occupation, fishers have limited bargaining power with middlemen and reports that fishers received their payments from traders months late appear common. Much of this results from the inability of fishers to obtain quota under the current system. It is suggested that additional returns to fishers can be achieved by addressing a number of these wider institutional issues, which are discussed in the sections on co-management and allocation of use rights. In addition, associations of fishers formed for the purposes of co-management of fisheries resources can also form the basis of joint fish marketing arrangements.

3.14 **Investment in infrastructure would help.** Fishers are currently dependent on proximity to cities and the season because infrastructure is lacking. Cold storage is generally unavailable, limiting fishers’ activities in summer (many of them do not fish for at least one month in summer). Fish they catch on warm days quickly loses its quality, and must be sold at a low price on terms dictated by buyers. The lack of paved access roads leading to water bodies and landing sites also prevents buyers from reaching fishers, or fishers taking their own catch to market. The absence of wholesale markets and a market information system also reduces the access of fishers to markets, and their knowledge of prices and demand, and further erodes their bargaining position. The fact that there is no wholesale market or auction system for fish (caught in Kazakhstan) also makes it difficult for the authorities to monitor the domestic trade in fish. Investment in the basic infrastructure of commerce by GOK, as well as increasing the availability of micro-credit to fishers to invest in their own storage and processing technology, would help to improve their market position and incomes (again, this credit may be available under APPAP-II).

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68 It is reported that caviar retails locally for approximately US$100/kg and local (un-official) middlemen pay US$50/kg for un-processed caviar. However, Atyrau-Balyk only pays fishing co-operatives an average of KZT 300/kg (approximately US$2.00/kg) by weight for landed sturgeon, irrespective of whether the fish has caviar or not.

69 Source: FSST

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**Figure 3.2: Pike-perch price structure by basin in 2003 (KZT/kg)**

[Graph showing the price structure by basin in 2003 (KZT/kg)].
4. INVESTING IN TECHNOLOGY

4.1 In order for the Kazakh fisheries sector to reach its potential, alternative sources of production will have to be developed. This requires increased investment in technology. With capture fisheries reaching their limit or even declining, growing demand will have to be met from other sources, including aquaculture. But the technology used for aquaculture in Soviet times is no longer cost-competitive in a market economy. Therefore, investments in research into more efficient production methods and appropriate, modern equipment are required for the sector to be competitive. There is also potential to enhance wild stocks, and improve aquaculture, through the production of stocking material. Finally, despite the concern about over-fishing, there are water bodies (mostly small) and fish species that remain under-exploited. Thus the main investments in technology should be focused on:

- Improving hatchery production;
- Promoting aquaculture;
- Developing small water bodies; and
- Exploiting under-utilized aquatic resources

A. IMPROVING HATCHERY PRODUCTION

4.2 Publicly owned hatcheries are uneconomic and often ineffectual. With State support during the Soviet Period, stocking material was produced in 13 large hatcheries, turning out 50 million fingerlings annually, with fish farms producing another 500 million fry for releases into reservoirs and lakes. However, the system subsequently declined and by 2002 only 77 million units of stocking material were produced. Many of the former hatcheries were too large and over-capitalized with outdated equipment. The stocking material from some hatcheries probably also has a low chance of survival as environmental conditions, as well as natural food supply, may not be favorable. Currently there is partial cost recovery from payments received from fishing enterprises for production of fingerlings for release, as this is one of the conditions for the issuing of fishing quotas. However “purchased” fingerlings are released into water bodies without regards as to whether the fingerlings bring benefit or not. An example is the Bukhtarma/Zaysan water body where large quantities of common carp fingerlings are annually released, but their return in catches is low. In many cases the hatcheries are producing fingerlings of species that have a low market value and are not target species (such as Gibel carp).

4.3 While most of the former SOEs in the productive sector have been privatized, the privatization process should be encouraged to continue to include the state owned hatch-

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70 To satisfy an average per capita consumption of 17kg/year (if not met by imports) would require domestic production to increase to around 255,000 mt, which is more than six times 2003 production, and 2.5 times 1975 production. This is unlikely to be sustainable for capture fisheries.

712 It is an important policy decision as to whether the existing system is maintained, whereby fishing enterprises pay the hatcheries (as a condition of their fishing quota/license). An alternative would be for the government to retain the responsibility for restocking and the cost of this be reflected in the cost of fishing quotas/license. There are certain economic arguments that favor the latter for reasons of economic efficiency for the hatcheries (in terms of not having to deal with lots of small enterprises).
eries. By putting the restocking programme out to the private sector (and producers/processors or the State paying market rates for restocking material), economic efficiencies will be encouraged that are not possible at present. The FSST recommends launching a process of privatization of all existing state owned hatcheries (see list of hatcheries in Annex F). This should be initiated over the next 1-2 years and be completed within the next 5 years and the State should not continue intervening to subsidize these hatcheries (the 2004 budget allocates KZT 91.6 million to the state hatcheries for material and equipment support). The exception to this is in the case of the two (and in the future possibly three) sturgeon hatcheries in Atyrau. These should remain within the public sector, consistent with how other neighboring states around the Caspian run their sturgeon restocking programs.

4.4 Only a small number of private hatcheries have emerged to take the place of the former SOEs, but they should increase with time. Some of the privatized hatcheries will not survive as a natural consequence of operating in a free market economy. Indeed, without a guarantee of demand to restock specific lakes or areas it would be futile to operate such a business. In order to ensure the survival of a number of these hatcheries, they will either need to diversify into full-cycle production of valuable fish species or have an exclusive supply contract with GOK to maintain the existing restocking program. It is hoped that with an improved policy environment and management of the sector, new hatcheries may in the near future be established in areas with concentrations of small water bodies. This may go in parallel with the revival in fishpond production for higher value fish species, such as trout, silver and grass carp, and with the start of sturgeon production in controlled pond environments and in selected lakes.

Recommended Actions:

- Due to their present economic non-viability, a decision on what to do with the existing large-scale hatcheries for production of stocking material is urgently needed. This also requires rethinking of the current strategy of stocking predominantly common carp into reservoirs and some lakes.

- The FSST recommends that the FC prepare a comprehensive privatization plan before embarking on such a program to ensure that the impact on the livelihoods of employees and their families from the privatisation process is minimized and that existing State assets are made best use of.

- The Government should consider constructing and running a pilot-scale demonstration hatchery for a variety of high value non-sturgeon fish species. This hatchery, which could be converted for this purpose from one of those already in existence, should be used for research and development, and training of middle-level specialists.

- The Government may consider establishing a salmonid hatchery which, apart from producing stocking material, would also provide an opportunity for scientists to study genetic selection and to improve the qualities of selected salmonid species (though care must be taken not to pollute the genetic stock of any remaining indigenous species).

- Investigate the potential for establishing a “center-of-excellence” hatchery for producing pike-perch fingerlings for restocking. (see also Annex B on pike-perch)

- Construct a new sturgeon hatchery and upgrade two existing hatcheries at Atyrau (see Section 2.F).

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72 This is a similar amount to the total revenue received from the sale of fishing quotas (currently KZT 70-100 million permutex), so that there is no longer a possibility of them being privatized. The FSST applauds this development.
B. PROMOTING AQUACULTURE

4.5 Aquaculture was well developed during the Soviet Period, but became depressed during the transition. Pond aquaculture was formerly strong, with production of up to 12,000 mt of fish per year. Numerous lakes were also developed for enhanced fisheries. However, after 1990 aquaculture and the production of stocking material declined considerably. Fish farms suffered from many of the same problems as the hatcheries, and were also uneconomic to run due to the rising cost of fish feed, utilities and other running costs, the cost and unavailability of spare and replacement parts, and also the need to increase wages. Modern technologies used for the production of valuable fish species, as developed in other countries, have not yet been applied in Kazakhstan and adjusted to local species. Introduction of a number of taxes and charges, such as for water, has further depressed aquaculture production of fish grown to marketable size, as well as production of the stocking material. The worst hit has been the production of carp species, as fish from capture fisheries sell for a lower price than those produced in ponds. With the rare exceptions of some carp producing fish farms, the only aquaculture showing profit has been rainbow trout production.

4.6 However, the potential for aquaculture remains good. At present only a few private sector fish farmers have started commercial pond culture or enhanced lake-fisheries ventures. However, with its many lakes, reservoirs and streams, Kazakhstan could produce up to 80,000 mt of fish per year from pond culture, lake breeding, use of thermal effluent from power stations, and mountain trout farms. This would bring the structure of Kazakh fish production in line with the rest of the world, where between 1996 and 2001 aquaculture production increased from 26.7 to 37.5 million tons, or 38 percent of food fish (even at its height, aquaculture only constituted 10-15% of Kazakh fish production). Some large existing pond systems could be converted to the production of sturgeon and Chinese carps (silver carp and grass carp). While this would lead to a lower production level, it is believed that it would be profitable as fish feed required for such culture can be obtained at minimal cost. Improved MCS should also limit the supply of poached fish and therefore make cultured fish more price competitive with higher-priced wild caught fish. Ponds could be constructed along the western shore of Lake Balkhash. The already available experience in cage production in thermal waters at power stations should be used for production of selected species in lakes. The development of intensive, small-scale production should also be encouraged. This would also provide alternative income-generating opportunities for fishing communities, especially women, and reduce their dependency and pressure on capture fisheries (although experience from other countries shows that fishers are not always the best fish farmers).

Recommended Actions

4.7 The following priority areas for development of aquaculture have been identified:

- Culture of high value fish species such as sturgeon, paddlefish, trout and striped bass in pond conditions, but also of some species produced under aquaculture conditions in small

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74 This is based mostly on interviews and field observations, as no one, including the FC, collects data on the aquaculture production of fish.

75 Total taxation is estimated at 46%, which helps to drive the sales price of cultured fish so high that it cannot compete with fish captured from the wild.

lakes, should be encouraged. Introduced exotic species not yet present in open waters must be fully investigated for their potential competition with indigenous fish of Kazakhstan, and quarantined to prevent introduction of fish diseases (see Section 2.F). There should be commercial (market) justification for introductions of exotic species new for Kazakhstan.

- In suitable situations, semi-intensive and intensive aquaculture should be developed. This may be in form of small enterprises, but equipped with advanced technology allowing productivity and specialization in fish of high market value.

- There is potential for developing aquaculture of common carp and sturgeon in suitable bays of Lake Balkhash, and a pilot study for these fish should be initiated.

- Trials should be conducted to evaluate the potential for introduction of the highly efficient carp (common, silver and grass) poly-culture systems popular in countries such as China, India, Vietnam and Bangladesh.

- With major problems facing pond fisheries, the research should focus on the development of better strains of selected aquaculture fish species.

- In the past, farms at five electric power stations in Kazakhstan produced market-size fish using discharged thermal water. Restarting these activities using modern technologies should be encouraged to produce stocking material for sale to private fish farmers or fish farming companies. The economics of producing market size fish should be reassessed by the electric power companies, and if found profitable, encouraged for development by private industry, perhaps as a joint venture between power companies and private investors.

- Establish a demonstration trout farm in Almaty oblast to encourage the development of trout farming in southern and eastern Kazakhstan, and a demonstration sturgeon farm in western Kazakhstan.

- Maintain broodstock of paddlefish (a species related to sturgeon) for use in production of stocking material for aquaculture in the following oblasts: Atyrau, Almaty and Kzyl-Orda.

- Aquaculture has inherent risks, and can be highly polluting if not done properly. Pen/cage culture in lakes is particularly risky (for example, eutrophication, fish diseases, genetic mixing between cultured and wild stocks of a species). This should be guarded against by developing and promoting the use of clean technologies.

**REDUCING THE COSTS OF AQUACULTURE PRODUCTION**

4.8 **One of the constraints to expanding aquaculture production is the cost of fish feed.** Fish feed figures prominently in the cost of raising fish on fish farms. Currently, high-quality feed for trout production can only be imported. Imported trout feed sells for 300 KZT/kg, while low quality feed locally produced for carp production sells for 20 KZT/kg.

4.9 **The substitution of locally produced fish feed for high-cost imports should be encouraged.** There appears to be no shortage of fish feed producers in Kazakhstan. Substituting high cost imported feed with locally produced high quality feed would be one way of decreasing the cost of raising higher value, high-protein-demanding fish such as trout and sturgeon. Kazakhstan’s

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77 In particular, effective measures must be taken to avoid escape of striped bass from entering open waters.
waters have large resources of low quality fish such as bream, roach and crucian carp with high protein content but presently poor market value. The total resource of such fish is estimated to be 25,000–30,000 mt. This could be converted to 6,250–7,500 mt of fish meal, equivalent to 20,000–23,000 mt of high quality feed for sturgeon and trout, resulting in the production of at least 8,000 mt of high quality cultured fish species, based on a Food Conversion Ratio (FCR) of approximately 3:1. More research is required to develop formulas for producing the feed with locally available materials.

**Recommended Actions**

4.10 Due to the high cost and public good nature of the research required to develop feed production technologies (i.e., other firms would be able to benefit from the research by appropriating the technology), owners of fishery enterprises hesitate to fund it. There is therefore a strong argument for Government to fund the basic research necessary to develop the feed technology. They can then transfer the technology to private enterprises for investment in production on a commercial scale. Another possibility is for feed processors to form an association to fund the research with contributions from members.

**C. DEVELOPING SMALL WATER BODIES**

4.11 Most of the 5,000 small lakes throughout the country remain unregulated and not subject to any quota restriction, and are exploited privately or collectively for low-value species. Many of these lakes are located in the steppe region of northern and central Kazakhstan. This is the only major fisheries basin where no basin management authority is planned. The local branch of the FRPC has also been closed. As a result, there appears to be almost no data collected on this fishery. However, the total annual catch from these lakes may be in the region of 20,000 mt, or nearly the same as in the Balkhash - Alakol or Irtysh - Zaysan fisheries. If only 50% of landings enter the local cash economy (as opposed to consumed at home) then this fishery contributes some KZT 1.0 billion to the national economy, or nearly 20% of the total official figure for the gross value added from the fisheries sector (KZT 5.4 billion). This fishery is therefore not insignificant.

4.12 There is potential to significantly increase the contribution of small lake fisheries through improved management and investment in production of higher value species. Given the large number of lakes, the potential for increasing the contribution of this fishery to the national economy from improved management and investment, by targeting species such as pike perch, is considered potentially significant and worthy of further investigation by the FRPC (possibly with support from the Bank, as was originally proposed in a concept paper submitted in late 2003). For example, if only 10% of the water bodies were targeted for stocking with higher value species, such as pike perch, given their market price (which is 2-3 times that for smoked bream), the potential for increasing the value-added from this fishery may well exceed an additional KZT 0.5 billion per year (see also Annex B on pike-perch).

4.13 Currently, there is uncertainty regarding ownership of small lakes, and this reduces the incentives for investment. Experiences from elsewhere (within Europe) suggest that the best way to ensure inward investment would be for these lakes and reservoirs to be either privatized or offered on a long-term lease, subject to adherence to sustainable management plans and

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78 Conservatively assuming that the principle target species are bream and a “farm-gate” sale value of KZT 15/kg and a value-added (smoked) sale price of at least KZT 100/kg.

79 Note that these figures are very approximate given the lack of reliable data on this fishery.
consideration of historical use by local populations. Legal entitlement and recognition of ownership are very important issues, both of the water body itself and the required land access. At present, there appears to be a great deal of uncertainty regarding tenure of small water bodies in Kazakhstan. Ownership regulations fall within the Land Code. Under this code, all natural water bodies and reservoirs are the property of the State (known as the “Water Fund”). Leases for exploitation of water bodies can be obtained through application to the regional government for periods up to 49 years (most likely for a nominal sum). However, this process is not yet well defined, and it is an open question as to whether these tenure arrangements are sufficient to encourage long-term investment in aquaculture.

**Recommended Actions**

4.14 The FC would be advised to consider how to attract investment to the small lakes fishery (in relation to the farming of higher value species) and how to capture some of the rent from this resource (by for example charging nominal fishing license fees, as long as the cost of collection of such fees does not exceed the rent received). Investment could be encouraged through long-term leases or the sale of ponds to fish farmers.

- The clarity of land tenure laws as they relate to fish ponds will have to be improved. In order to create sufficient incentive for private entrepreneurs to invest, their tenure will have to be secure for a sufficient period of time. At the same time, leases should be made renewable (e.g., every 5 years) contingent upon development and implementation of sustainable management plans.

- Investments in small water bodies should be supported by ensuring that there is easy access to high-quality stocking material, fish feed and fertilizers, and research into new technologies.

- Lake ranching of coregonids (salmonid family) should be rehabilitated or initiated in selected lakes and reservoirs in northern Kazakhstan. A number of coregonid species\(^{\text{80}}\) (*Coregonus albula ladogensis*, *C. albula*, *C. sardinella*, *C. peled*, *C. lavaretus maraenoides*, *C. l. ludoga*, *C. muksun* and *C. autumnalis migratorius*) have been introduced in isolated lakes. Many of these have hybridized and this has led to decreasing production. Coregonids are both commercially fished and produced in culture.

- The now closed branch of the FRPC in Petropavlovsk in northern Kazakhstan should be reopened and concentrate its research activities on the multitude of water bodies in this region. To improve the situation the lakes may have to be restocked again, stocking each lake only with species that cannot hybridize with each other.

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**D. EXPLOITING UNDER-DEVELOPED AQUATIC RESOURCES**

4.15 While some fish stocks have been over-exploited, **there remain other aquatic resources that have not yet been developed to their full potential** for various reasons, including lack of technology and market access. One such aquatic resource is **crayfish**. There are considerable crayfish resources (*Astacus leptodactylus*) in the Caspian Sea, Bukhtarma/Zaisan and Shulbin reservoirs, and in some other water bodies. During the first eight months of 2003, only 1,100 kg of

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\(^{\text{80}}\) Examples of common names include whitefish, vendace, cisco, and peled.
crayfish were harvested from these two reservoirs, while the maximum sustainable yield is estimated at 100 mt/year. No estimates are available for other water bodies. Due to the overexploitation and decimation by crayfish plague of crayfish stocks in Turkey and Europe, there is a lucrative market especially in Europe\(^81\) (see Box 4.1). Developing a strategy for crayfish exploitation would be a way of making an asset from a species currently considered a pest due to entanglement in fishing nets. The following actions are recommended:

- Harvesting should be preceded by market studies, especially in the European Union and in particular in Scandinavia. The Kazakh export quality requirements should then be assessed for their compliance with the market countries’ regulations. Promotion of Kazakh crayfish abroad could also be considered.

- The sustainability of this resource needs to be further confirmed, and the best harvesting methods and technology identified and developed where necessary. For up-to-date harvesting methods and technology, and packaging of live crayfish, the major European producers (Sweden and Spain) should be consulted.

- After securing markets, the development of a sustainable, well-managed crayfish fishery in the Irtysh reservoirs and Caspian Sea should be encouraged.

- If lucrative markets are available, crayfish culture could follow. This will require additional research and development of appropriate technology. If the Petropavlovsk branch of the FRPC is re-established, investigations on the suitability of some lakes in the northern steppe region for crayfish production should be initiated.

- All measures must be taken to prevent the transfer of crayfish plague to Kazakhstan. This includes the ban on import of American crayfish known to be vectors of this disease. Any containers transporting live crayfish for export must not re-enter the country.

**Box 4.1: The crayfish fishery**

The recent appearance of crayfish in the Bukhtarma/Irtysh river system represents a challenge to fisheries, which has up to now concentrated on fish. Crayfish is also common in other water bodies of Kazakhstan, including the Caspian Sea (Astacus pachypus, A. leptodactylus, with several sub-species). There is considerable demand for crayfish in the world market, both in Europe and in the U.S.A, if the product can be delivered for a reasonable price. The largest importers in Europe have been Spain (which produces much of its own), Sweden and France. Until the late 1980s the European countries were importing crayfish from Turkey, with 2,505 tons purchased in 1985 by Sweden alone. However, the spread of crayfish plague (caused by fungus Aphanomyces astaci) in the Turkish crayfish soon after that led to collapse of this industry. The same crayfish plague attacked European populations in the second half of the 19th century, but to some extent stocks have recovered. Kazakh crayfish of genus Astacus has not yet been attacked by the disease, and therefore its fishery and aquaculture have good potential for development and marketing. Such activities must include measures to prevent the introduction of the crayfish plague. Both live and processed crayfish can be exported, subject to agreement with the importing country.

Today, much of the crayfish in Europe is produced in aquaculture, which concentrates on species introduced from the U.S. The methodologies of crayfish culture are well developed, both for the native European species and those introduced from the U.S. In the 1990s European countries cultured and harvested 8,500 tons of freshwater crayfish. Scandinavian countries (Sweden, Finland, Norway) have the best-

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\(^{81}\) For example, current wholesale prices in Sweden, which is a major consumer, are reported to be over US$13/kg for signal crayfish (Pacifastacus leniusculus) imported cooked.
developed aquaculture. Westman et al. (1990) and Westman and Manninen (1994) provide very useful information on the status of the crayfish fishery in individual European countries. The Baltic countries, especially Lithuania, also have crayfish stocks, and experiments have been conducted on production of crayfish in ponds. In the late 1980s on the Lower Volga the “Volzhanka” fish farm was releasing crayfish larvae in open waters and it was planned to construct a large hatchery for production of stocking material. The methodology of farm production of crayfish is described by Kozlov (1989), while details on the biology, distribution, dynamics, and fisheries of the Volgo-Caspian crayfish are given by Rumyantsev (1974). The recent increases in crayfish stocks in the Irtysh/Zaisan water body indicate that the stocks are in good condition and that they may be sustainably exploited, with strict monitoring to avoid overharvesting, but also to keep a check on the possibility of crayfish plague. Private entrepreneurs should consider that it takes 4 to 6 years to produce crayfish for markets.

References:


Westman, K. and K. Manninen (1994) Institutes, research workers and programmes related to research on crayfish in Europe. Fishing Game and Fisheries Research Institute, Aquaculture Division, P.O. Box 202, Finland 00151, Helsinki, Finland.


4.16 Kazakhstan has valuable resources of fish-food organisms that can be used for aquaculture, but are currently under-exploited. In the past numerous smaller lakes provided sustainable harvests of gammarids (up to 1,000 mt per year) and of *Artemia salina*, which were processed or used directly as fish food. Harvesting of these organisms has the potential to alleviate shortages of high-protein fish food during the young stages of domestic production of some fish. Considerable quantities were also exported in the past. The current status of this industry is unknown. Most of these resources are in smaller water bodies of the steppe region. It is estimated that at present 100 to 350 mt of artemia are being harvested annually in northern lakes, and another 100 mt in other regions of Kazakhstan. Resources of gammarids, the benthic organisms on which fish feed, are estimated to be 2,467 mt or 400 mt of dry weight in 19 lakes of northern Kazakhstan. Gammarids inhabit the bottom of shallow lakes that freeze during winter, and so do not contain fish. In the past harvesting gammarids was a small-scale operation providing a livelihood for a significant number of people, and the decline of the industry has left many of them without income-generating opportunities. Another potential source of fish food is zooplankton, which up to now has not been harvested in Kazakhstan. It is estimated that only 1% of the available resource could provide 2,700 mt of dry fish feed with a high protein concentration. The following actions are therefore recommended:

- Close scientific supervision should avoid overexploitation of fish food organisms in lakes with naturally high concentrations. This should be one of the tasks of the northern Kazakhstan branch of the FRPC, if reestablished (see Section 5.C).
- The economics and methodology of harvesting zooplankton under sustainable conditions still needs to be investigated.
- Socioeconomic considerations (for example, livelihood diversification for the local population) should be a government priority for the rational development of the fish-food organisms industry in natural lakes.
5. REFORMING THE ADMINISTRATIVE ORGANIZATION

5.1 For the fisheries sector to reach its potential and be sustainable, Government has an essential role to play. It is important to recognize that there are certain functions that Government should continue to be involved in if fisheries are to be managed properly and the development of the sector encouraged. In order to effectively carry out its responsibilities, and implement the recommendations of this study, Government should improve and maintain the organization and capacity of fisheries management institutions.

A. IMPROVING THE MANAGEMENT STRUCTURE

DISADVANTAGES OF THE CURRENT STRUCTURE

5.2 The current administrative organization is overly complicated, making it difficult to take the actions necessary for ensuring sustainability of capture fisheries, improving marketing, and making the required investments in technology. At least four departments within MOA and twelve additional government agencies are involved in managing different aspects of the sector. This leads to unclear divisions of authority and slow decision-making.

5.3 Some progress has been made, but more needs to be done. There have been several organizational changes over the past 5-years and the process of restructuring is still ongoing with the re-introduction of the Fisheries Committee and a system of basin directorates re-established in 2003. These are positive developments. But the current arrangements remain complex (see Tables 1 and 2 and the organograms in Annex A), particularly as there appears to be no representative body (such as an inter-ministerial working group) coordinating this process. Frequent changes in administrative organization are also disruptive to the sector, so GOK should decide on a structure and adhere to it to the extent possible. In summary, the issues that have arisen are:

- **Functions of the FC:** Whilst licensing and quota control remain functions under the control of the FC (through the Basin Directorates and Oblast Akimat), functions related to trade and marketing issues, processing (quality control) and economic data collection remain outside the scope of the FC.

- **Institutional linkages:** there is a need to be able to resolve conflicts within the FC and between the FC and other institutions, to strengthen the capacity of the FC and improve co-ordination with other MOA departments and ministries.

- **Addressing the needs of primary producers:** fishing communities are marginalised as stakeholders within the sector and the tendering process and quota allocation is not transparent enough (see Chapter 2). This results in a fishery management decision-making process that is slower than is needed to react to dynamic changes in the aquatic environment. There is also little trust shown by the industry and compliance is poor (as demonstrated by the under-reporting of catches and illegal cross-border trade in fish products).

82 Catch data is collected by the FC.
**Fisheries research:** does not even fall within the domain of the FC, but a different MOA department (Science). There is duplication of research efforts by the Fisheries Research and Production Center, Oblast Akimat (in some Oblasts only) and some of the Interoblast Basin Departments. There is also a serious under funding of basic stock-assessment research and the FRPC (see Research below).

**Fisheries Inspectorate:** the two vessel registries should be combined, and the capacity of the Inspectorate should be strengthened, but the number of Fisheries Inspectors could be significantly reduced (especially if fisheries management moves towards a system of co-management). Data collection is limited and the accuracy of the data that is collected highly questionable.

**RECOMMENDATIONS FOR IMPROVING THE MANAGEMENT STRUCTURE**

5.4 **In order to address these issues, fisheries management responsibilities should be restructured and streamlined, and allow for more decentralized decision-making.** It is clear from discussions with the MOA that the FC already recognises that the existing division of administrative functions between the various ministries and at various levels of national and regional government renders fisheries sector planning, decision-making and co-ordination difficult. One issue that concerns the FSST is that much of the industry still only has a limited formal role in the decision-making process.\(^\text{83}\) This is of particular concern with regard to the primary producers (fishers) given that in many of the remoter regions of the country they have limited alternative options to working in the fisheries sector.

5.5 **Despite the challenges of doing so, management decisions should involve stakeholders more.** It is a general truism in other fisheries around the world that whenever attempts are made to involve stakeholders (that is producers) in the management of resources there is greater compliance. In the management of European fisheries for example there is currently a greater awareness of the importance of involving local communities in the management process, as the centralization of power within the European Commission and Parliament in the past is seen as a key-contributing factor to the failure of the EU Common Fisheries Policy (CFP). On this basis the FSST has proposed the development of co-management (see Section 2.E).

5.6 **Fisheries administration should be within one department, the Fisheries Committee.** What is clear from an analysis of the institutional structures of other countries is that the fisheries sector is invariably organized and administered within one department or division of a ministry. This is important given the diverse policy areas (technical disciplines) that need to be dealt with in the fisheries sector. As an aid to assist the FC in appraising its future structure, some information on the institutional structure of fisheries administrations elsewhere is attached in Annex G.\(^\text{84}\)

5.7 **The FSST suggests that the FC should be organized around three divisions:**

(i) Structural and Planning;
(ii) Markets; and
(iii) Fisheries Resource Management.

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\(^\text{83}\) Although it is suspected that informally some middlemen and traders operating in the sector do have considerable influence on the allocation of fishing quotas and the tendering process.

\(^\text{84}\) Details on the institutional structure of other EU member states can also be found on links from the DG Fisheries website: [http://www.europa.eu.int/comm/dgs/fisheries/index_en.htm](http://www.europa.eu.int/comm/dgs/fisheries/index_en.htm).
A Fisheries Management Information System (FMIS) would function across all of these divisions and there would be a close link between the resource management division and FRPC concerning stock assessment activities.

5.8 **The FC needs to include specific competencies.** An analysis of the structure of the FC suggests that it needs to incorporate the following between its divisions/units:

- Structural issues, policy and planning, international affairs and fisheries economics
- Organization of fish markets and post harvest sub-sector (but this does not include dealing with the food health and hygiene issues of fish marketing, which should continue to be addressed by the MOA Veterinary Department)
- Fisheries resource management and conservation (but not environmental management issues as this is the responsibility of the MoE) and control (under which the Zonal Inspectorates operate through the Basin Directorates)
- Aquaculture management and stock assessment research of inland fisheries (all of which should be undertaken in close association with the FRPC)
- Fisheries Management Information System, FMIS (includes all data collection, vessel monitoring and the fisheries control) – this issue is covered in Section 2.D and in the FMIS Concept Note.
- The FC should improve the coordination of partnership activities in the sector and liaison with a variety of bilateral and multi-lateral organizations (such as the World Bank, EU, Asian Development Bank etc). This could be done through the establishment of an **International Liaison and Project Coordination Unit** within the FC, located institutionally within the Structural and Planning Division.

5.9 A more detailed review of management could be carried out as part of the proposed FMIS project. The review could incorporate an institutional appraisal and financial appraisal of the FC and other key institutions both within the MOA and other ministries. It would address the following issues to help determine the most appropriate future institutional structure for the FC:

- Legal framework and national development objectives
- Supervisory framework and the operational environment
- Internal organization and functions
- Management processes, delegation and manpower planning
- Financial accounting, planning and budgeting (recurrent costs, capital expenditure, working capital and auditing)
B. IMPROVING MANAGEMENT CAPACITY

CHANGES IN STAFFING AND CAPACITY OF PERSONNEL ARE REQUIRED

5.10 The FC will require some additional professional staff to cover the competencies described above. The FC currently has 15 staff based in Astana. For the size of the sector this is considered reasonable, particularly as the FC is supported by the FRPC with a staff of 129, of whom 88 are reportedly researchers. Additional trained personnel will however be required to staff the center responsible for the FMIS, and the Project Coordination Unit mentioned above. The FC must also consider employing a trained fisheries economist (or at least an economist that can be trained in the principles of fisheries management). For the Project Coordination Unit, the following are recommended:

- It is recommended that initially two persons should staff the unit: one staff member of this unit could deal with project implementation and donor coordination, and the other deal with international fisheries issues (liaising with the Ministry of Foreign Affairs).
- Both staff should have at least one second European language (preferably English) and ideally be educated to graduate level. Professional training in project management would be necessary for this staff if they were not already trained.
- If there is a significant amount of aid donor assistance being provided to the sector in the future, then a third staff member may need to be recruited to deal with procurement issues and/or project monitoring and evaluation.

5.11 Currently, the educational system does not satisfy the needs of the sector, and should be improved. Increased capacity will require considerable professional advice and high technical qualifications from fisheries managers and technicians involved in modern aquaculture. However the fisheries sector is currently short of both technical and economic specialists. While there are universities that educate ichthyologists and biologists, the demand today is for erudite fishery managers with knowledge in biological sciences as well as business and economics. Such a combination does not exist at present at Kazakhstan universities and the FC/MOA should take up this issue with the Ministry of Education and Science.

5.12 On the other hand, there are too many fisheries inspectors, particularly if more responsibility is shifted to producers. There are currently 600 in the country. The inspectors are also under-resourced and poorly trained, with no career path or leadership structure – for example there is no Chief Fisheries Inspector post within the FC. Based on experience in other countries, it is suggested that staffing of the inspectorate could be reduced by as much as 50%, particularly if the cost-savings were re-invested in building up the capacity of the remaining inspectorate and some form of co-management regime were introduced that would commit local fishing communities to a degree of voluntary compliance. An example of international best practice for such an inspectorate is illustrated in a case study from the UK (see Box 5.1). This is a major

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85 By comparison for example the Latvian fisheries administration has a staff of 15 that manages a sector with a throughput of approximately 100,000mt per year and the Polish fisheries sector (with a throughput of 250,000mt and employing over 38,000 people) was until 1999 managed by an administration of only 5 people.

86 For example by comparison Poland has a total of 30 Inspectors managing 52 fish landing sites receiving over 200,000mt of fish per year along the Baltic coastline of 530km. The Inspectors carry out controls over fishing activities by boarding vessels, inspecting catch landings and checking compliance with catch reporting requirements (1999 data, S. Diffey).
Improved fisheries research capacity is required to ensure the sustainability of stocks, develop technologies necessary for the growth of the aquaculture sector, and preserve rare and endangered species. The Fisheries Research and Production Center and its four branches need to enhance research and monitoring in several important areas, including ecology and bioresources, hydrobiology, ecological toxicology, and pond fisheries. High quality scientific research is not currently carried out in many basins due to a lack of laboratory equipment, trained specialists, and sea-going vessels.

It is vital that stock assessments be carried out on a regular basis. Estimates of the fishery resource available for exploitation are based on determination of the numbers and biomass of each individual fish species in each water body. These estimates then serve to determine the catch quota for each species under the current system. More accurate stock assessments of aquatic organisms in a variety of water bodies of Kazakhstan are therefore essential for safeguarding the sustainability of bioresources, and are a requirement for management decisions on the best utilization of fishery resources (see Section 2.F). Otherwise, quotas may eventually become unrealistic and lead to either overexploitation or underutilization of fish stocks. Monitoring of fish stocks by GOK is currently carried out only on the major water bodies, and even these have

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Even under co-management this work is essential to providing a sound basis for management decisions (although it would be good to involve fishers too).

Caspian Sea and Aral Sea, lakes Kamyslybash and Balkhash, Alakol lakes, and on the following reservoirs: Shardara, Bukharmazaisan, Ust-Kamenogorsk and Kapshagai. Occasionally, other reservoirs are also investigated: reservoirs of the Irysh-Karaganda canal, Shulbin reservoir, and lakes of the spa “Burabai”
become suspect due to the lack of resources of the FRPC. Apart from providing budget for the research work of the FRPC, GOK also allocates funds to oblasts every few years for assessment of smaller water bodies. However, these funds are often re-allocated to other uses by the oblast akimats.

5.15  For improved research, the budget and staff of the research centers will have to increase, more of the budget should come from core Government funding, and research centers should no longer be obliged to bid on an allocation for research fishing. At present the FRPC reportedly receives about 80% of its total annual research budget from tendered contracts that determine to a large extent its activities, with basic research sidelined. For example, the FRPC collaborates with a major oil exploration company in aquatic bioresources assessment in the Caspian Sea sector of Kazakhstan. Supplemental funds from contract work and from grants are also obtained through collaboration with foreign research organizations that carry out applied fishery research work in Kazakhstan. While it is good for the FRPC to bid on contracts for non-government clients, the share of funding from this source is considered the inverse of the international norm.89 An additional hindrance for the stock assessment work carried out by the Atyrau branch of the FRPC has been its obligation to bid for a quota allocation for research fishing.

5.16 Specialized education and training in fisheries sciences will also have to be improved. Currently a large number of universities in Kazakhstan offer courses in aquatic sciences and fisheries, while not having sufficiently qualified aquatic sciences and fishery specialists to teach them. The government issues 50 study grants annually for specialization in fisheries, with the grants being distributed among all universities. As a result, no university can develop a strong program in fisheries science, there is a complete lack of training for engineers, and only limited opportunities for vocational training. In light of the rapid development of aquaculture and capture fisheries elsewhere in the world, new textbooks, manuals, and scientific publications are also needed for research and management of fisheries in Kazakhstan. Another major obstacle for small-scale fishery development is the lack of fisheries extension services for fishers, who are thus unable to see what could be done to improve fish production, processing and marketing.

5.17 It is also necessary to change the “culture” of research.90 In most countries of the world, as in Kazakhstan, research has focused in the past on the biology of fish and—more recently—the relationships governing aquatic systems. Only a few countries have well-functioning economic institutes analyzing fishing operations. Few research programs provide sufficient knowledge for timely management decisions. In the future, the prevailing culture of scientific independence in research institutes should be transformed to link research funding with the production of timely outputs tailored to fisheries management requirements.

Recommended Actions:

• There is an urgent need to increase operating budgets for stock assessment work by the FRPC, both in the field and for the evaluation of the results.

• It is essential that the FRPC and its branches’ manpower be strengthened to fully carry out

89 For example, the Centre for Environment, Fisheries and Aquatic Science (CEFAS) in the UK has an annual budget of J32.7 mil (US$58.9 mil), and J26.0 mil of this comes from core government funding.

stock assessments on a regular basis. More specialists therefore need to be employed and the budget increased. There is also a need for increases in salaries of both researchers and lecturers, to avoid brain drain to the private industry. International assistance could be sought and requested, particularly for responsibilities related to biodiversity resources of global importance (for example, from the Global Environment Facility—GEF).

- Core funding for basic science by the FRPC should be provided from public sources based on a formal contract between the FRPC and FC. This should constitute approximately 80% of its total budget. This could then be supplemented with consultancy work for government and the private sector. The FRPC should also no longer be required to bid on a quota allocation for research fishing (though use solely for research should be strictly enforced). Meanwhile, there should also be a system of performance indicators used to measure the value for money of services delivered by the FRPC to FC.

- The FSST is of the opinion that GOK should seriously consider reestablishing the now closed north Kazakhstan branch of FRPC. In the past this branch covered the research on a variety of smaller lakes in the north, including the biology, hybridization and production of coregonids (see Section 4.C), an important component of fisheries. Activities of the branch should also include research on fish-food organisms, i.e. gammarus, artemia and freshwater zooplankton, and on the maximum sustainable yield to allow their sustainable harvesting (see Section 4.D).

- Fisheries study grants should not be tied to particular universities, but should make it possible for students to choose the universities with the best fisheries education standards.

- Urgently needed are new textbooks and manuals on modern fisheries practices, management and research. As a first step, selected existing manuals and handbooks from the Soviet era may have to be selectively edited and updated for use in Kazakhstan. Special care should be given to the preparation of extension manuals and their wide distribution. Increased internet access for researchers could also be a cost-effective means of knowledge transfer.

- Provision of government grants is needed to enhance the knowledge of fishery scientists and managers through study tours of selected foreign research institutions and fish production establishments with relevance to Kazakh fisheries. Twinning research in collaboration with overseas institutions should be encouraged.

- There is also an urgent need for updating research equipment to the current international standard.

D. PUBLIC EXPENDITURES IN THE FISHERIES SECTOR

5.18 In order for Government to effectively play its required role in the management of the fisheries sector, and adopt the innovations outlined in this report, sufficient and sustained funding from the public sector is required. The cost of managing a fishery is becoming an increasingly important issue in many countries around the world as governments seek to limit public expenditure at the same time as trying to improve the delivery, efficiency and cost-effectiveness of public services (including fisheries management services). In addition governments are increasingly looking towards policies and strategies that promote economic efficiency and environmental sustainability.
OBJECTIVES OF PUBLIC EXPENDITURE

5.19 Efficiency, cost-benefit analysis and cost-effectiveness are key objectives of public expenditure. As stated in recent research on the subject of the cost of managing fisheries by the OECD, the primary objective of any government intervention in the sector is to ensure the optimum use of marine resources, within, and financial and human resources applied to, the sector. There are two key principles leading to achievement of this objective. Firstly, that management itself improves the performance of the sector (and the benefits from management outweigh the costs of fisheries services and so generate resource rent). Secondly, that these services should be delivered as cost effectively as possible. For example, MCS is one of the primary responsibilities of public sector fishery management. However, there is no economic justification for having an MCS operation within a fishery that directly costs more than the benefits accruing to the economy from the exploitation of that fishery. The OECD study goes on to suggest that the greater the degree of user participation (by the industry) in decision making, service delivery and the payment for services, the more likely that fisheries services will be cost-effective, more accountable with better compliance, and have lower overall management costs. This again supports the argument for introducing some form of co-management within the sector (see Section 2.E).

5.20 Any operational and manpower review of the FC and fisheries inspectorate will need to ensure that future fisheries management plans for the country are financially sustainable. In order to be able to do this, and to develop appropriate cost-benefit strategies, a considerable amount of accurate micro- and macro-economic data is required from both the private and public sector. This is currently unavailable.

DETERMINANTS OF PUBLIC EXPENDITURES IN THE FISHERIES SECTOR

5.21 There are many factors that influence the cost of the main components of fisheries services, and their relative budget allocation within a country. Fisheries service costs can be broken down into three broad components (as used in the OECD study): research (data collection and stock assessment), management (including monitoring fishing input and output controls) and enforcement (or surveillance costs). The OECD study provides a considerable amount of data on the fisheries service costs of a variety of OECD member-state countries (although none compare directly with Kazakhstan in terms of a combination of size of country, limited population base and a resource base dominated by freshwater species). A selection of examples is provided in Box 5.2.

Taking one specific country as an example, public spending in the UK on the fisheries services in 2002 was £120 million (US$220 million), or about 20% of the value of the UK fish catch. Of this budget, 42% was for stock estimation (research) work, 23% for enforcement and 5% for administration costs. The remaining 30% was for direct financial aid to the sector. Ignoring these subsi-

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91 The Costs of Managing Fisheries, OECD, 2003
92 The FC quotes its mission statement more vaguely as the: “Preservation and enhancement of fish and biological resources of water bodies of the Republic of Kazakhstan” (FC Presentation at the FSST Workshop, November 2003)
93 Ignoring unrelated and indirect costs, as other objectives may mean that a vessel is engaged only part time in fisheries surveillance.
94 Of course a country can value a resource beyond its immediate financial return for social, political, historic, or biodiversity reasons.
95 Such as support for the decommissioning of vessels, support to producers to stabilize fish market prices, grant regional assistance to processing factories for upgrading facilities, etc.: UK Fisheries – Situational Analysis of the Fisheries Sector, June 2003. Prime Minister’s Strategy Unit, UK Government
Box 5.2: Examples of fisheries service costs in other countries

An OECD study\(^97\) provides a considerable amount of data on the fisheries service costs of a variety of OECD member-state countries, although none compare directly with Kazakhstan in terms of a combination of size of country, limited population base and a resource base dominated by freshwater species. The following data collected from 11 countries does however illustrate the wide variations in the cost of national fisheries services:

- Research costs as a proportion of total fisheries service costs varied between less than 10% (Korea) to close to 50% (Australia and Iceland). The average was in the region of 30-40%.
- Management costs varied widely between over 60-70% of total costs (Mexico and Turkey) to less than 10% (Norway and Iceland).
- Enforcement costs also varied widely between 70-75% of total costs (Norway and Korea) to almost nothing (Mexico and Turkey).
- As a percentage of the value of fish production, the cost of research services varied between almost nothing (Mexico) to over 20% (Turkey).\(^98\) Most countries averaged between 1-5%. In general there is a positive relationship between providing research services and the size of the sector.
- The cost of management services in Australia and Norway were US$1,200-1,400 per license.
- The cost of enforcement services within the European Union was US$50/mt of production (or 4.3% of the value of production). This is close to the OECD average.

Other sources provide examples of MCS costs alone in other countries. In general, the higher the incomes in a country, the greater will be the proportion of the recurrent MCS\(^99\) costs attributable to staff. The following are examples:

- During the 1990s the USA spent approximately US$80 million annually on the surveillance of foreign fishing vessels, but collected only US$41.5 million in license revenue (although there should be other, less easily quantified benefits from the reduction in competition with foreign boats over fish resources).\(^100\)

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\(^96\) Transition to Responsible Fisheries: Economic and Policy Implications, OECD 2000.

\(^97\) The Costs of Managing Fisheries, OECD, 2003; all the data is converted to 1999 US$.

\(^98\) In both these cases the costs were distorted because of devaluations in the local currency against the US$.

\(^99\) Section 3.e explains that MCS is more than just fisheries inspection.

Namibia currently collects license/quota fees of approximately N$120-130 million (US$ 13.0-14.5 million) per annum. The total government budget (based on 2000-20001 data) for management of the fishery is N$80 million (US$9.0 million), of which the MCS operational budget is N$41 million (US$4.5 million) or 33% of the total revenue.

License revenue from the Falkland Islands licensed EEZ fishery in 1990 was a total of £35 million (US$63.0 million). The total cost of managing the fishery, including MCS operational costs, was £7.5 million (US$13.5 million), or 22% of gross license revenue.

The annual cost of policing the waters of the United Kingdom within the EU is £20-25 million (US$36-45 million). This cost is high relative to the other EU countries, being equivalent to approximately 5% of the landed vale of the catch and is primarily because of the use of naval vessels for fishery protection services outside the coastal 12-mile zone.\(^{101}\)

5.22 The range of factors that influences the cost of research, management and enforcement services in Kazakhstan include:

- Geographical characteristics: the large number of scattered fish landing sites and the size of the country increases the cost of enforcement and research.
- Fish resource characteristics: there should be lower costs with regard to enforcement and research in the sturgeon/caviar fishery given that there are only a few species targeted and there is (at least officially) a monopoly in this industry. Research costs are however increased given the likely over-exploited state of many of the stocks.
- Industry size and fleet structure: the large fleet of small vessels involves greater costs in terms of licensing and MCS.
- Management instruments: in theory all of the three main management tools are used in Kazakhstan—input controls (through the licensing of vessels and fishing companies), output controls (quota auctions) and technical measures (mesh sizes, closed areas and seasons). However, this is a difficult area to analyze because in practice only the catch quota system is functioning, so there is limited evidence on the impact/advantage of one management instrument over another on fisheries service costs.
- Resource use conflict: there is limited dialogue between stakeholders and the FC (plus the added problem of no fisheries law to support stakeholders) and therefore limited capacity in the country for resolving conflicts – the result is over-fishing and poor compliance.
- Method of service delivery: all services are provided by the public sector (either from the state or republican budget). There may be scope for privatizing some of these services, such as for example certain research activities of the FRPC and reducing enforcement costs through some self-policing by the industry (supported by the introduction of a co-management regime).

The Fisheries Budget and What is Appropriate for Kazakhstan

5.23 A good benchmark by which to judge the cost of fisheries administration in Kazakhstan over time is 10-15% of the landed value of the catch. This includes the costs of administration,

\(^{101}\) Enforcing the Common Fisheries Policy's Quota Regime, presented by Dr. Steven Haines at a Surveillance & Enforcement Conference hosted by the Greenwich Forum. May 1998, London
5.24 **The budget for fisheries management in Kazakhstan should be higher.** Historical data provided by the FC is more clear-cut, although there is no data for the landed value of fish sales in Kazakhstan. Published data from 2001 does however indicate that the republican budget for fisheries services was KZT 188 million. This represented 3.5% of the contribution of the sector to GDP (based on official data), which is less than a third of the OECD average. The government is currently only receiving in the region of KZT 110 million (US$ 0.73 million) per year from quota revenue. However, taking into account the significant value of IUU landings, and assuming that the value of quota revenue directly reflects the true value of resource rent, the FC could be receiving 3-4 times what it is currently receiving—between KZT 330-445 million (US$ 2.2-2.9 million). If true, this also means that GOK’s contribution to fisheries services is significantly less as a proportion of fisheries GDP and of the value of fish landings than is currently stated.

5.25 **Increases in the fisheries budget have already begun, but more is required on a sustained basis.** The 2004 budget for the Fisheries Committee, through the Ministry of Agriculture, was KZT 629 million, which was a significant increase and a positive step (after a decrease in 2003, see Figure 5.1). In addition, the official budget figures are somewhat misleading in that they do not include the purchase of material and equipment (KZT 357 million for 2004), funds for regional authorities (KZT 330 million for 2004), funds for development of laws and regulations (KZT 3.4 million for 2004), or the core funding for the FRPC that comes from MOA’s Science Department (KZT 70 million for 2004). That these additional figures have not been included in the official Republican fisheries budget and that some (e.g., the FRPC core funding) are not even controlled by the FC, reduces the transparency of the budget process and makes comparisons over time very difficult. Nevertheless, it can be estimated from these figures that the true Republican expenditures on fisheries services will be in the region of KZT 1,390 million for 2004.

**Recommended Actions**

- The FSST suggests that if GOK wishes to keep in line with international standards regarding the delivery of fishery services, the state budget for the sector should be in the region of KZT 2,000 million per year. Thus, while the budget increase for 2004 is encouraging, additional, sustained funding is required.

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102 Based on an analysis of data on fisheries management costs in other countries in the OECD Reports and anecdotal information collected by the FSST

103 For example, the recent construction of a modern new sturgeon hatchery in Azerbaijan alone cost approximately KZT 1,350 mil (US$9 mil), which is nearly four times the Republican budget for fisheries in Kazakhstan in 2002.

104 This is not however the same as saying that fisheries services account for 3.5% of the landed value of fish. The figure of 3.5% is estimated based on a given figure of KZT 188 million (the republican budget for 2001) as a proportion of the gross value added from the fisheries sector (5.4 billion). This is the latest year for which the value added figure is available. The gross value added figure is likely an under-estimate of the contribution of the sector given that the official value added figure must be derived from official landing statistics (by volume NOT value), which are highly inaccurate. This assumes GDP can be accurately calculated by summing the value added.

105 These first three items, along with FC salaries, are typically included in MOA overhead.
• Maximum effort should be made to ensure that the increased funding is based on the principles of cost-benefit and cost-effectiveness analysis, and should result in measurable improvements in the quality and efficiency of public service delivery. This will require additional capacity in the FC for economic and financial analysis. The budget should only be increased gradually as the FC demonstrates the capacity to use the additional resources effectively and efficiently.

• The FSST recommends that for funding fisheries services, the FC should investigate options for increased cost recovery (from producers) in the issuing of licenses and quotas. The improvements in management discussed in Chapter 2 should facilitate this.

• The FSST recommends that the FC budget accounting procedures (and perhaps for all of MOA) be standardized in the future to comprehensively reflect true State expenditures on the sector, and allow for more accurate comparisons over time and across categories.

• It is recommended that an early task of the proposed FMIS be to collect accurate micro- and macro-economic data from both the private and public sector for use in cost-benefit analysis. The FC should start compiling this data now by working closely with the National Statistics Office to improve the collection of economic data (albeit that the data currently collected is reportedly un-reliable).

5.26 Implementing the recommendations contained in this report, and allowing the fisheries sector to reach its potential, requires money. It requires sufficient and sustained funding from the public sector commensurate with fisheries’ importance and current and potential contribution to the economy. In the short term, additional funds will likely be required for the investments necessary to improve the management of the sector. The sequencing of these investments and size of outlays should be topics of discussion among Government and other stakeholders at the dissemination workshop for this study. Of course, the increase in funding should occur gradually as the FC demonstrates the capacity to absorb it, and should be accompanied by clear objectives and measurable impacts of improved fisheries service delivery on the ground. Examples of possible impact indicators and means of verifying them are provided in Table 5.1. Given these conditions, the great promise exhibited by the fisheries sector in Kazakhstan should justify the increased investment necessary to support its sustainable development.

Data from Statistics Agency.
Table 5.1: Suggested key fisheries services impact indicators and means of verifying them

<table>
<thead>
<tr>
<th>Key Impact Indicator</th>
<th>Means of Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved policy environment</td>
<td>New framework law and number of regulations (byelaws) sent to Parliament for adoption</td>
</tr>
<tr>
<td></td>
<td>Institutional linkages between FC and other ministries clarified and simplified</td>
</tr>
<tr>
<td></td>
<td>Improved industry and sector representation/consultation</td>
</tr>
<tr>
<td></td>
<td>Resource management policy prepared for all major fisheries</td>
</tr>
<tr>
<td></td>
<td>The Role of FRPC strengthened</td>
</tr>
<tr>
<td></td>
<td>Introduction of the principles of co-management (initially on a pilot basis)</td>
</tr>
<tr>
<td>Increasing the availability and quality of management information</td>
<td>FMIS operational with up-to-date fishing vessel register</td>
</tr>
<tr>
<td></td>
<td>Decrease in IUU catches</td>
</tr>
<tr>
<td></td>
<td>Increased capture of economic rents</td>
</tr>
<tr>
<td></td>
<td>Market and trade data collected</td>
</tr>
<tr>
<td></td>
<td>Macro- and micro-economic data collected</td>
</tr>
<tr>
<td></td>
<td>Standardized accounting procedures in use with the MOA</td>
</tr>
<tr>
<td>Increasing cost-effectiveness of service delivery</td>
<td>International Liaison and Project Coordination Unit functioning</td>
</tr>
<tr>
<td></td>
<td>Memorandum of understanding between FC and FRPC in place</td>
</tr>
<tr>
<td></td>
<td>Size of state budget for fisheries sector</td>
</tr>
<tr>
<td></td>
<td>Improved industry and sector representation/consultation</td>
</tr>
<tr>
<td></td>
<td>State fisheries budget as a percentage of landed value</td>
</tr>
<tr>
<td></td>
<td>Implementation of cost recovery mechanisms</td>
</tr>
<tr>
<td>Improved MCS capacity and compliance</td>
<td>Restructured fisheries inspectorate</td>
</tr>
<tr>
<td></td>
<td>Involvement of fishing communities (co-management regime)</td>
</tr>
<tr>
<td></td>
<td>Cost-benefit of MCS strategies</td>
</tr>
</tbody>
</table>
1. ANNEXES

A. Organograms and Administrative Responsibility Tables
   i. Fisheries Committee
   ii. External agencies

B. Pike-perch

C. MCS and Its Role in Fisheries Management

D. Quota Allocation Examples

E. List of Red Book species

F. List of state-owned hatcheries and fish farms

G. Fisheries administrative organization examples

H. Summary of Key Statistics

I. Map of Kazakhstan with major water bodies and Fisheries Basin Authorities
### Table 1: Key Responsibilities of Institutions within the Ministry of Agriculture

<table>
<thead>
<tr>
<th>Institutions within Kazakhstan</th>
<th>Responsibility at National level</th>
<th>Responsibility at Basin Directorate level</th>
<th>Responsibility at Oblast level (regional government)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishery Committee</td>
<td>State fisheries management, planning and administration (plus representation within regional fishery organisations)</td>
<td>Management of fishing quotas/licenses through Oblast basin divisions. Data collection.</td>
<td>Fishery protection co-ordination and fish reproduction</td>
</tr>
<tr>
<td>Veterinary Department</td>
<td>Co-ordination of fish disease research</td>
<td>Control over fish health status of reservoirs</td>
<td>Control over fish health status of reservoirs (through territorial departments of MoA)</td>
</tr>
<tr>
<td>Fishery Research &amp; Production Centre (FRPC)</td>
<td>Forecasting status of stocks, providing recommendations on commercial fishing regime and stock enhancement work</td>
<td>Stock assessment and enhancement work</td>
<td>Advise on allocation of auctioned catch quotas[^107]</td>
</tr>
<tr>
<td>Water Committee</td>
<td>Co-ordination of work on reservoir usage and fishery protection</td>
<td>Co-ordination of work on reservoir usage and fishery protection</td>
<td>Co-ordination of work on reservoir usage and fishery protection</td>
</tr>
</tbody>
</table>

[^107]: Increasingly in conflict with advise provided by Basin Directorates/Oblasts and private sector (in particular oil companies operating in the Caspian Sea).
Table 2: Key Responsibilities of Other Government Institutions

<table>
<thead>
<tr>
<th>Institutions within KZ</th>
<th>Responsibility at National level</th>
<th>Responsibility at Basin Directorate level</th>
<th>Responsibility at Oblast level (regional government)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Environmental Protection (state control and Kazhydromet)</td>
<td>Co-ordination of work on environmental protection, pollution levels and impact on fish stocks</td>
<td>Co-ordination and implementation of state control on environmental protection, pollution levels and impact on fish stocks</td>
<td>Environmental protection, pollution levels and effect on fish stocks</td>
</tr>
<tr>
<td>Ministry of Interior Affairs</td>
<td>Organisation and co-ordination of fishery protection measures</td>
<td>Implement fishery protection measures</td>
<td>Implement fishery protection measures</td>
</tr>
<tr>
<td>General Prosecutors Office</td>
<td>Enactment of environmental legislation</td>
<td>Implement environmental legislation</td>
<td>Implement environmental legislation</td>
</tr>
<tr>
<td>Ministry of Healthcare</td>
<td>Co-ordinate work on sanitary control of reservoirs</td>
<td>Execute work on sanitary control of reservoirs</td>
<td>Execute work on sanitary control of reservoirs</td>
</tr>
<tr>
<td>Ministry of Foreign Affairs</td>
<td>Issues related to transboundary use of bio-resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ministry of Finance</td>
<td>Financing of the Ministry of Agriculture, including the Fisheries Committee and its divisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ministry of Economy and Budget Planning</td>
<td>Preparation and approval of annual budget and programs</td>
<td>Preparation and approval of annual expenditure budget</td>
<td>Agreement between Republican and Oblast budgets</td>
</tr>
<tr>
<td>Agency of Customs Control</td>
<td>Joint responsibility for controlling export and import of fish products</td>
<td>Joint responsibility for controlling export and import of fish products</td>
<td>Joint responsibility for controlling export and import of fish products</td>
</tr>
<tr>
<td>Frontier Service of the Committee of National Security</td>
<td>Organise and conduct joint work on protection of fish stocks in trans-boundary zone</td>
<td>Organise and conduct joint work on protection of fish stocks in trans-boundary zone</td>
<td>Organise and conduct joint work on protection of fish stocks in trans-boundary zone</td>
</tr>
<tr>
<td>Ministry of Science and Education</td>
<td>National curricula and personnel training</td>
<td>Personnel training</td>
<td>Personnel training</td>
</tr>
<tr>
<td>Oblast Akimat</td>
<td>Liaison with Fisheries Committee</td>
<td>Liaison with Basin Directorates</td>
<td>Hold fishing quotas, tendering of fishing rights (quotas/licenses) and conduct fishery protection activities (and in at least one case has its own fisheries department.)</td>
</tr>
<tr>
<td>Ministry of Transport and</td>
<td>Maintain fleet registry and implement shipping</td>
<td>Control over fleet operations</td>
<td>Control over fleet operations</td>
</tr>
</tbody>
</table>
ANNEX B: PIKE-PERCH (STIZOSTEDION LUCIOPERCA)

1. The pike-perch fishing industry is very active in Kazakhstan, especially in the Irtysh/Zaisan water body area. As pike-perch stocks have significantly declined in Asian countries west and southwest of Kazakhstan, Turkey, Iran, Europe and the U.S.A due to overfishing, the demand for pike-perch fillet and whole frozen fish has greatly increased and turned pike-perch fishing into a lucrative trade for Kazakhstan. As a result pike-perch is now one of Kazakhstan’s most important export items. Recently a decrease in the catch size has been noted, which suggests that pike-perch fishing in the Irtysh/Zaisan reservoir has reached its maximum exploitation level.

2. This annex summarizes the status of pike-perch fishing in Kazakhstan. It briefly describes the efforts of a number of countries to produce pike-perch in hatchery conditions either to enhance the stocks in open waters or culture table-size fish. It also discusses the environmental impact of pollution on pike-perch and the use of pike-perch in biomanipulation. Finally the annex includes recommendations, which may be useful for Kazakhstan as it begins to address issues of overfishing and environmental degradation while maintaining a sustainable catch.

PIKE-PERCH STOCKS IN BUKHTARMA/ZAISAN AND SHULBIN RESERVOIRS (IRTYSH RIVER)

3. Due to a poor food base at the early growth stage and competition by pike and perch, it took 13 years before the pike-perch stock in the Bukhtarma/Zaisan (B/Z) and Shulbin reservoirs reached a level of commercial importance. However, once a new food organism, crustacean mysids was introduced into the reservoirs, the pike-perch stocks increased more rapidly. The resulting increase in zooplakton biomass led to an increase in both plankton-feeding and predatory fish, especially pike-perch. The doubling of zooplankton biomass resulted in tripling the pike-perch biomass\(^{108}\). As the numbers of other predatory fish decreased, pike-perch stocks increased. The slow build-up ensured that there was no: (i) sudden population collapse as a result of explosive reproduction; (ii) starvation due to a short supply of food organisms, and (iii) overexploitation by fishers, as occurred in a number of water bodies in European countries, and in the Great Lakes of Canada and the USA which have a related species Stizostedium vitreum (walleye).

4. The following chart provides data on pike-perch and bream catches in the B/Z reservoir from 1971 to 1991.

![Chart showing pike-perch and bream catches in the B/Z Reservoir from 1971 to 2002 (% total)](chart.png)


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\(^{108}\) Conversion ratio 1:3.3 (pike-perch to food organisms).

\(^{109}\) mean per year
5. Recently, the annual catches of pike-perch appear to have stabilized at around 10-11% of the total catch in B/Z, and around 20% in Shulbin. The higher values for Shulbin may correspond to the presence of a more suitable prey fish, i.e. perch (Perca fluviatilis), rather than bream (Abramis brama), which dominates in B/Z. The present statistics, compared with historical data, suggest that fish production in B/Z has stabilized, as both the percentage proportion of pike-perch and that of bream in today's catches are close to those during the period 1976-1991 (see above). Unreported catches of pike-perch may however, substantially increase the percentage in the total catches, and if this is so, a careful re-evaluation of the possible impact of overfishing should be done as soon as possible.

6. Selective fishing has led to underutilisation of fish of lower value in B/Z (only 65-70% of bream is being harvested). As a result the percentage of bream in the total fish biomass has increased. However, breams' slower growth rate, lower fecundity, and the high ichthyomass have also led to a parasite infection by Ligula, which has been found in 1-15% of the total bream population. In B/Z, in the second half of the 1970s the dermatofibrosarcoma disease infected more than 60% of mature pike-perch stock. Between 1992-1999 the disease infected 12-19% of its total population, but intensified fishing reduced the infection. It is suspected that water pollution is contributing to the spread of this disease. Recently, the percentage of infected fish in B/Z reached 25-30 % in protected areas where fishing is banned. In such areas, controlled fishing should be used to remove the sick fish and the areas should have restrictions on commercial fishing.

7. In 2000, when bream represented 84.4 % of the total catch, the following recommendations were made: (i) increase harvesting of younger fish and (ii) recreational fishermen should use smaller mesh size nets (40-55 mm), with a 5 day limit and a maximum harvest of 10 kg per net. Interestingly, during the period 1980-1991 (Karpova et al., 1996), bream catches fluctuated between 78.3% and 87.1% of the total, with a mean of 84.2% for the 12 year period. This is identical with the mean for the year 2000, when the above measures for better exploitation of the bream were put forward. A report issued in 2001 again pointed out that bream and roach (Rutilus rutilus) were underexploited due to the limits on the use of small mesh size nets and poor market for fish of low value, while the quotas for pike-perch, pike (Esox lucius), ripus (Coregonus albula) and carp (Cyprinus carpio) were fully utilized.

8. In 2002 only one company in Kazakhstan, Zaisan-Ryba got fishing rights. However, the company was unable to fish the full quota and fulfill its environmental obligations. It also failed to meet some of the conditions set for allocation of the fishing rights, including the purchase or pro-
duction of stocking material for releasing fish into the B/Z reservoir, water works maintenance, and retaining the required number and type of gear, etc. Short-term fishing quota allocations therefore do not encourage companies to take over activities required for sustainable management of fishery resources.

9. In the Shulbin reservoir high-value fish such as pike-perch and pike are fully fished, but there is a potential for better exploitation of bream and roach. The poor marketability of such fish has resulted in underfishing. Untimely spring releases of water from Shulbin reservoir, which lower the reservoir water level and expose shallows, which function as major spawning and nursery grounds is a major problem. One recommendation is to adjust the spring water releases and provide shallows to allow fish to spawn. Artificial spawning substrates were used in the past in Irtysh River reservoirs to counteract the unfavourable spawning conditions by increasing the number of suitable spawning grounds. This practice could be tested again for its impact on fish stocks.

10. The effectiveness of stocking carp (Cyprinus carpio) in both reservoirs appears to be negligible. In B/Z only 1600 kg of carp were captured in 1998, in 1999 – 700 kg, no capture was recorded in the statistics for the years 2000 and 2001, and 400 kg were captured in 2002. In the Shulbin reservoir, 800 kg of carp were captured in 2001, and 400 kg in 2002. The strategy of regularly releasing carp into the reservoirs needs to be reassessed, and the cost/benefit of the current practice carefully evaluated.

OVERFISHING

11. Overfishing is a well-known issue for a number of countries in Europe, the USA and Canada. There are many examples of pike-perch and walleye stocks which have collapsed as a result of overexploitation. The walleye fishery in Lake Huron’s Saginaw Bay collapsed by the late 1940s, primarily because of the intensive fishery and environmental degradation. Stock declines have also been traced to a series of weak year classes resulting from low flood levels such as in Russian and Kazakh rivers. Pike-perch populations go through 4 to 6 year cycles of peaks and lows as seen in lakes in Estonia, Belorussia, Poland and Finland. Overfishing can be prevented by: (a) careful monitoring to reveal weak production years; (b) imposing a fishing ban especially to protect broodstock in spawning areas, and (c) stocking fingerlings produced in hatcheries to compensate for losses. However, it is essential that the spawning habitat be sufficient to support natural reproduction if stocking is to be only an interim measure in the rehabilitation process.

PIKE-PERCH PRODUCTION IN EUROPE

12. Pike-perch production depends on the availability of suitable prey fish. The most productive pike-perch waters produce 40 kg/ha. In Europe the average harvestable pike-perch production is 10-30 kg/ha/pond, and 10 kg/ha/lake. In Germany’s small lakes 5-12 kg/ha production is considered good. In Hungary’s Lake Balaton, the annual commercial fish harvest between 1960-78 varied between 889 and 1530 t (yields of 14.9 – 25.7 kg/ha), with pike-perch at 39 to 182 t (0.3-3.1 kg/ha). The proportion of pike-perch in the total landings was 10.8-12.4% during 1960-64, and 3.9 to 9.8% afterwards, but only 3.8% in 1978. Starting in 1975 the annual yield of pike-perch was less than 1 kg/ha. Between 1960-1978 the annual catch from sport fishery increased from 0.76 to 6.4 kg/ha, of which the increase in pike-perch catch was from 0.05 to 0.6 kg/ha. It could be that sport fishermen have directly affected the commercial catches of pike-perch, which during the same period declined from 2.8 kg/ha to 0.8 kg/ha. This is difficult to prove, but it is possible that the decline in pike-perch fishery has been caused by a combination of overfishing and increased eutrophication.
13. In the Kuybyshev reservoir\(^{10}\) on the Volga River, the three dominant predatory fish, pike-perch, Volga zander (Stizostedium volgense) and pike (Esox lucius), formed 19% of the total fish catch in 1980, 18% in 1985, and 7.8% in 1990. In terms of production per ha, the total fish production was 6.6 kg/ha (1980), 8.8 kg/ha (1985), and 8.7 kg/ha (1990), of which the three dominant predators represented 1.27 kg/ha, 1.54 kg/ha, and 0.68 kg/ha, respectively. While the pike-perch catches remained reasonably stable at around 300 t/year, and those of Volga zander around 150 t/year, pike-perch catches declined by 1990 to 71 t, one third less than the 1980 value of 242 t, due most likely to the eutrophication of the reservoir. The food base for the predatory fish was well diversified, with ample stocks of cyprinids such as roach and wild carp and some other species preferred by pike-perch.

**SIZE LIMITS**

14. In addition to maximizing the catch of large fish, establishing size limits also contributes to the protection of the potential spawning capacity. In Finland, the minimum size limit for pike-perch is 37 cm, which produces the highest yield per recruit. For this purpose the minimum mesh size used is 84-90 mm stretch (42-45 mm from knot to knot). The number of large fish is especially important when recreational fisheries play an important role, as the value of large fish is higher than that of small fish. Size is also important where commercial fishing supplies fish for filleting. If the minimum size limit is increased, the size of spawning stock and the number of larger fish increase. When the growth rate is fast, the minimum size limit may be set higher, as done in Germany, where pike-perch reaches a length of 40 cm at an age of only 2 to 3 years.

**PIKE-PERCH AND POLLUTION**

15. In the coastal waters of the Baltic Sea in Finland a higher population density of pike-perch slows down the growth rate. Low-level organic pollution of water favored the reproduction and survival of pike-perch in Finland and in Germany. However, in Germany eutrophic lakes generally had a low pike-perch production, as did Lake Balaton (Hungary) where eutrophication reduced the original pike-perch density of 15 fish/ha to half, and sometimes to less than one fifth. Pesticide runoff from agricultural practices may also have had a negative impact on pike-perch. In addition, a large part of the fish population consists of deep-bodied bream, which escape the small gape size of the predator (how does this contribute to pollution?)

**FEEDING AND CONVERSION RATES**

16. Low mortality after hatching depends to a high degree on the availability of abundant food organisms of the right size, i.e. zooplankton. Fry drifting down-river find themselves in an environment poor in plankton. The situation improves when the fry start to feed on fry of other species. Beyond the fry stage it is the availability of prey fish that produces very strong year classes of pike-perch, therefore growth may eventually slow down when there is a shortage of prey fish. For example in the Volgograd reservoir pike-perch of size 12-17 cm (1 year old) eat 3-3.5 cm fish; 34-43.5 cm (4 year old) eat 6.5-18 cm fish; and 58-63 cm (7 year old) eat 10-15 cm fish. It takes an estimated 500 kg of prey fish to achieve 100 kg pike-perch production. At an average weight of prey fish of 14g, 46.6 t of pike-perch captured in 1956 in the Saratov oblast consumed 17 million fish.

\(^{10}\) When full, its water surface area covers 625 km\(^2\).
17. Where pike-perch depleted food resources and changed to cannibalism, its stocks crashed. This has happened in small lakes in Poland and Germany, in rivers in England, and some water bodies in United States water bodies where a related American species, S. vitreum (walleye) is found. Availability of abundant small prey seems to be more important than food preference. In the Caspian Sea pike-perch could consume 40 species of fish, although showing a preference for only about half a dozen species. In Dutch lakes roach is a preferred food.

**USE OF PIKE-PERCH IN BIOMANIPULATION**

18. When introduced into new lakes, pike-perch may have a major impact on the prey fish. For example, in Sweden’s Lake Ymsen, during a 10 year period, pike-perch reduced the numbers of perch (Perca fluviatilis) in the annual catch from 1175 to 87 kg, of bream (Abramis brama) from 2435 to 69 kg, and roach (Rutilus rutilus) from 285 to 5 kg. In Lake Erken, pike and perch catches declined from 1.2 kg per net to 0.15 kg/net. In such water bodies, with a limited prey supply, pike-perch may not maintain high densities for long. In established waters it may comprise only a small part of the total predator population.

19. Pike-perch is used to improve water quality through biomatipulation by controlling small, low value fish species, which appear in eutrophicated shallow lakes in countries such as the Netherlands, Poland, Germany, and Finland. The small fish, by feeding predominantly on phytoplankton-filtering larger planktonic crustaceans, contribute to the eutrophication and phytoplankton blooms, and subsequently to deterioration of water quality. Studies on lakes in Germany have shown that when pike-perch stocks are underexploited, this will periodically favor overexploitation of prey fish and lead to clearer water, which in turn leads to recovery of submerged vegetation and the accompanying fauna, including pike and tench (Tinca tinca). This process is ideal for improving water quality purposes, however because of increased cannibalism at low prey fish densities, recruitment of pike-perch is simultaneously halted. An ecological constraint on predator enhancement through the limitation of fishing effort is the cyclic nature in the balance between predators and prey fish, which can be expected because of the unpredictable variability in the recruitment of small prey fish. ??

**ENHANCEMENT OF STOCK**

20. Enhancing pike-perch supplies by stocking less than 1 year old or older fish has become common practice in a number of European countries, e.g. Finland, the Netherlands, Germany, Czech Republic, Denmark, Sweden and Poland, but very few evaluation studies have been undertaken.  Juveniles? are obtained from hatcheries and raised in ponds to a size of 6-7 cm before they are released. This type of stocking seems adequate to support the adult population, for example in Lake Vesijarvi, Finland. Pike-perch introductions with eyed ova, fry and fingerlings were more successful in lakes with higher phosphorus concentrations. Introduction of large-sized pike-perch also tend to be more successful. Rehabilitation of pike-perch populations in Denmark was carried out with two-year-old 20-30 cm individuals, at a stocking rate of 8-10 fish per ha, for three consecutive years.

21. Stocking in large reservoirs of the size of B/Z and Shulbin may not be as effective, as stocking only represents a minute proportion of the natural recruitment in large water bodies. Release of billions of 0-3 day-old walleye fry into the Great Lakes at the border of the USA and Canada
during the early 1900s failed to produce a dramatic increase in walleye stocks. As a result, most hatcheries in the USA producing stocking material were closed. Fluctuations in abundance and survival of native fry easily masks the contribution of stocked fish to the year-class unless stocked fry substantially outnumbers native fry. Fry should be stocked where there is abundant zooplankton to provide food after absorption of the yolk sac. But it is difficult to coordinate hatchery production with changing and unpredictable weather conditions that affect the spring plankton pulse. Fingerling stocking has been effective in rebuilding spawning populations in some embayments of the Great Lakes, which shows that the initial releases of billions in the early 1900s were probably executed in the wrong places. Such a strategy could also be applied to B/Z and Shulbin reservoirs in selected areas, with caution. The level of dermatofibrosarcoma incidence among the fish is a good indicator of pike-perch density. High disease incidence is present in dense stocks of pike-perch, therefore further enhancement of stocks in this setting would be undesirable.

22. In new European reservoirs or suitable lakes (without pike-perch) of 50 ha area the recommended stocking rate is 5000 – 10,000 of one-year-old fingerlings. Pike-perch mortality in small (manageable) lakes and ponds is about 20% when stocked with 10-15 cm fish. The mortality will depend to a large extent on the availability of suitable food and absence/presence of fish diseases. Stocking large-sized fingerlings in B/Z (surface area 5500 km²) would be expensive and the results uncertain.

23. The objective of increasing pike-perch stocks through stocking and careful management has not always been successful, as documented by experience from Germany, Poland and Hungary. In Germany, increasing eutrophication has often interfered with pike-perch production. While stocking has not resulted in an increase in walleye stocks in the Cedar River in Iowa (USA), it has shown some success in Iowa lakes. Also, stocking the overfished Cherokee reservoir (122 km² surface area) in Tennessee (USA) for 4 years with a hybrid of S. vitreum and S. canadense was successful where the hybrid achieved a good growth rate.

AQUACULTURE

24. The methodology of pike-perch breeding in aquaculture conditions is well developed. There has been a long practice of producing pike-perch fry in hatcheries on the Volga and Kura rivers, and the Caspian Sea (20 million and 5-12 million 1 g fry per year). Pond production of pike-perch stocking material has been reported from the Ukraine, on the lower Don. The Czech Republic, a leader in providing training in pike-perch aquaculture technology, has a well-established aquaculture production of pike-perch (zander) stocking material, and has been exporting pike-perch fry for a number of years.

25. In artificial spawning grounds in central European conditions the mean number of fry per artificial nest was 7300, as monitored over a period of 10 years. The survival of fry/fingerlings was very high: at initial stocking density of 13 700 – 15 600 of 40 mm fry per ha of pond, 12 500 – 13 400 of 95 to 110 mm yearlings were produced by autumn, with average survival rate of 96 %. In Poland, aquaculture was tested in recirculating systems using trout pellets (42.2-52.5% protein, 14.0-22.0% fat). After 720 days the individual fish weight was over 1 kg.
Socioeconomic issues arise where commercial and recreational fisheries for pike-perch and other species of fish coexist. The fisheries themselves must exist in the context of other uses that are being made of the reservoirs or any other fished water body. A framework for analysis and management that encompasses all of these issues is required if use of the resource is to be optimized.

**Recommendations**

- The gradual reduction in the size of fish caught, may be indicating that pike-perch fishery in Irtysh/Zaisan is at its maximum exploitation level. Careful monitoring of catches, and an adjustment of the minimum allowable size may be needed to avoid overexploitation.

- Enhancement of pike-perch stocks through hatchery produced fingerlings may not be economically feasible, as natural breeding will produce much higher quantity of spawn without any cost when compared with hatchery-produced spawn. While the survival rate of larger fingerlings to be released is higher, the cost of producing larger fingerlings may not be economically justified.

- The practice of providing artificial spawning substrates for pike-perch spawning in suitable areas of Irtysh/Zaisan should continue, as it probably results in a higher spawn production.

- Control of the dermatofibrosarcoma in pike-perch in large water bodies such as Irtysh/Zaisan is not possible. However, heavier fishing pressure on fish stocks, combined with the removal of diseased fish, leads to reduced incidence of this disease. Care must be taken that the fishing pressure does not exceed the sustainable fisheries level, consequently a careful balance must be kept between controlling the disease and the fishery, and this can be achieved only in full collaboration between researchers and fishing companies.

- Aquaculture of pike-perch may be considered an alternative if the open water stocks seriously decline. However, venturing into aquaculture for pike-perch should be preceded by a careful economic study.
FISHERIES MANAGEMENT AND MCS - INTRODUCTION

1. Fisheries management is described as the integrated process of information gathering, analysis, planning, decision making, allocation of resources, and formulation and enforcement of fishery regulations which govern present and future fishing activities in line with a specified set of objectives (which usually includes resource sustainability). Responsible fisheries management combines a respect for eco-systems and bio-diversity, the needs of consumers and the economic interests of the sector.

2. Fisheries management really has two arms – the first is the strategic outlook, which is essentially an exercise in planning. However, this is not only about management of fisheries, but includes pollution control, mineral exploitation, marine safety and a host of other integrated considerations. The second arm of fisheries management is the practical implementation or executive arm – this is Monitoring, Control and Surveillance, or MCS.

3. A fisheries management system combines and requires a wide number of inputs. Biological and economic data are an important pre-requisite in this regard, because fisheries management, and the role of MCS, has to be based on an adequate ‘pool of knowledge’. A government fisheries administration cannot fulfill its requirements without this information. Social aspects to be addressed include the profile of fishing communities, the role of women, the role of the subsistence economy and small-scale fisheries, existence of co-operatives, level of co-management and income distribution. Other important inputs to the fisheries management system include national and international laws, budgeting, planning and, above all of these, the political will and institutional (governmental and non-governmental) structures within which fisheries management is to be carried out.

WHAT IS MONITORING?

4. In its simplest definition monitoring is a requirement to continuously measure fishing effort and resource yields. Monitoring will continuously record catches, location, species distribution, discards, seasonal patterns, and the intensity of fishing effort and sales information. This can be carried out using observers onboard vessels and/or from data collected at landing sites and, to some extent, from research work undertaken afloat or ashore. Monitoring is the database of MCS; it is the critical analytical or intelligence base from which the control regime is derived.

WHAT IS CONTROL?

5. Control is the follow-on from monitoring. It is the set of regulatory conditions under which a particular fishery can be exploited. It is the regime which lays down licensing conditions, quotas, technical requirements for gear, seasonal criteria (such as breeding seasons), registration and

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111 Adapted from a paper presented by Commander I. Shea at a MCS Regional Workshop, Namibia March 2002.
112 Ultimately leading to the preparation of fishery management plans (and MCS operational plans-see overleaf).
reporting requirements, and is carried out by a legal framework that complies with current international law and best practice and regional agreements. It also supports the fisheries management strategy derived from monitoring data.

**WHAT IS SURVEILLANCE?**

6. Surveillance is that range of measures intended to ensure compliance with the control regime. These measures include checking and supervision of fishing activity by inspection ashore and afloat, countering non-compliance by patrolling, arrest and prosecution when necessary, and maintaining conditions of access. The surveillance role also has a responsibility to feed back into the monitoring system, thus completing the loop.

**WHAT MCS IS NOT**

7. MCS is not Fishery Protection by another name. Fishery Protection was and is, where it remains, effectively only the Surveillance part of MCS. While the word “protection” gives a hint that it is concerned with protecting the environment, this is not generally the case, because the role is usually carried out by naval and coastguard ships which are not suitable to carry out any role other than enforcement and deterrence.

8. MCS is also not a policing operation. This is one of the functions of Surveillance, it is true, but in an efficient MCS regime it is only a small part of the overall structure of implementation. In a fishing industry with high degrees of voluntary compliance the policing role, necessarily, diminishes.

9. Nor is MCS only about enforcement, although, once again, it is a component. As we will see shortly, MCS is a cyclic system that feeds into itself. Surveillance is not only about enforcement; it is also about supporting the data collection effort, which contributes to monitoring.

10. MCS is not only about deterrence, although this is a significant factor. Effective MCS boosts and supports voluntary compliance. There is the need for a deterrence component, obviously, but the primary objective of good MCS is to enhance voluntary compliance. Good MCS therefore requires both appropriate control (legal) mechanisms and effective enforcement of these control mechanisms.

11. MCS is also not necessarily a military task. The availability of naval vessels might dictate their use for MCS, but this does not define MCS as a naval or coastguard task by right. Many countries operate excellent MCS regimes without any military or quasi-military options. The fact that a navy is available to support this civil MCS effort is usually an adequate ultimate sanction.

12. And, lastly, MCS is most definitely not the sole responsibility of the State. Participatory management, co-management and voluntary compliance will both improve compliance and actually tend to relieve the state of many of its MCS tasks (and costs).
SUMMARY - WHAT ARE THE CONTENTS OF A FISHERY MANAGEMENT PLAN

- Definition of the area/zone of the fishery, history of management and legal status
- Recognition of interest groups and details of decision-making processes
- Definition of the objectives for the fishery (resource, environmental, bio-diversity, economic, social, technical)
- An analysis of the state of each fishery (by species, season, region, gear type, etc)
- A review of the aquatic eco-system and biology of the most important species targeted in the fishery (life history, size composition, growth patterns etc)
- Details of non-fishery users and coastal zone management issues
- Details of access rights to the fishery and agreed regulations to meet stated objectives
- Details of environmental issues to be addressed and monitored
- Development of a strategy for fisheries management (by stock, zone, gear type etc)
- Arrangements for co-management of resources, MCS and establishment of an enforcement regime
- Training and human resource development requirements
- Review and audit requirements for the management plan

Based on FAO Technical Guidelines for Responsible Fisheries (No.4-Fisheries Management), 1997. Examples of such plans exist for specific fisheries in countries as diverse as Australia, New Zealand and Namibia and are currently being considered for development on a regional basis within the European Union (following a review of the EU Common Fisheries Policy in 2003).
ANNEX D: FISHERIES MANAGEMENT—EXAMPLES OF THE ALLOCATION OF QUOTAS

EUROPEAN UNION

1. The process of allocating Total Allowable Catches is briefly as follows:

(i) Annual TACs are set based on detailed studies and reflect a precautionary biological approach to TACs which also have to take into account economic, socio-economic and political factors.

(ii) Stock assessment studies are undertaken by scientists co-ordinated by ICES, NAFO and other international organizations.

(iii) These study reports are sent to the ACFM (Advisory Committee on Fisheries Management) and the ACFM makes recommendations to the STECF (Scientific, Technical and Economic Committee for Fisheries).

(iv) From this the Commission draws up proposals for the Council.

(v) The Council then decides TACs and national quotas.

2. The fishing mortality for each vessel is controlled by using a system of Fixed Quota Allocations (which is set as a percentage so that if the TAC varies then so can the quota). Fleet capacity reductions are achieved through Multi-Annual Guidance Programmes (decommissioning of vessels etc). The allocation of exploitation of stocks is also managed using technical measures such as by minimum mesh sizes, minimum landed sizes and fishing period/area restrictions.

3. Comparison of the fishing capacity of different vessels is done by using a standard measurement referred to as VCU (Vessel Capacity Units), the formulae for which is: (Length Overall x Breadth of vessel) x Engine Power (Kilowatts) x 45%.

POLAND

QUOTAS (OUTPUT CONTROL)

4. Catches of salmon, cod, sprat and herring are subject to a TAC set each year by the MOAFE (Ministry of Agriculture & Food Economy). These are based on the recommendations of the International Baltic Sea Fisheries Commission, IBSFC (which is in turn based on information provided by MIR and other research institutions reporting to ICES). This TAC is then divided into two parts. One part is allocated to the ‘coastal fishery’, ie, boats of up to 15m in length, to be shared between these vessels as a whole. The rest of the TAC is divided into individual quotas that are allocated to

114 Taken from Fisheries Sector Study Report prepared in 1999 by S. Diffey et al
those fishing vessels defined as 'cutters', i.e. vessels of between 15-30m in length which have a deck and a main engine power of up to 611 KW.

5. The division of quotas between cutters is calculated using a formula based (at least within the cod fishery) only on the length of the vessel, and does not take account of other factors relevant to the overall fishing effort of the vessel, such as engine power. This system should be reviewed before accession to the EU.

REPORTING

6. Vessels to which an individual quota has been allocated (i.e., the cutters) must carry a logbook on board and must complete the logbook (recording details of the nature, volume and location of the catch) and submit it to the Maritime Office after every fishing trip. The logbooks are sent to the nearest Maritime Office on landing, but all data is processed by MIR (Fisheries Research Institute), and is eventually retained also on the database of the Maritime Office at Slupsk.

7. Vessels of less than 15m which fish from the joint 'coastal fishery' quota do not need to carry a logbook, but instead they must submit monthly catch reports to the Maritime Office. On the basis of these monthly reports the Maritime Office (and MIR) can calculate when the coastal fishery quota has been reached and can take appropriate measures to stop fishing. On the basis of the logbooks, these authorities can calculate how much of the individual quotas are being utilised. However, it is widely reported that there is considerable under-reporting of catches in Poland. This is due mainly to the fact that, because of the number of fishing vessels, the quotas allocated to each vessel are too low to make fishing economically worthwhile unless considerably more fish than the allowable quota are caught and sold.

LICENSING OF FISHING EFFORT (INPUT CONTROL)

8. There was until recently no legal power to limit fishing effort by prohibiting the licensing of new vessels, but just a 'gentlemen's agreement' not to increase the number of vessels. However, a new Ordinance has recently been issued under Article 7(1) of the Law on Fisheries, which will place a maximum limit on the number of fishing vessels in Poland and will also allow the authorities to limit the number of days vessels spend at sea. It should also be noted that there is a power in the Law on Fisheries to refuse a license where this may result in the prescribed fishing effort being exceeded.

TURKEY

9. There is no quota management of stocks within the Turkish fisheries sector. Input controls for management of the various fisheries is by vessel licensing, although this may not be up-to-date. Various conservation management techniques are in use, including vessel size and seasonal limitations, fishing gear and mesh size regulations. The enforcement of many of these management measures is however reportedly limited, particularly of closed seasons.116

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115 Taken from EU Accession Project Inception Report prepared in 2002 by S Diffey

116 Many of the capture fisheries are closed annually between the 1st April or May and 1st September.
### SOUTHERN AFRICA

<table>
<thead>
<tr>
<th>Type of fisheries</th>
<th>Angola</th>
<th>Mozambique</th>
<th>Namibia</th>
<th>South Africa</th>
<th>Tanzania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial and subsistence artisanal fisheries. Both sectors are of importance.</td>
<td>Industrial and subsistence artisanal fisheries. Artisanal fisheries very important for food supply &amp; employment. Shrimp fisheries strategically important for exports &amp; foreign exchange earnings.</td>
<td>Industrial and small-scale commercial fisheries only.</td>
<td>Industrial and coastal artisanal fisheries. Importance of artisanal fisheries greater on East Coast.</td>
<td>Industrial and subsistence artisanal fisheries. Artisanal fisheries important for food supply and employment.</td>
<td></td>
</tr>
</tbody>
</table>

**Fisheries policies (National & International)**


**Institutional Responsibility for MCS**

| Ministry of Fisheries and Environment (Direcdo Fiscalizaz) | Ministry of Fisheries (Direcdo Administr) | Ministry of Fisheries and Marine Resources | Marine & Coastal Management (Depl. of Environmental Affairs & Tourism) | Ministry of Natural Resources and Tourism (Fisheries Division) |

**Fisheries Management System(s) in use**


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**Source:** S Diffey, 2002
THE THEORY OF ALLOCATING CATCH QUOTAS

1. A catch quota is an allocation of total allowable catch between individual units of effort. Fishermen may be given this right for a specified quantity of fish or for a given percentage of the catch. The amount allocated in the quota may be altered from year to year or seasonally in accordance with the abundance of fish.

2. In order to make this method efficient both biologically and economically the allocation of quotas involves, first, knowledge of the year-to-year allowable catch that involves expensive resource monitoring and, second, a distribution of quotas in a way which will ensure that the most efficient are allowed to fish. The initial decision is to determine the basis upon which the quotas will be identified. Whether they are given for a vessel, for a specific type of gear, or to individual fishermen depends on the nature of the fishery. First, however, is has to be accepted that the common property of a fishery no longer applies. Unless the total number entering the fishery is controlled this method is ineffective in restraining total catch (This issue is very important and was referred to in the presentation made to the FC on the 27th November. It is the problem of open access that needs to be addressed ie, restricting the number of producers (legal fishermen) operating in the various fisheries).

3. If such a scheme could be operated without conflict it could achieve the biological goal of maintaining an appropriate catch level, and it could lead to reasonable economic efficiency in the industry since each quota owner would trim the effort he applied to his fishing quota.

4. The major problems in establishing fishing quotas are likely to arise in the initial stages in making the decisions as to whom and how the quotas should be allocated. The following are the most usual ways of allocation:

- On the basis of historic participation, allocating to those who previously operated the fishery. Difficulties arise in how to handle the relative newcomers who may be innovators and very efficient fishermen. This method may tend to favour the old established fishermen who may not necessarily be the most efficient.

- On the basis of size of catch. Quotas would be allocated on the basis of catch average over a number of years. To prevent the problem illustrated above, some weighting system could be applied to enable relative newcomers to have a fairer share. Both 1 and 2 require a detailed knowledge of the industry and its individual operators.

- On the basis of socio-economic considerations. For example, poorer small-scale fishermen who are most dependent upon fishing as a source of income may be given priority in the allocation of quotas in pursuit of some national objectives of employment and equity. This would not necessarily be the most efficient method of operating the fishery but it might be politically the most expedient.

- On the basis of an auction. The managing authority would divide up the total quota into units of a given allowable size of catch and would sell the units to the highest bidders. This could ensure that the most efficient would be likely to get the largest parcel of quotas. This method has the advantage that the managing authority is thus able to earn revenue.

- On the basis of a lottery. This gives anyone an equal chance of obtaining a specified quota, but it is random and does not ensure that the most efficient fishermen will succeed. A charge made to enter the lottery would sort out the least efficient and provide some income for the managing authority.

118 From Economics of Fisheries Development, Lawson 1984
ANNEX E: FISH SPECIES CONSIDERED THREATENED IN KAZAKHSTAN AND LISTED IN THE RED BOOK

Ural-Caspian basin (all are endemic)
Caspian lamprey (Caspomyzon wagneri)
Volga shad (Alosa kessleri)
Caspian trout (Salmo trutta caspius)
Inconnu, conny (Stenodus leucichthys leucichthys)
Kutum (Rutilus kutum)

Aral-Syrdarya basin (all but one are endemic)
Bastard sturgeon (Acipenser nudiventris) (not endemic)
Syrdarya shovelnose (Pseudoscaphirhynchus fedtschenkoi)
Aral trout (Salmo trutta aralensis)
Pike asp (Aspiolucius esocinus)
Aral barbel (Barbus brachycephalus brachycephalus)
Turkestan barbel (Barbus capito conocephalus)
Eastern ostroluchka (Capoetobrama kuschakewitschi orientalis)

Irtysh basin (non-endemic)
Taimen (Hucho taimen)
Inconnu (Stenodus leucichthys conny)

And considered for inclusion:
Lenok (Brachymystax lenok)

Balkhash basin
Marinka (Schizothorax argentatus pseudaksaiensis) (endemic)
Balkhash perch (Perka schrenki) (endemic)
Bastard sturgeon (Acipenser nudiventris)
Aral barbel (Barbus brachycephalus brachycephalus)
The last two species have been introduced and represent an important gene pool.
## ANNEX F: KAZAKHSTAN STATE-OWNED HATCHERIES & FISH FARMS

<table>
<thead>
<tr>
<th>Hatchery</th>
<th>Director</th>
</tr>
</thead>
<tbody>
<tr>
<td>Republican State Enterprise Atyrau Fish/Sturgeon Hatchery</td>
<td>Sagiden Yerbulekov</td>
</tr>
<tr>
<td>Republican State Enterprise Uralo-Atyrau Fish/Sturgeon Hatchery</td>
<td>Aldigerey Kairalapov</td>
</tr>
<tr>
<td>Republican State Enterprises Bukhtarminskoye Spawning Breeding Farm</td>
<td>Tolegen Nursagatov</td>
</tr>
<tr>
<td>Republican State Enterprises Verkhne-Tobolskyl Fish Hatchery</td>
<td>Valery Kurbanov</td>
</tr>
<tr>
<td>Republican State Enterprises Karaganda Fish Hatchery (includes Zhezkazgan Fish Hatchery)</td>
<td>Viktor Molodozhyna</td>
</tr>
<tr>
<td>Republican State Enterprises Kachirsky Fish Hatchery</td>
<td>Bazarbai Abzhakov</td>
</tr>
<tr>
<td>Republican State Enterprises Kamyslybashsky Fish Hatchery</td>
<td>Adilbek Aimbetov</td>
</tr>
<tr>
<td>Republican State Enterprises Kapsagaiskoye Spawning Breeding Farm</td>
<td>Taiyr Adilbayev</td>
</tr>
<tr>
<td>Republican State Enterprises Petropavlovsky Fish Hatchery</td>
<td>Yury Povoroznuk</td>
</tr>
<tr>
<td>Republican State Enterprises Shardarinsky Fish Hatchery</td>
<td>Vladimir Kazban</td>
</tr>
<tr>
<td>Republican State Enterprises Kazakh Production Acclimatization Station</td>
<td>Rafael Bekirov</td>
</tr>
<tr>
<td>Republican State Enterprises Maibalyksky Fish Hatchery</td>
<td>Dmitry Gudyno</td>
</tr>
</tbody>
</table>
ANNEX G: EXAMPLES OF FISHERIES ADMINISTRATIVE ORGANIZATIONS

The following details and organisational charts illustrate the range of institutional arrangements in a number of fishing nations.

IRELAND (IN 2001)
(Some changes have been made since then)
NORWAY (in Year 2000)

Ministry of Fisheries

- Coast Directorate
  - 5 regional offices
- Directorate of Fisheries
- Guarantee Fund for Fishermen
- Institute of Marine Research
- Norwegian Seafood Export Council
  - Research Council of Norway
    - Norwegian Inst. Of Fisheries and Aquaculture Research
      - Norwegian Industrial and Regional Development Fund
        - Boards, councils and committees
A Department within the Ministry of Agriculture and Rural Development (MARD) administers the fisheries sector in Poland. MARD Departments include:

- Minister’s Political Office
- Bureau of Director General
- Department of Budget and Finance
- Department of Land Management and Rural Infrastructure
- Department of European Integration
- Department of Pre-accession Aid and Structural Funds
- Department of Plant Protection
- Department of Animal Production and Veterinary Matters
- Department of Rural Development
- Department of Fisheries
- Department of Agri-food Processing and Agricultural Markets
- Department of Defence Matters
- Department of Foreign Cooperation
- Control Bureau
- Law Office
- Office of the Minister’s Press Spokesman
- Administrative and Budgetary Office
- Internal Audit Post
- Post of Confidential Information Protection.

The Department of Fisheries currently employs 30 persons, and is headed by the Department Director and two Deputy Directors. It includes the following Divisions:

1. Coastal, Inland Fishery and Aquaculture
2. Ship Register and Control of Regional Sea Fishery Inspectorates
3. Market Organisation and Quality Supervision
4. European Integration and Structural Policies
5. International Agreements and Legal Affairs

The Department of Fisheries supervises the operations of three Regional Sea Fishery Inspectorates in Gdynia, Slupsk, Szczecin, with a total employment of 78. This number includes 34 inspectors, which is expected to expand. The Inspectorate’s responsibility includes: supervision and control of fishing; supervision and control of off-loading from fishing vessels; control of fishing gear; records in fishing vessel register; fishing records and environmental monitoring and other general duties.
ENGLAND, SCOTLAND AND WALES
(DEPARTMENT FOR ENVIRONMENT, FOOD AND RURAL AFFAIRS)

The Fisheries Department within DEFRA is headed by a senior civil servant (Permanent Secretary). A non-Cabinet Minister has overall political responsibility. Negotiations with Brussels are dealt with in London, but the Scottish Executive Environment and Rural Affairs Department (SEERAD) deals with internal fisheries issues in Scotland.

The DEFRA Fisheries Department is divided into the following divisions:

- Fisheries I - Structures and markets
- Fisheries II - Aquaculture, Salmon and Freshwater Fisheries
- Fisheries III - Sea Fisheries Conservation
- Fisheries IV - Management and Control
- Sea Fisheries Inspectorate

Fisheries economics is dealt with by the agricultural economists and not by the Fisheries Department.

SEERAD has a responsible Scottish Minister and a Deputy Minister, and the department deals partially or totally with the following issues:

- Licensing in external waters
- New fishing opportunities
- FIFG (use of structural funds)
- Quotas for Scottish vessels and licensing
- Seals, aquaculture and the environment
- Fish culture - salmon and fresh water and marine fish farming
- Social research
## ANNEX H: SUMMARY OF KEY STATISTICS

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Quantity/Units</th>
<th>Source/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economics/Financial</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Republican Budget for fisheries services - 2001</td>
<td>KZT 188 million</td>
<td>Government published data</td>
</tr>
<tr>
<td>Gross Value Added from Fisheries Sector - 2001</td>
<td>KZT 5,377.10 million</td>
<td>Government published data</td>
</tr>
<tr>
<td>Projected Republican Budget for fisheries sector - 2004</td>
<td>KZT 629 million (estimated)</td>
<td>Fisheries Committee</td>
</tr>
<tr>
<td>Collection of Quota Revenue (2003 - 9 months only)</td>
<td>KZT 68.8 million</td>
<td>Fisheries Committee</td>
</tr>
<tr>
<td>Funding of state-owned hatcheries (for restocking)</td>
<td>KZT 140.8 million</td>
<td>State Order, 2003</td>
</tr>
<tr>
<td><strong>Socio-Economics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Official Figure of Employment within the sector</td>
<td>13,200 persons (full-time equivalent)</td>
<td>Statistical Agency, 2002</td>
</tr>
<tr>
<td>Working population in rural economy/percentage working in fisheries sector</td>
<td>1,091,900 persons</td>
<td>Fisheries Sector Study Team, 2003 (taken from official statistics)</td>
</tr>
<tr>
<td>Calculated figure of employment within the sector</td>
<td>Approx. 110,000 persons (full-time &amp; part-time) or approximately 30,000 persons per basin</td>
<td>Fisheries Sector Study Team, 2003</td>
</tr>
<tr>
<td>Total average monthly income of a rural household</td>
<td>32,130 KZT per month</td>
<td>Fisheries Sector Study Team, 2003 (taken from official statistics)</td>
</tr>
<tr>
<td><strong>Production</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Official Landing Data - 2002</td>
<td>27,000 mt</td>
<td>Statistics Agency</td>
</tr>
<tr>
<td>Official Landing Data - 2002</td>
<td>37,161 mt</td>
<td>Fisheries Committee</td>
</tr>
<tr>
<td>Estimated Actual Catch - 2002</td>
<td>121,000 mt</td>
<td>Fisheries Sector Study Team from State Statistics Agency data, 2002</td>
</tr>
<tr>
<td>(127,000 mt total consumption + 26,000 mt exports - 32,000 mt imports)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breakdown of Catch Quota Composition</td>
<td>78% = low value species (Bream and most carp)</td>
<td>From FRPC projection of fish production for 2004</td>
</tr>
<tr>
<td>1% = high value species (Sturgeon &amp; salmonid)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21% = medium value species (Pike perch, asp, silver carp)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catch Quota Limit for 2003</td>
<td>58,661.5 mt</td>
<td>Fisheries Committee</td>
</tr>
<tr>
<td>Actual recorded catch for 2003 (January-September only)</td>
<td>21,678.9 mt</td>
<td>Fisheries Committee</td>
</tr>
<tr>
<td>Percentage of actual catch to quota (2003 - 9 months only)</td>
<td>37%</td>
<td>Fisheries Sector Study Team, 2003</td>
</tr>
<tr>
<td>Restocking Program</td>
<td>76 million larvae/fingerlings</td>
<td>State Order, 2003</td>
</tr>
<tr>
<td>(23.2m carp larvae, 26.1 carp fingerlings, 0.7m 1yr old carp, 20.0m salmonid + white fish and 6.2m sturgeon)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fish Marketing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Official Retail Sales (volume and value)</td>
<td>52,000 mt (6.1 million KZT)</td>
<td>Statistical Agency, 2002</td>
</tr>
<tr>
<td>Estimated Consumption (volume and value)</td>
<td>127,000 mt (17.2 million KZT)</td>
<td>Based on per capita consumption of 8.6 Kg (from GoK Statistical Agency household survey, 2002)</td>
</tr>
<tr>
<td>Official Exports</td>
<td>26,000 mt (of which 25% value-added and 19,000 mt frozen)</td>
<td>GoK data, 2002 Frozen fish primarily low-value species</td>
</tr>
<tr>
<td>Official Imports</td>
<td>32,000 mt (of which 50% frozen and 50% value-added)</td>
<td>GoK data, 2002 Frozen fish primarily marine species Value-added species primarily canned</td>
</tr>
</tbody>
</table>