Fisheries Management in the Black Sea Countries

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Abstract

Fisheries management is a governmental system of management rules based on defined objectives and a mix of management mean to implement the rules, which are put in place by a system of monitoring control and surveillance (MCS). Modern fisheries management is most often based on biological arguments where the idea is to protect the biological resource in order to exploit the resource in a sustainable manner.

The political goal of resource use is often a weak part of fisheries management system as conflicting objective is often found when exploiting a fish resource as to maximize sustainable biomass yield and sustainable economic yield, to increase employment in certain regions, to secure protein production, food supply and increase export income.

International agreements are required in order to regulate fisheries taking place in areas outside national control. The desire for agreement on this and other maritime issues led to the treaty known as the United Nations Convention on the Law of the Sea (UNCLOS). Exclusive economic zone (EEZ) concept allocates certain sovereign rights and responsibilities for resource management to individual countries.

The Black Sea has been subjected to very serious environmental impacts since mid 20th century due to anthropogenic dumping, huge chemical pollution mainly via Danube River, invasive species, nuclear pollution, climate change, over fishing, illegal, unregulated and unreported fishing. Riparian countries use same fishery resources mostly in migratory small pelagics. In case of shared stocks, intergovernmental agreement is unavoidable. After the accession of Bulgaria and Romania to the European Union, the Black Sea has become the sovereign responsibility of Common Fishery Policy of EU and GFCM.

In this paper, it is aimed to gather all fisheries management applications of individual Riparian countries in order to compare and summarize them for further common management purposes.

Key words: fisheries management, legal framework, the Black Sea countries, administration

Introduction

The Black Sea fishery resources have been shared by Bulgaria, Georgia, Romania, Russia Federation, Ukraine and Turkey. The most populated country is Russian Federation and followed by Turkey and Ukraine. About 16 million people live in coastal cities and majority of this population belong to Ukraine and Turkey which have coastal length and inhabitants of 2,782 km, 6.8 million and 1,329 km, 6.7 million, respectively. In case of Black Sea fish production, Turkey is the lead country (342,455 t) and followed by Ukraine (63,161 t) and Russian Federation (24,922 t). Number of fishing vessels is significantly high in Turkey (Table 1). The Black Sea countries had been agreed on EEZ of 200 nm zone and have national sovereignties in their EEZ. In case of highly migratory species and straddling fish stocks, this sovereign responsibility must be exercised in collaboration with neighboring coastal states and fishing entities, usually through the medium of an intergovernmental regional organization set up for the purpose of coordinating the management of each stock. Although certain intentions, there is no specific action on to set up an agreement on common management of the resources which should be based on the internationally agreed, albeit non-binding, standard Code of Conduct for the Responsible Fisheries agreed at an FAO session in 1995 including the precautionary approach within concrete management rules as minimum spawning biomass, maximum fishing mortality rates, etc. (WWF - World Wildlife Fund, 2008).

Being a semi-closed sea and having shared stocks are obliged the Black Sea countries to manage fishery resources with common measures. After the accession of Bulgaria and Romania to the EU and position of Turkey as a candidate country, the Black Sea has become an interest area to EU which all the fisheries activities needs to be managed in accordance to the Common Fisheries Policy (CFP) rules. In order to establish co-management plans, basic management knowledge on current management systems is urgently needed for all national and international stakeholders. In this paper it is aimed to review fisheries management issues of the the Black Sea countries for further studies.

Table 1. Some demographic and fisheries data of the Black Sea countries

Data	Bulgaria	Georgia	Romania	Russian Federation	Turkey	Ukraine
Population[1] (x 1000)	7,965	5,177	22,387	144,082	70,318	48,902
Coastal Population (x1000)	714	650	746	1,159	6,700	6,800
Coastal Length (km)	354	310	225	800[2]	1,329	2,782[2]
Total Fish Production (t)	11,000	3,000	13,000	3,051,000[3]	644,000	229,000[3]
Black Sea Production (t)	2,843	2,837	1,824	24,922	342,455	63,161
Number of Fishing Vessels	1,261	360	436	2912	7,308	2,300

[1] Demographic data in 2000.
[2] Including Azov Sea.
[3] Includes high seas fisheries.

Bulgaria

Prior to 1989, Bulgaria produced large quantities of seafood and the majority of the products available were locally produced fish (mackerel, trout, carp and sprat) with very limited imports. The industry went through a major restructuring as the fleets, fisheries and processing plants were privatized after 1989. In 2000, the industry started registering its first years of growth but since 2002 the total catch has declined each year. Measures have been implemented by the Ministry of Agriculture to increase the fish population and total catch quantity. A computerized system has been implemented by Government of Bulgaria (GoB) to provide recent and accurate catch and price figures (FAO, 2008a).

Bulgarian fishing fleet was state owned and operated before 1989. According to the regulations of GoB, fishing operations can only be carried out by the national fleet, with exports being minimal. To meet domestic demand, the Bulgarian national fleet significantly over-fished the Black Sea, and the populations of mackerel, turbot, sprat and anchovies were dramatically declined due to pollution and invasive species. Privatization of the fishing fleet has started in 1989 has caused a decline in the total catch from the Black Sea (Prodanov *et al.* 1997). Private companies became fully functional by 1999 and the total catch figures rose, but the total catch has significantly declined from 15,419 t in 2002 to 5,434 t in 2005 (Table 1). In case of marine capture fish, production was 9,653 t in 2002 and declined to 3,408 t in 2005. The GoB imposed quotas to prevent over fishing i.e. a quota of 50 t for turbot was set in 2003, but it was not met (40.8 t produced) and decreased to 30 t in 2007.

The number of fish farms grew significantly from 127 in 2003 to 204 in 2005 (15.8 million total fingerlings, 2,898 t total fish to 26.2 million fingerlings, 4,165 t total fish, respectively) producing carp (118 farms, 1,313 t), sturgeon (4 farms), game fish (1 farm), trout (59 farms, 1,549 t), polyculture farms (8 farms) and mussel (15 farms, 171 t). Fish consumption per capita is 4.2 kg in 2005.

In compliance with Fisheries and Aquaculture Act – FAA (2001) provisions and the Waters Act (1999), commercial and recreational fishing cover the Bulgarian zone along the Danube, on-shore sea water areas, the territorial sea waters and the Black Sea EEZ, as well as the Danube riverine areas, coastal lakes and marshland. The Convention on Biological Diversity (CBD) was ratified by Bulgaria and came in force in 1996. There are several units of Ministry of Environment and Water (MoEW) involved in CBD implementation referring to living aquatic resources diversity such as the National Nature Protection Service, Aquatic Resources and Water Quality Department and 15 Regional Inspectorates on Environment and Waters (RIEW) responsible to follow up fisheries issues as well as incorporation with Economic Analyses and Forecasts Agency (EAFA) and National Forestry Directorate (The Convention on Biological Diversity, 2008).

The Fisheries and Aquaculture Directorate is responsible for implementation of fisheries legislation. It performs activities concerning the conservation and reproduction of fishery resources, control of implementation of established fishing activities in inland waters, the Bulgarian coastal zone in the Black Sea, and the Danube River (control of fishing activities, issuing of fishing licenses, maintaining the fishing vessels register, collecting and processing of fisheries statistics, etc.), participates in activities of international fisheries organizations, and related tasks. Regional offices (27) are responsible for implementing fisheries legislation at a regional level, and are primarily involved in control and monitoring activities. EAFA is responsible for:

- Implementation of the National Fisheries and Aquaculture Program, together with the Executive Maritime Administration Agency under the Minister of Transport and Communications,
- Conservation and protection of the national fishery resources and control of compliance with the fishing rules and fisheries practices established and recognized,
- Issuing commercial fishing licenses and registration of the entities and individuals involved in fishing and aquaculture,
- Establishment and maintenance of a sector-wide system of statistical information on fisheries and aquaculture,

- Other functions assigned and provided for by law.

The Executive Agency for Fisheries and Aquaculture, and the Executive Maritime Administration Agency have joint responsibility to the registration and control of fishing vessels. The National Department of Forestry, under Ministry Agriculture, Forestry and Agrarian Reform (MAFAR), is responsible for the safety and control of inland fish resources and areas used for the purposes of angling, under the supervision of its regional offices and units, in compliance with the provisions of FAA and the Forestry Act.

The Scientific and Technical Fisheries and Aquaculture Council (STFAC) is an advisory body reporting to the Agriculture Minister. STFAC gives scientific advise to drafting and implementation of the National Fisheries and Aquaculture Program, the Code of Conduct for Responsible Fisheries, as well as other sector-related legal measures, documents and program, depending on the state of fish and other aquatic stocks, propose measures aimed at their conservation and reproduction, TACs for certain fish species and other aquatic organisms, as well as quota allocation patterns; and report on the social and economic implications of all issues on which it has been required to provide opinions, recommendations and advice.

Bulgarian Fishing Association (Bourgas) and National Fish Producers Association (Sofia) were established in 1998. The first relates mostly to all aspects of the marine fisheries subsector, and second involves primarily freshwater fish producers. Both of them participated in the elaboration of FAA (2001).

The recreational fishers and organizations mentioned above may associate with individuals and organizations in accordance with the Game Hunting and Protection Act.

Various management strategies have been formulated to control fishing effort and promote rehabilitation and conservation of aquatic resources and ecosystems. These measures include:

- Direct limitation of fishing effort through licensing of fishing gear and fishing vessels which are valid from April 1 to March 31 (a fiscal year).
- Closed seasons to ensure reproduction and survival of juveniles (i.e for winter and spring reproduction of trout and other cold water species fishing banned from October 1 to January 31 and for *Huso huso* and *Thymallus thymallus* from January 1 to March 31, for spring and summer reproduction of carp, catfish and other warm water species no fishing season is April 15 – May 31). In case of Danube fisheries there are 30 to 60 days banned period in compliance with the internationals agreements applied to the river in case of sturgeon species and *Alosa pontica*. Closed season starts from April 15 and lasts 45 to 60 days for Black Sea turbot.
- Rehabilitation of resources through the establishment of artificial reefs (outside mussel installations) is pending on the Bulgarian Black Sea shelf,
- Restocking of the Danube and the inland water bodies with sturgeon and cyprinid juveniles which have been developing since 1998.

Enforcement of fishing activities in Bulgaria's jurisdictional waters is carried out by EAFA and the National Forestry Directorate. Management measures that have been implemented through the legal and institutional framework to control fishing effort include:

- Controls on size and power of fishing vessels (through FAA (2001), the EU-supported Fishing Vessel Register Data project, fishing vessel management scheme, controls on size and power of fishing vessels in line with EU CFP),
- Registration of fishers (all fisher must be registered and anybody working, living or staying on a fishing vessel must have a fisher's registration card).

Efforts and measures undertaken to conserve and rehabilitate the fisheries resources and aquatic ecosystems include:

- Closed fishing areas and seasons, restriction of some gears (bottom trawling and dredging),
- Management zones. Fishing Zone 1, from coastline up to 3 nm and Fishing Zone 2, from 3 nm to EEZ limit has been established through a licensing scheme. The two management zones attempt to provide equitable allocation of resources and reduce conflict between traditional and commercial fishermen.

Crayfish and sea mammal fishing is prohibited. By-catch of sea mammals should be immediately released to the sea. Where the populations of certain fish and other aquatic species have been endangered by overfishing, the Environment Minister may ban fishing until their populations are restored. Under FAA (2001), explosives, poisons and narcotics, electrical fishing, bottom trawls, dredges, firearms, and harpoons are banned as destructive effects to the environment and fisheries resources.

As an input control, fishing effort can be limited by the licensing and registration system of fishing vessels (regards their equipment, gear and fishing method, processing and storage capacities under the responsibility of the Executive Maritime Administration Agency of Minister of Transport and Communications incorporation with EAFA) and fishing gear under the current FAA (2001). EAFA establishes and maintains the registration of fishing licenses, angling permits, and fish farmers.

Commercial fishing may be carried out by Bulgarian citizens who have come of age, and legal entities that have been granted a commercial fishing license. EAFA incorporates these data in the fisheries statistical information system. The management plan for Bulgarian fleet capacity in line with the EU requirement has been developed by a Working Group (with participation of all stakeholders), for establishment of a balance between biological, social and economic aspects of fisheries which is based on detailed analysis of Bulgarian fishing rights resulting from International Fisheries Agreements and Conventions, the situation of the fish stocks in the Black Sea, and the existing fleet capacity of the country. Foreign vessels can be allowed to carry out commercial fishing in national waters. Log-books containing catch quantities by species, number and size categories in kg (turbot), weight and individual size (sturgeon), allowable by-catch amounts, weather conditions, area coordinates and fishing places should be filled out by masters of fishing vessels (>15 m). In case of open-sea transshipments, vessel masters are required to report detailed data on the place of transshipment, receiving vessel and port destination. The log-book must be submitted to the regulatory authorities when requested. During landing, declaration of origin (contains information about the place of fishing and catch quantities by species) is needed. Fishermen are obliged to fill in the landing declarations and first sales notes with information concerning the quantities caught and fishing zones. First sales of fish and other aquatic organisms is carried out at assembly markets registered under the Commodity Exchanges and Wholesale Markets Act, as well as collection centers and points or retail establishments meeting the requirements under the Veterinary Act.

Fixed trap nets and beach seining sites which the main technical parameters is defined by EAFA in coordination with the Executive Maritime Administration Agency and naval stations and bases of the Bulgarian Army, are the public ownership and allocated to concessions under the provisions of the Concessions Act.

In case of output controls, there is no Individual Transferable Quota (ITQs) system in Bulgaria. Total Allowable Catch (TAC) is applied for turbot and sprat production, and caviar (sturgeon) export.

Monitoring, Control and Surveillance (MCS) measures, and enforcement of fishing activities are carried out by EAFA. Biodiversity control on aquatic resources is the responsibility of MoEW.

Exploitation safety and conservation of fish resources has been exercised by EAFA through its fishery inspection officers and the National Forestry Department (fishing licenses and angling permits, fishing gear, tackle and auxiliary installations, and material compliance with the terms and conditions of using fish resources). Fishery inspection officers check and inspect fishing vessels and vehicles, storehouses and buildings, cooling facilities and equipment.

Computerized operational catch data are processed and stored in the National Information and Fisheries Statistics System (NIFSS) and used for monitoring purposes. The NIFSS provides information for cross checking of the information on fishing activities, and for detection of infringements of the fishing regime.

In case of first sales of capture fish and imported products, the seller submits buyer copies, declaration of origin and veterinary certificate. National Veterinary Service (NVS) / State Veterinary Control (SVC) and National Agency for Fisheries and Aquaculture (NAFA) are responsible for implementation of the marketing standards for fish and fishery products. The SVC is responsible for control over the quality, packing and labeling of fish and fishery products. The control activities are performed by inspectors of SVC national and regional offices, and include on-site checks of trading and storage sites, market standards.

Georgia

The main fisheries objective is the Black Sea anchovy and partially Azov Sea anchovy, sprat, whiting, mullet, red mullet, turbot, rapa whelk and dog fish. According to the 2005 data total fish production has declined to 3000 t by 360 fishing vessels (Table 1).

Georgia, as an independent state, does not have any established fisheries policy which regulates marine resources use in the country (UN - Division for Sustainable Development, 2008). According to the existing legislation and Georgia - Ukraine governmental agreement starting from 1997 to 2002, in territorial waters of Georgia anchovy fishing is undertaken by Ukrainian fishing fleet. The conclusions on the commercial fish stock, ecological conditions and prognosis on fishing are provided by Marine Ecology and Fisheries Scientific Research Institute of Georgia on the basis of license given by the Ministry of Environment and Natural Resource.

The coastal fishery in Georgia is performed without registration, though by law the fishery is to be licensed. The fishery is legalized by law “on entrepreneurship” and is controlled by eco police. The coastal fisheries in the Georgian Black Sea area is performed by fixed, throw net, beach seine net, large angle, trap nets of the Turkish production with so called “parachute”.

Over the last decade fisheries has lost its historical importance in Georgia which resulted in limited funding and staffing of the Department of Fisheries (DoF) under the Ministry of Agriculture (MoA) which is the lead ministry in the area of fisheries policy and sector development. On the other hand, the Ministry of Environment Protection and Natural Resources (MEPNR) - through the Fishery Branch of its Department of Biodiversity – has the responsibility for the conservation of fisheries

resources and the ecosystems. Other government ministries involved in fisheries-related activities are the Ministry of Economics (trade issues), Ministry of Finance (taxation), Ministry of the Interior (border control) and a number of ministerial-linked and semi-independent institutions, such as Ministry of Environment Fisheries Research Institute (MEFRI), the Coastguard, the Marine Authority of Georgia, the Institute of Zoology, the Maritime Transport Administration and the Bucharest Convention through its Commission. In the Ministry of Agriculture, Department of Fisheries, Veterinary Department and Food Products' Expertise and Monitoring Agency are relevant for fishery sector development and management with a policy-making function within the sector, implementation of food safety measures, and licensing for fish production activities.

The Ministry of Environment Protection and Natural Resources has two dependent agencies which are relevant for the Georgian fishery sector: MEFRI, which carries out marine fishery research and recommends allowable catches for the Black Sea; and the Institute of Zoology, which carries out fishery research in inland water bodies.

Eco-police Department of Ministry of Interior is responsible for control of fishing activities and resource conservation, Georgian State Border Guard Department provides control of fishing activities in waters under Georgian jurisdiction, and Coastguard controls and provides surveillance over fishing activities in Georgian marine waters.

The state Department of Statistics is responsible for gathering, analyzing and publishing fishery sector data.

All these governmental bodies are subjected to lacking technical, managerial and financial capacity to carry out their duties efficiently. There is a clear need to increase the competence of the staff to contribute effective and efficient inputs to the duties and responsibilities of the DoF; elaborate a comprehensive government development policy on fisheries in Georgia and set priorities for all types of fisheries, make optimal use of the export potential of fish and fishery products originating from all types of fisheries resources (marine and inland waters plus aquaculture), elaborate draft normative acts within the competence of the department and present them for approval in accordance with existing regulations, prepare a fishery investment program and support its implementation, promote the employment of qualified fishery specialists in fishery enterprises, produce and deliver fish products to satisfy domestic needs.

Rights and obligations of DoF are defined as:

- to promote establishment of fisheries enterprises and introduction of modern production technologies to attract investments together with other agencies, participate in the assessment of fishery stocks,
- to maintain a database of fishery enterprises in accordance with international requirements,
- to make recommendations for fish reproduction, grow-out to commodity fish and for taking preventive measures against fish diseases,
- to study systematically the market for fishery products and provide information on the current situation and trends,
- to prepare plans for the rehabilitation and development of existing fishery enterprises,
- to present proposals for projects, modifications to laws and regulations, plans, government budget, target program.

A national fishery sector policy with objectives or goals for the sector is currently non-existent in Georgia. However, the MoA is preparing a Master Plan for Fishery Sector Development in Georgia, 2005-2020, in collaboration with other relevant ministries and fishery sector stakeholders such as fishers' associations, research institutes and fishing companies (FAO, 2008b). Fisheries has not been recognized as priority sector in the current governmental Economic Development and Poverty Reduction Program (EDPRP) which provides an established overall framework of national economic policy. In the 2004 version of the EDPRP, the only references to fisheries and fish were those in relation to the consumption of meat, fish and dairy products and the investments to be made for the rehabilitation of the fishery sector and artificial restocking of sturgeon in the Black Sea.

At the international level, Georgia became party to a number of conventions and agreements over the last decade;

- Convention on Biodiversity (CBD) (1994)
- Bucharest Convention on Protection of the Black Sea against Pollution (1994)
- Fishing Vessels on the High Seas (Compliance Agreement) (1994)
- United Nations Convention on the Law of the Sea (UNCLOS) (1996)
- Ramsar Convention on Wetlands (1996)
- Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) (1996)
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (2000)
- Convention on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) (2001)

In addition, Georgia has ratified one international fisheries agreement that implements several provisions of UNCLOS, i.e. the Compliance Agreement which is approved by the FAO Conference in 1993 and entered into force in 2003 aim to respond about depletion of fish stocks in the high seas as a result of increasing Illegal, Unreported and Unregulated (IUU) fishing addressing the

problems of "reflagging" and "flag of convenience" practices caused by vessels. Reflagging in the context of fishing involves the registration of a vessel in the jurisdiction with inefficient control and enforcement regimes so as to avoid capture and other fisheries enforcement action. Generally, flag of convenience practices are prevalent in states that are either unwilling or unable to police the fishing rights that they grant. It should be noted that some fishing vessels under the Georgian flag have been quite recently reported as being involved in IUU fishing. In the same context, Georgia has not ratified the Agreement for the Implementation of the Provisions (UNCLOS) relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UN Fish Stocks Agreement) (UN - Division for Ocean Affairs and Law of the Sea, 2008).

As a member of the Food and Agriculture Organization of the United Nations (FAO), has agreed to the Code of Conduct for Responsible Fisheries. Georgia has aimed to be a member of relevant regional and international fisheries bodies such as General Fisheries Commission for the Mediterranean (GFCM), the European Inland Fisheries Advisory Committee (EIFAC), Network of Aquaculture Centers in Central and Eastern Europe (NACEE) and the Black Sea Fisheries Commission, to be established under the Convention for Fisheries and Conservation of Living Resources of the Black Sea (The Commission on the Protection of the Black Sea Against Pollution, 2008).

At present Georgia has no fisheries law. Recently, however, it has pursued various legal and administrative initiatives that have resulted in the adoption of a number of laws and regulations that address the fishery sector in various aspects including:

- The Georgian Constitution (1995, as amended)
- The Veterinary Law (1995, as amended)
- The Law on Protected Areas (1996)
- The Law on the Protection of the Environment (1996)
- The Law on Promoting and Ensuring Investment Activity (1996)
- The Law on Environmental Permit (1996)
- The Law on Wildlife (1996)
- The Law on Water (1997)
- The Marine Code (1997)
- The Law on the Privatization of State Property (1997)
- The Law on Maritime Areas (1998)
- The Law on Standardization (1999)
- The Law on Food and Tobacco (1999, as amended in 2003)
- The Law on General Procedures for Granting Business Licenses and Permits (2002, as amended in 2004)
- The Sanitary Code (2003, as amended)

At the very beginning of the twenty-first century the MoA started to prepare a new law on fisheries for Georgia. Governmental approval of this law was expected to take place in coming years, after which a number of regulations under the law will still need to be produced.

In case of fishery statistics, there are several collection programs for fishery data, involving the Department of Statistics, the Ministry of Environment Protection and National Resources, and the Department of Fisheries of the Ministry of Agriculture. Data collection of fisheries-related data was not coordinated among the different government units in the past. Data collection for estimating fishing effort did not use sampling techniques. Basic variables such as production by species and prices were obtained directly from the landings of licensed fishing units and/or from market research. Information gaps appeared to exist in the small-scale fishing units sector, since most of these operate without a license. Production was usually reported for the species included in the license. Transboarding of fish and seasonal migration of fishing units seem to constitute two possible factors for unreported catch. A third factor concerns fishing activities that take place using beach seines and other methods that do not use a registered or licensed fishing craft.

Fishing effort information is not collected on a regular basis, thus preventing the formulation of basic indicators such as catch per unit effort (CPUE) by boat/gear categories.

Data collection should be carried out through sampling operations in order to lack of landing data recording system. An inland capture fishery is less important in quantity than marine catch, and would thus justify only a limited investment in data collection. Aquaculture statistics are still fairly unknown. However, in 2004 and 2005, with support from the FAO Technical Cooperation Program, statistical activities are described in much more detail in technical notes on statistics and data collection and in reports of workshops organized by the project.

Romania

Romania completed negotiations with EU in the area of fisheries in June 2001, accepting the entire “acquis communautaire” without requesting any derogation or transition periods. Romania is member country of EU since 2007.

Fisheries have traditionally been managed by direct restrictions, including seasonal and area closures, minimum mesh size, and access limitations. In recent years, licensing and individual quota system were introduced as effort-control measures, in order to bring fishing effort more in line with the available resources. Licenses relate to a specific group of species or gear type, and usually delimit the fishing area (FAO, 2008c).

Ministry of Agriculture, Forests and Rural

Development (MAFRD) is responsible for fisheries policy in Romania through Directorate of Fisheries (DoF). Fisheries resources management is carried out by several institutions, under MAFRD coordination.

The major research topics include:

- The National Company of Fisheries Resources Management (NCFRM) (2002): The major responsibility is to manage the fisheries resources in a sustainable manner by limiting fishing effort and by restocking natural waters,
- The National Forest Administration: It is charged with controlling fisheries in mountain waters, and trout farming activity,
- Danube Delta Biosphere Reserve Administration (DDBRA), (Ministry of Waters and Environmental Protection): The main objectives are to ensure conservation and protection of the existing natural heritage and to promote ecologically sustainable use of its natural resources.

Enforcement in the Romanian fisheries is carried out by the Fishery Inspectorate (under MAFRD, which has 10 branches countrywide (Law no. 192/2001). Fishing activities are managed by different authorities according to their management areas. Quota allocations have primarily been based on historical catch rates, but now being allocated within the limit of the Total Allowable Catch (TAC), based on research studies. Fishing activities in upstream Danube occur within several fishing areas established by the NCFRM, areas that are leased by public tender addressed to legally recognized entities or fishermen associations.

All commercial fishing vessels have to be recorded in the Fishing Vessel Register as a first condition for obtaining a fishing license and quotas. Fishing Vessel Register Office of DoF records the data concerning all fishing vessels in line with EU CFP rules.

Fishery and protection of the sturgeon stocks is based on fishing quotas and TAC approved by the Romanian Academy, as the highest scientific authority and guided by the Convention on International Trade in Endangered Species (CITES). It is compulsory for each individual sturgeon captured to be marked with a special tag to allow easy identification and traceability, and each fisher has to fill out landing declarations with all the catch data: each sturgeon species, the place and time of capture, and biometrical measurements (weight, length).

Marine fishing is based on fishing licenses issued by NCFRM to qualified persons or legal entities. In the Black Sea, the use of fishery resources is provisionally free of charge to allow marine fisheries development, with a tax of 1% on sales. In the coastal fisheries, the precautionary principle is applied by forbidden fishing activity by trawlers within the area of the DDBRA and in less than 20 m depth for the rest of the coast.

The current enforcement system is mainly based on logbooks, landing declarations, and compulsory first-sale notes of the landings, with penalties for violations of the rules.

Fishery, by itself, receives no direct subsidies from the state, but there are some exemptions from VAT and excise taxes for fuel used by the fishing fleet in the Black Sea.

In the future, the major supplier of domestic fish is expected be fish farming, by modernizing fish farms and diversifying cultivated species. In order to reach the EU fish consumption level, fish production should be increased 53,000 t in 2007, but Black Sea production is estimated to increase to 10,700 t by modernizing of fishing fleet units.

The development of the fisheries sector in Romania aims to ensure a balance between stock size and exploitation level, strengthening and developing the competitiveness of certain economically viable undertakings, stabilizing the fish market, improving fish products quality, and supporting the economic development of fish-dependent regions.

The National Institute for Marine Research and Development "Grigore Antipa" in Constanta is responsible for most of the research in the Black Sea. Research in the Danube Delta area and the Danube River is carried out by the National Danube Delta Research Development Institute, Tulcea. The major research topics include:

- Developing artificial spawning and rearing technologies for different fish species,
- Developing sturgeon culture to obtain high quality caviar and fresh fish,
- Improving existing technologies for artificial reproduction and breeding in a freshwater environment, using extensive and intensive systems,
- Introduction of paddlefish to Romanian fish farming.

University of Galati, through its Department of Fisheries and Aquaculture, is the most important provider of higher training in fishery. At the same time, each of the domestic agricultural universities offers in their curricula training in fish breeding for day or regular students, but with different emphases and subject matter.

The Russian Federation

Russian Federation has a long fisheries tradition in the Black Sea and ocean fisheries in administration, legal framework and research activities. Capture fisheries are carried out in the Azov and the Black Sea.

After the fall of the Soviet Union, fisheries sector in Russia and Ukraine had been severely impacted. The Black Sea fisheries was carried out by cooperatives as state corporations or as collectives (*rybkolkhoz*) which have fishing vessels, research vessels, planes and helicopters (Honneland, 2005).

There were special academies educating sailors and fishermen, investing in the development of knowledge and human resources. There was a separate Fishing Ministry in the USSR and fishing sector has experienced degradation in the state bureaucracy. Responsibility for fisheries became vested in a State Committee for Fisheries and was then moved further down to a Fishery Agency, sorting under the Ministry of Agriculture. After 1991 the Russian fishing bureaucracy has earned a reputation as corrupt and inefficient. In effect, the fishery sector has lacked coordination on a federal level, which seems to have lost command in a frequent reform activity. The latest ongoing bureaucratic reform which implies that political, executive, and controlling functions are to be more clearly separated.

Department of Fisheries under the Ministry of Agriculture is responsible for the formulation of the general fishery policy in the Federation, as well as the fishery regulations. At present, Fishery Agency is responsible for services and contract with the different agents within the sector. After the reform the most important control institutions are the Veterinary Service and the Federal Border Service. Fishing Inspection Service continues control activities. In December 2004 a new Federal Fisheries Law came into effect. Law on Russian Exclusive Economic Zone was adopted in 1998, forming a legal foundation for state rule in the economic sea areas of Russia. Concept for the development of fisheries in the Russian Federation towards 2020 is the other important strategy document from 2001 which sketching out some of the major challenges Russian fisheries face, and measures that will be taken in order to meet these challenges (Dvorynakov, 2001).

According to the new Fishery Law, fishery resources have been managed by quota system. The Black Sea fisheries are regulated by "Rules of Commercial Fishing in the Basin of the Azov Sea" and "Rules of conduct for fisheries, the protection and exploitation of live resources in the Economic Zone of USSR in the Black Sea" for Soviet fishing organisations and fishing vessels. Besides these regulations, commercial fisheries are governed and further specified by the 'Regimes of Fisheries', an annual set of regulations. All the vessels and fisherman should have license and needs registration.

The quota for industrial fisheries in Russia's internal marine waters, territorial sea and the EEZ is provided by the annual Total Allowable Catch (TAC) proposed by the assessments of particular fisheries institutes and the administrative boundaries of the basins controlled by particular fisheries directorates (*rybvods*). Small fishing enterprises in important fishing areas are sometimes united in associations on an administrative district basis (Lykova, 2000).

Currently, there are several institutes of marine fisheries and oceanography (NIRO) that are responsible for assessment of resources and research in fishery science. General methodology and coordination issues in fisheries research are covered by the central fishery institute VNIRO, in Moscow.

Ukraine

In 1995, Ukraine established its Exclusive Economic Zone (EEZ) in the Black Sea, on the basis of the UNCLOS. Biological resources in the Azov Sea form a common resource for the two countries on the basis of the Agreement with the Russian Federation (1993). In 1999, Ukraine ratified the United Nations Convention on the Law of the Sea of 10 December 1982 and in 2002 ratified the Agreement relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (Global Forum on Oceans, Coasts, and Island, 2008).

Current problems in Ukrainian fisheries are connected with the general crisis in the economy of the country, following the transition from a centrally-planned to a market economy. The major problems are high costs for supplies of materials and machinery, high credit costs, taxation policy, extremely strict taxation, wrong privatization legislation, absence of circulating assets in enterprises and laws concerning fisheries and aquaculture, criminalization of fisheries business, and shadow turnover of the greater part of the capital. Formation of a competitive environment is still at an early stage (Toje and Knudsen, 2006).

Government support for fisheries as it exists in many countries has not yet been established in Ukraine. Ukraine has no wholesale markets for fish products, so expenses for sale of fish products in the domestic market approach half of total commercial costs. In 1995, Ukraine introduced obligatory certification of canned products, and in 1998 certification became obligatory for smoked, cured and salted fish.

The State Register of Ukraine is responsible for technical surveillance and classification of marine vessels. As fisheries legislation is still developing, private investment in the fisheries sector in Ukraine has been limited.

Fisheries research and planning institutions still exist in the country. Ukraine has great industrial and scientific potential in fisheries and aquaculture, and there are active specialized high schools and educational institutes for the fish industry. There are program for professional re-qualification and certification for fisheries.

For ship owners and leasers operating on the high seas, the primary problem is to provide the vessels with the circulating capital for fisheries. Bank credit in Ukraine is very expensive, so the main source of circulating capital is the fish caught.

Until the mid-1990s, Ukraine applied Soviet standards for fish products, their processing, storage, packaging and sale. Starting from 1992, Ukraine has been developing and adopting new standards for fish products, including those aimed at satisfying EU requirements.

Ukrainian fisheries and aquaculture are overcoming the crisis situation and transforming. The Ukrainian economy is moving towards a free market basis, so for fisheries enterprises the most urgent need is to arrange their activities on the basis of up-to-date efficient management, with development of market studies.

The reference points for development are still the achievements of the 1980s, which were based on a centrally-planned economy and no private property. The disappearance of this economy, beginning in 1990–1991, resulted in a sharp decline in national output of fish products. From 1989 to 1994, fish production in Ukraine fell mainly due to the greatly diminishing fishing effort and corresponding catch on the high seas and in the Black and Azov Seas, and declining aquaculture production. It was induced by the severe economic crisis in the country. Based on analysis of fisheries and aquaculture development in Ukraine in the 1990s, it should be noted that in the economic crisis, the marine and oceanic fisheries were more attractive for business than aquaculture. For the period from 1993 to 2001, the catch in the Azov and Black Seas increased from 26,000 to 91,000 t. Output from aquaculture in the late 1990s decreased from 136,000 to 30,000 t and stabilized at this level.

In the near future, with the improving economic situation in Ukraine, expansion of business initiatives could be expected in all fisheries aspects. The basis for development is the availability of underexploited resources in the Azov and Black Seas, plus the technical inheritance from the USSR in material and technical terms, including the fleet, the system of pond farming, facilities for fish food processing, fishing ports, fish processing enterprises, old traditions in fisheries and aquaculture, fish products consumption, and availability of skilled staff and an education system for their training.

Together with imported fish products, it should allow annual fish consumption in Ukraine to reach 15–18 kg per capita.

In the Black Sea within Ukrainian waters, according to YugNIRO (Research Institute in Kerch) assessments, the stocks of European sprat, whiting, dogfish, rays, haarder, rapa whelk are underexploited. The wintering concentration of Black Sea anchovy in the waters off Georgia is fairly exploited; this stock is accessible to Ukrainian fishermen in accordance with the Ukraine-Georgia Agreement on fisheries. The attractive aspect of the sea fisheries in the Azov and Black Seas is the good efficiency of the fisheries, especially of small pelagic fishes. Modernization of large old trawlers increased their productiveness by a factor of two to three, but such fleet re-equipment, management and operation in marine fisheries in an efficient and profitable way requires high preliminary and ongoing investment.

Under the current conditions in Ukraine, where commercial bank credit is expensive, the alternative to the long-term bank credit may be leasing in the form of credit-rent, which is widely used in many countries for fleet shipbuilding and modernization.

Fisheries policy in Ukraine is still developing. In 2000, the Ukrainian Parliament approved a Concept Paper on fisheries development of Ukraine. The Concept Paper outlined the strategic directions of government policy in the sphere of fisheries. The most important elements are creating favorable conditions for stabilization and steady improvement in production of competitive fish products; and fulfilling the population's needs for fish products. The Concept Paper recognizes the important role of fish products in national food security. The most important objectives are renewal and modernization of the fishing fleet and the technology of the fishing and processing companies, improved efficiency in fish stocks utilization, ensuring the reproduction and protection of fish stocks, improved quality and increasing range of fish products, development of international scientific and technical cooperation and external economic links, harmonization of the laws of Ukraine on quality of fish products with standards of the EU and other countries, structural reforms and property reforms, and improvement in the quality of staff training to meet international standards.

The Concept Paper indicates that implementation should be through state regulation and management of aquatic living resources and fisheries on the basis of scientific data, monitoring of the state of resources and fisheries control.

Turkey

Turkey is the most important country as to realize maximum fish production from the Black Sea, having a wide range of fisheries infrastructure and legal framework, and long fishing tradition in the region.

The Ministry of Agriculture and Rural Affairs (MARA) is the main state organization responsible for fisheries (including aquaculture) administration, regulation, protection, promotion and technical assistance (The Ministry of Agriculture and Rural Affairs, 2008). All activities in fisheries and aquaculture are based on the Fisheries Law No. 1380, enacted in 1971. With this law, and its related bureaucracy, definitions were codified. Based on this law, regulations and circulars are prepared to regulate fisheries. The Fisheries Law No. 1380 of 1971 as amended by law 3288 of 1986. According to Laws 1380 and 3288 and Continental Waters Law No. 2674 of 1982, foreigners are not allowed to take part in commercial fishing activities. In accordance with the laws, every year commercial fisheries and sport fishing circulars are published and announced in the official journal about the restrictions for stock control (FAO, 2008d).

MARA undertakes its duties in fisheries management through four General Directorates, as well as the District and 81 Provincial Directorates. Control Sections of 81 Provincial Directorates of MARA are responsible for implementing fishing

regulation arrangement and control the fishing stated in the annual ministerial circulars. Additionally, Coastguards from the Ministry of Internal Affairs also have the responsibility of controlling the fishing in some defined areas.

The fisheries laws give the major responsibility of fisheries to the MARA, and during 1980's, significant effort was devoted to preparing laws and by laws which are related to the management of coastal and inland resources. A significant part of legislation prepared in this period deals with protection and conservation issues. These include laws on environmental protection, national parks and the protection of cultural and national wealth, which may limit some fisheries and aquaculture activities. As a result, a number of ministries and institutions established in the 1980s such as the Ministry of Environment and Forest, Under Secretariat of Maritime etc. is involved in the decision making process regarding fisheries and aquaculture.

The State Planning Organization prepares long-term development plans and annual programs conforming to the targets of the sector determined by the government, and coordinates activities of the ministries and public institutions concerning economic, social and cultural policies, to ensure efficient implementation and advise the government regarding fishery policy issues. Fisheries production data are gathered and evaluated by the State Statistics Institute in collaboration with the MARA. The institute uses a complete questionnaire method for large scale fishermen, and sub-sampling for small scale fishermen.

The Under Secretariat of Foreign Trade of the Prime Ministry is the other public organization which regulates fish exports and imports regime.

The Agricultural Bank of Republic of Turkey and Under Secretariat of the Treasury operate credit and incentive schemes to support the fisheries and aquaculture sectors.

The Scientific and Technical Research Council also plays an important role organizing and subsidizing research activities.

The Export Promotion Centre of Turkey, which is the only public organization in this field, acts as an intermediary in establishing business contacts between foreign importers and Turkish exporters to develop and to promote Turkish fisheries exports.

Governmental policy towards the fisheries sector has traditionally focused on stimulating production and has included both fisheries management and fisheries development measures. The development of fisheries in Turkey is decisively linked to the economic and social strategy outlined in the National Five Years Development Plan and the National Annual Program. Management of fisheries in Turkey has been under the jurisdiction of the MARA which is responsible for the formulation of fisheries regulations and development programs.

In 2002, a study on the Turkish fisheries sector and legislation was undertaken as part of an EU Project titled "Support to the Turkish Authorities in Charge of Legislative Alignment to the Acquis in the Fisheries Sector". The overall objective of the project is to enhance the sustainable contribution of the fisheries sector to the national economy and prepare the sector for Turkey's accession to the European Union by implementing relevant legal, institutional and structural policy reforms identified in the Fisheries Sector EU Alignment Strategy developed by the Fisheries Working group (includes officials of the Fisheries Department of the MARA, the Coast Guard, the State Statistics Institute and other stakeholders from the fisheries sector).

The project's immediate objectives are sector management, including conservation, inspection and control, resource management and structural adjustment practices, common market organizations and producer organizations, adoption of market standards (including quality control) and market statistical information system and design of an intervention system, and development and implementation of a computerized fisheries vessel registration, vessel monitoring and statistical information system in compliance with current relevant EC legislation.

According to the Fisheries Law of 1971 and 1986, licensing both fishermen and their vessels has become compulsory. During the fishing season fishermen can fish in all waters any species by any amount with fewer exceptions as closed areas and gear type in the specific areas which are identified in the annual circular.

Fishing regulation is based on the following criteria (Duzgunes, 2007);

- Minimum mesh size (i.e. trawl net 20 mm in the Black Sea and 22 mm other seas),
- Minimum fish size (length (cm) and/or weight (g),
- Closed area and terms for specified gears and/or vessels,
- Closed season and area,
- Species under full conservation (dolphin, seal, salmon, sea turtle, sponge, corals and sturgeons),
- Completely banned fishing methods and fishing gears,
- Gear restriction for identified species,
- Gear or fishing method restrictions,
- Some restrictions concerning pollutants.

Seasonal prohibition protects spawning stocks as it bans the use of trawl and purse seines between May and September. Zone restriction refers to the law against fishing within three miles from the coastline.

There are no other management measures such as TACs and landing quotas, exclusive regional or sub regional fishing permits. Almost half of the fishery regulations are targeted trawls and similar fishing gears. But the current regulations and measures which are using ineffective methods and insufficient prohibitions and inspection do not support the fish

resources to recover (OECD, 2008).

Trawling is not allowed in the area within three miles off the coast.

Fleet capacity was frozen by not permitting to construct and license new vessels over 12 m in 1991. In 1997, all licensing was stopped for new fishing vessels. However, limited numbers of licenses were granted to fishing vessels for short periods in 1994, 1997 and 2001. No vessel entry into the fleet has been allowed since 2002. New entries are only allowed when a vessel is exiting the fleet. In such cases maximum 20% increase in length is tolerated. Both in case of modification and replacement of vessels, engine power or tonnage are disregarded.

Effective control of fishing effort might be achieved by a development of the current system for licensing of fishermen and boats. Licenses might specify not only a simple permission to fish but also more detailed control measures such as the gear to be used, the areas and periods to be fished, or even the ports at which fish should be landed.

The registration of fishing vessels and fishermen has been conducted in accordance with the FAO standards by Provincial Directorates. The MARA is currently founding a central registry system of vessels at the General Directorate of Protection and Control in Ankara collaborating with Under Secretariat of Maritime Affairs (The General Directorate of Protection and Control, 2008).

The Government of Turkey has improved hygienic conditions in processing plants, raw material and the marketing to improve the quality of fish and fishery products, in line with the EU regulations.

Some threatened species such as sturgeon, marine mammals and sea trout are under full protection.

According to 2006 data total fish production is 488,966 t of which 340,350 t is obtained from marine capture fisheries. Fish consumption per capita is 7-8 kg (TUİK, 2007).

In order to promote production in fisheries sector, Turkish Government has introduced several state aid measures including export refund for prepared and preserved fish, tax relief scheme for diesel oil used in fishing vessels, aquaculture support scheme, and subsidized credit scheme for fishermen and fish farmers.

Other mechanisms concerning fisheries management are multilateral agreements (EU CFP, FAO, GFCM, OECD, EUOROFISH, ICCAT, EIFAC, CITES) bilateral agreements (Algeria, Morocco, Ukraine, Bulgaria, Romania, Georgia, and Yemen) and technical and control measures for migratory species.

Turkey currently has a well-established fisheries and aquaculture education system which is part of the Turkish higher education system. Turkey has significant know-how and research capacity. Fisheries and aquaculture education are performed by high schools, vocational high schools, fisheries, marine science and agriculture faculties, and marine science institutes. There are only 3 high schools which are under control of the Ministry of Education; students enter at the age of fifteen. Vocational high schools and faculties are part of the higher education system elected through a central entrance exam. Duration of the vocational high school education is 2 years and courses include hydrobiology, water quality, fish biology, fishing, aquaculture and processing (Okumus, 2007).

At present, there are 12 Fisheries and 2 Marine Science Faculties, and 5 Departments at agriculture faculties providing undergraduate and graduate education (Ustundag, 2007). Undergraduate education lasts four years and includes courses on basic aquatic sciences, fisheries biology and management, aquaculture and fish handling, processing and marketing. Acceptance for Master of Science (MSc) and doctorate (PhD) programs depends on again central examination (called graduate entrance exam) and success at undergraduate level. MSc and PhD programs may last 2-3 and 3-6 years respectively. These educational institutes are the part of the national higher education system, are being harmonized with the EU higher education system, and are distributed all around the country. However, the practical training opportunities are insufficient due to the high number of students and lack of physical infrastructure. Each year more than 300 students graduate from these faculties, but the numbers employed by the sector itself are very limited, mainly in aquaculture, processing and fisheries administration (Okumus, 2007).

Research and development activities are performed by above mentioned higher education institutions (faculties, departments and institutes) and Research Institutes of MARA which are situated on the Black Sea coast (Trabzon), the Mediterranean coast (Antalya), the Lakes Region (Egirdir) and the Eastern Anatolia (Elazig). Institutes in Egirdir and Elazig are mainly responsible for freshwater, while the others combine coastal waters and freshwater research. The institutes mostly conduct practical and applied research for collecting basic data needed for fisheries management and aquaculture development. Training courses are generally organized by MARA and conducted by university teachers, MARA's own experienced staff and international consultants. Extension and dissemination of information and knowledge is carried out by various units of MARA (research institutes, relevant departments and provincial directorates), but it is the weakest link of the support services for fisheries and aquaculture development. Consultancies are provided free of charge by MARA and universities (Okumus, 2007).

Conclusion

The Black Sea Region is distinguished by its enclosed and international nature. Of its six bordering countries, Turkey, Bulgaria and Romania have ratified GFCM, and Romania and Bulgaria became

members of the EU in 2007.

Some targeted species, such as shellfish, may be relatively static and for management purposes considered to be fully resident in national waters. However the major capture fisheries in the Black Sea migrate within the Black Sea, and are shared with other Black Sea stakeholders. Proper management of shared stocks must involve negotiation with stakeholders throughout the range of the species. International agreements and national initiatives may force countries to prepare common fisheries management plans in near future. So every country should be ready for such actions.

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