IMPROVING THE EXISTING COMPETENCES AND DEVELOPING NEW ONES IN THE AQUACULTURE AND FISH PRODUCTS TRADE SECTOR

DACIAT BSB-461

Deliverable T.1.1.1 Consolidated Report on Aquaculture in All Partner Regions

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STATE OF AQUACULTURE IN GREECE, ROMANIA, TURKEY & UKRAINE

INTRODUCTION

This study is being carried out in the framework of the European Project "Improving the Existing Competences and Developing New Ones in the Aquaculture and Fish Products Trade Sector-DACIAT BSB-461" under INTERREG ENI CBC Black Sea Basin Program for 2014-2020 period. This report has been prepared based on the studies and research carried out in partner countries; Greece, Romania, Turkey and Ukraine. Project implementation area, in particular, is Eastern Macedonia and Thrace in Greece, South-eastern region of Romania, the Eastern Black Sea region of Turkey and Odesa region in Ukraine. DACIAT Project aims to enhance cross-border cooperation in the Black Sea Region by situmulating the exchange of experiences and best practices, in order to develop and increase existing aquaculture capacities.

This report describes the current state of aquaculture, institutional and regulatory framework, governance at local, regional and national level, supporting institutions for the development, and research and development activities in partner countries based on country reports of partners.

1. STATE OF AQUACULTURE IN GREECE, ROMANIA, TURKEY & UKRAINE

1.1. Summary

Farming of fish, shellfish and aquatic plants is known as aquaculture or fish farming in more general concept. It is one of the world's fastest growing food sectors, already providing the planet with about half of all the fish consumed. Aquaculture production has increased almost 12 times in the last 30 years, with an average annual increase of 8.8% (FAO, 2018). At present FAO also declared that aquaculture is the fastest and constantly growing sector among all food production sectors. Global capture fisheries from the seas and inland waters have been at a relatively stable level, at 90 million tons in recent years; On the other hand, aquaculture production is constantly increasing. World aquaculture production was 172.7 million tons in 2017; 92.5 million tons (53.6%) of this production was obtained from fishing and 80.1 million tons (46.4%) from aquaculture (FAO, 2019).

According to scientific research, it is estimated that the investment in aquaculture will expand further in coming years, the amount of production obtained by aquaculture will be equal to the amount of captured production in 2030 and in the long term, aquaculture production will surpass fishing. Therefore, importance of the seas and inland waters has been increasing in the world day by day and shows that aquaculture will be the sector of the future to provide food. However, this target is closely related with essential measures taken for the protection of the environment and better use of water resources in planned manner for the sustainable reduction of the environmental impacts.

According to the latest projections, world population of 7 billion will reach 8 billion in the next 20 years; the increase in the demand for seafood is inevitable. By 2050, it is estimated that the world food production will need to be doubled in order to feed the growing world population adequately and balanced. In terms of food value, animal foods are of great importance in human nutrition. In addition to being a good source of protein, seafood contains vitamins A, D, B and K, as well as calcium, phosphorus and many rich minerals.

Under these circumstances every country should implement some actions to produce more food, increase employment and offer fish and other aquatic products for the nutrition of the society. Due to diverse water resources, different ecosystems, aquaculture production can be improved by good measures in the partner countries. Moreover, this intention is the motivation source of DACIAT project to implement common actions to improve aquaculture business and production in partner countries.

According to the latest statistics Greece has 133990 tons of aquaculture production, which constitutes 62% of the total fishery production, with a value of €588 million. Farmed fish and shellfish production have shares of 83% and 17%, respectively. Sea bream and sea bass plays an important role in fish farming with 112000 tons of production, that is worth €546 million. Industry creates 12000 direct and indirect jobs mainly in coastal and remote areas. There are 5648 fish farms across country.

In Romania, inland fish farming is carried out due to geographical and ecological caharacteristics of the region. Total inland aquaculture production is 1554 tons in 2018; formed mostly Asian (61.3%) and indigeneous (32.1%) Cyprinids, 2.4% trout, 2.6% predatory species, and 1.6% sturgeons produced in 72 farms in various districts of the South-Eastern Region of Romania.

Aquaculture is very well developed in Turkey; total production of fish farms is higher than the captured fish in 2018 with a total production of 314537 tons from aquaculture (in 2100 farms) and 314094 tons from fishing. The share of the Black Sea from aquaculture is 29586 tons (9.4% of country total, from 427 farms). The share of mariculture is higher than inland fish farming. Production of rainbow trout in marine cages has an increasing trend by harvesting big trout mainly for export. Also fish farming in net cages is becoming popular in dam reservoirs. So, these farms employ 10500 workers and create more jobs at supporting services as transportation, packaging, marketing etc. About 80% of the production is exported from the Black Sea. Considering the whole country, Turkey is the top finfish producer and exporter to EU; total value of exports is over 1 million US$.

Ukraine has similar conditions with Romania regarding the potential to improve inland fish farming; especially in the western part of the country, in wetlands and lakes along the Danube River and its branches. In the classic form, commercial aquaculture in the region functions in pond farms built on projects. Despite the sufficiently developed network of pond farms, the volumes of marketable fish production in farms are extremely low; 1007 tons in 2018 (approximately 9-12% of the catch in inland reservoirs) and mainly consist of herbivorous fish species (silver carp, white cupid). There are 11 fish farms on the territory of the region with 1500 hectares of cultivation ponds and 11 hatcheries with the capacity of up to 700 million larvae. Four farms have breeding status and carry out breeding of white and mottled silver carp, Ukrainian scallop carp, white carp and paddlefish. Innovative aquaculture methods suitable according to the nature of the existing water resources are needed. Commercial capture fisheries can be carried out together with aquaculture if the appropriate farming methods could be applied for Ukraine.

1.2. The History and Evolution of Aquaculture in Partner Countries

Fishing and aquaculture is one of the oldest activities of human kind to provide food. Since the early ages men have always been a hunter and fishermen in order to survive. Fishing abilities were developed in line with the advances in canoe, raft and small vessel building, making handy tools for fishing; axes, spears and arrows made from wood, rock and metals. Sailing allows them to go far for fishing and sailing with wind opened new horizons.

The earliest form of aquaculture practiced consisted of trapping wild aquatic animals in lagoons, ponds or small shallow lakes, so that they would be available at all times. This method dates back to the Neolithic age, when man started to act on natural resources, namely around 4000 B.C. in Europe.

In the second stage in its evolution aquaculture no longer relied solely on nature: aquatic environments favourable to the development of fish, mollusks and/or crustaceans were developed.

The Chinese FAN LI writes in the year 473 B.C., the first "Fisheries Treaty" in the world. The Chinese introduced into the pond for fattening, the fish caught in the natural streams.

It is assumed that the origin of fish farming in Europe dates from the Roman Era and is related to the propagation of Christianity, in order to respect religious precepts regarding the diet. The Romans kept oysters and fattened fish in specially designed tanks.

In Middle Age, monastic communities played an important role in the development of fish farming. The fish was easier to fish if the water level in the ponds was lowered by digging a channel and from the ponds by cutting the barrage (dam). These operations were performed periodically (every 3-5 years) but required large volumes of work and, of course, large periodic expenses. To avoid such inconveniences, a monk invented the water drainage facility, which is still used today, as a 'monk'.

In southern Europe, fish farming also dates back to this time, when lagoons and coastal ponds were first fitted out to retain fish swept in by the tide. This practice often alternated on a seasonal basis with salt production.

In time, traditional combined forms of fish farming in ponds and lagoons increasingly evolved into more managed production modes described as semi-extensive aquaculture.

As for seaweed, the first written record of human consumption appeared in Japan more than 1500 years ago. In Europe seaweed was traditionally gathered by coastal populations without mechanization or any equipment to be used as fertilizer for land crops. Changes in this activity are very recent and mechanical seaweed harvesting started only at the beginning of the 20th century with the discovery of methods to extract salt and iodine, then later on colloids and alginates (gels and gum production).

Starting with the 17th century, freshwater fish stocks began to decline in certain places, probably due to increases in the human population. The authorities started to explore the idea of restocking rivers with fry hatched in captivity.

In 1741, Stephan Ludwig Jacobi, a German scientist, built the first trout hatchery in Westphalia. In the 18th century the aquaculture faced a regress due to the economic conditions and the animal husbandry. The current configuration of aquaculture farms dates back to the beginning of the 19th century.

In the second half of the 20th century the fish farming achieves a high development rate due to the new methods of increasing production. Industrial intensive fish farming of species such as trout, carp, salmon, sturgeon and eel increased.

1.2.1. Greece

Aquaculture means the rearing or cultivation of aquatic organisms using techniques to increase the production of those organisms in addition to natural growth. Aquatic organisms remain in the ownership of the natural or legal person during farming/cultivation, as well as harvesting. Fish and shellfish farming, as well as aquaculture, are one of the fastest growing food sectors, which already supplies the planet with half of the fish consumed. In Europe, aquaculture accounts for almost 20% of fish production and employs approximately 85000 people directly. The industry consists mainly of small and medium-sized or very small enterprises located in coastal and rural areas. The EU aquaculture industry is renowned for its high quality and sustainability and for the consumer protection standards it implements[1].

[1] https://ec.europa.eu/fisheries/cfp/aquaculture_el

In southern Europe, fish farming in brackish water dates back to the Middle Age, when people began to exploit lagoons and coastal lakes to keep these fish brought by water currents such as sea bass, sea bream and mullet, usually combining aquaculture with the production of salt. Through this process, aquaculture technology developed, long before relevant university and technical schools were established. These ancient forms of aquaculture are still practiced throughout Europe today. A typical example is the case of traditional extensive fish farming, applied from Lapland to Sicily and from Kerry to Thrace (Μπασιούλη Ιωάννα, 2014). Over the centuries many methods and techniques have been developed for the rearing of many different species of fish and other marine organisms in different countries. Techniques have evolved over time, and by simply keeping fish in tanks, research has created different forms and techniques of aquaculture, depending on the species and area, for which a large number of parameters are now predicted and controlled. Overall, the aquaculture sector has developed vastly worldwide, as has research and development of new culture techniques, up to date.

Greece met" aquaculture after 1956 " and made remarkable and spectacular progress over the last 20 years, though relatively late, exceeding 120000 tons annually. Special climatic conditions, geomorphology, variety of "water sources" (rivers, lakes, sea, etc.), financial support from various agencies and the rapid and successful introduction of technology and know-how in many cases have contributed to development of Greek aquaculture. Although growth has in many cases been uneven and unplanned and the environmental burden disproportionate to the result, Greece offers remarkable land and marine areas for aquaculture development. This is reinforced by the fact that the country has a shortage of fishery products, with fisheries generally accounting for only 3% of the country's gross agricultural product and only 18% of Greeks' needs for protein of animal origin (Μπασιούλη Ιωάννα, 2014).

Until the early 1980s, the aquaculture sector in Greece initially included extensive aquaculture fish farms, intensive inland aquaculture, mainly trout and mussel culture. Aquaculture then represented only 2% of fish products, with only 12 farm units, with the remaining 98% originating from fisheries. In the recent years, in the Greek aquaculture sector, intensive rearing of Mediterranean fish species (mainly sea bream and sea bass) has emerged. Now, aquaculture farms become gradually autonomous, integrating their production and acquiring industry-wide features (ΥΠΠΑΤ, 2014).

The aquaculture techniques currently used in Europe are as follows (Ευρωπαϊκή Επιτροπή, 2012):

1. Extensive freshwater aquaculture: Artificial ponds are maintained in such a way as to promote the growth of aquatic fauna with greater than natural ecosystem efficiency. The density is low and the fish are fed naturally. Some producers provide nutritional supplement. These artificial lakes play an important and positive role in landscape, water management and biodiversity. Examples - Carp, in the context of multiculturalism with other species (seagrass, river bass, pike, catfish, etc.)
2. Aquaculture of marine species in land plants: The rearing of marine fish (especially flatfish) can also be carried out on artificial land tanks but which are supplied with seawater. Water recirculation, which provides a closed and controlled environment, is essential for optimal production in hatcheries and marine breeding areas. Examples - Shade, sole, Senegalese sole, sea bass, sea bream.
3. Extensive aquaculture in brackish waters: Animals (often carried by water currents) are kept in lagoons designed for this purpose (eg Italian vallicoltura farming, Spanish esteros). The introduction of hatchery-born juveniles and the administration of nutritional supplements reinforce the semi-extensive character of culture. This form of aquaculture plays an important role in preserving the natural heritage in coastal zones. Examples - Sea bass, eel, sole, Senegalese sole, mullets, sturgeon, shrimp, and shellfish.

4. Intensive freshwater aquaculture: In intensive systems, fish are kept in tanks until they reach commercial size. There are two techniques: continuous flow (the tanks are fed upstream and returned downstream) and recirculation (the water remains in a closed circuit and is recycled so it can be reintroduced into the tanks). Recycling systems have a higher cost (energy) but allow better control of rearing conditions (temperature, oxygen) and water quality. Examples - Rainbow trout, eel, catfish, sturgeon, Nile tilapia, etc.
5. Marine aquaculture in cages: The fish are kept in anchored cages. Cages are held in the surface by a plastic floating frame. This form of farming is mainly practiced in protected areas near the coast, but the most sophisticated techniques (diving cages, remote monitoring, automatic feeding, etc.) make it possible install cages in various environments. Examples - Atlantic salmon, sea bass, sea bream, etc.
6. Intensive aquaculture in freshwater cages: mainly for lake fish and lagoons. Examples - carp etc.
7. Shellfish farming: Shellfish farming is based on the collection of "wild" spat (with fishing, harvests) or spat from approved hatcheries, which feeds on the nutrients provided by the environment itself (filter feeders). Oyster and mussel farming represent 90% of the European production with a wide variety of techniques: culture in sandy bottom, slabs, wooden poles, ropes, baskets, etc. Examples - Oysters, mussels, clams

Aquaculture has been one of the fastest growing sectors in Greece in recent decades, taking advantage of land areas, marine areas, modern biotechnology results and the need to invest in new areas. At the same time, products from Greek fish farms are now recognized worldwide (APC, 2009).

Greece's climate and geomorphological conditions, which favor the cultivation of large fish, human resources, and the decline in fish stocks in the wild, have contributed significantly to the growth of the sector in Greece. Globally, about three-quarters of the wild fish stocks have been fully exploited, overfished or depleted according to FAO, when at the same time the demand for fisheries products for human consumption is growing rapidly.

In Greece, the rapid increase in production, the spectacular penetration of international markets, the production and export of know-how all contribute to the establishment of the industry as a productive activity of great importance to the national economy. Its economic dimension creates new economic opportunities and more specialized jobs, more efficient use of local resources and opportunities for productive investment. It is worth noting that aquaculture is the second largest export sector in the country, with 70% of all Greek fish being exported, with only 30% consumed on the domestic market. Investments made in recent years by large companies, as well as partnerships and acquisitions, create other growth opportunities and give the industry new momentum. In addition, aquaculture is one of the few productive activities that allow the use of uninhabited islands and islands that are usually excluded from other investments (ΣΕΘ, 2019).

Greek aquaculture is highly diverse and encompasses a wide range of species, systems and practices. The total number of aquaculture farms in Greece amounts to 1,065, of which 85% are in seawater (908 units for fish and mussel production), 8% are inland water (onshore) and the remaining 7%, in brackish waters (lagoons). Most of them are family, small and medium-sized enterprises, and there are larger farms owed by big companies that produce fry, feed and fixed equipment in addition to fish farming. The above analysis does not include marine fish hatcheries (29 in total) that support marine fish farms (ΣΕΘ, 2019).

In more detail and according to the latest data available from the Hellenic Seafood Association, by breeding category there are:

- 318 marine aquaculture units, mainly breeding sea bream and sea bass
- 590 shellfish units (mainly Mediterranean mussel)

- 85 units in inland waters where trout, carp, eel, etc. are raised
- 72 holdings in brackish waters
- 29 Mediterranean fish stations (sea bream, sea bass, etc.)

It is worth noting that cultured fish in seawater account 97% of the total production, while only 2% originates from inland aquaculture. In the Greek lagoons the main species fished are sea bream, sea bass and mullet, while rainbow trout is the main species of inland aquaculture. Although the production of sea bass and sea bream constitutes the largest proportion of total production, the cultivation of new species such as sharpsnout seabream, red sea bream and common dentex are constantly gaining ground (ΣΕΘ, 2019).

The importance and position of aquaculture in economic and social terms in Greece is easily understood, as it accounts for a particularly high proportion of the production of fishery products consumed. In order to meet the needs of the growing population, the rate is expected to increase in the coming decades, as fish and their products are one of the most important sources of animal protein, vitamins, trace elements and other nutrients that the human body needs. According to World Food Organization estimated, by 2030 over 65% of fishery products will come from aquaculture (ΣΕΘ, 2018).

According to the latest data available from the Hellenic Seafood Association over the last decade, there has been a slowdown in growth and a slight decline in production. But the climate has already begun to reverse and the industry is recovering and returning to growth as this activity has become one of the most competitive for Greece. Greece is a leader in production of Mediterranean species in European and international level (ΣΕΘ, 2019).

1.2.2. Romania

The first documentary evidence of fish farming in Romania dates back to the 12th century and it refers to the existence of numerous ponds and the fishes that populated them. The development of the modern fish farming in Romania faced three important stages:

- Stage 1 starts with the application of the first fishing law in 1896, elaborated by the great scientist Grigore Antipa. This stage is characterized by the modern approach of fishing and fish farming, protection and rational exploitation of the fisheries fund, the foundation of research units and education in the field of fishing and fish farming.

- Stage 2, 1944-1990, is distinguished by: foundation of specialized higher education, development of the existing research units, extension of the landscaped area and development of the industrialization of fishing. The disadvantages of this stage were: the dissolution of the Research Institute for fish farming, impoundment of rivers without facilities for the access of the fish in ponds, construction of dams without fish passage facilities, excessive drying of ponds, replacing valuable traditional species (carp, scallops, catfish, etc.) with species difficult to be accepted by consumers (Asian cyprinids).

- Stage 3, starting with 1990, is characterized by the drastic decline of the fish production and the reduction of the industrial capacities.

With Romania's accession to the European Union, at the national level, non-reimbursable funds have been allocated for the development of aquaculture under the Operational Programme for Fisheries 2007-2013 and the Operational Programme for Fisheries and Maritime Affairs 2014-2020. The public financial assistance allocated through the two operational programs has supported small and medium-sized enterprises in making investments regarding the establishment, expansion and modernization of aquaculture farms, the acquisition of high-performance equipment, the diversification of production, the orientation towards value-added products and the development of other activities of the aquaculture farms (food service, accommodation facilities, recreational fishing tourism, educational tourism).

1.2.3. Turkey

Fisheries have very long history in economy, nutrition, social life and the culture of the Black Sea. First written records go back to 17th Century. In his "Travel Book" Ottoman traveler and writer "Evliya Çelebi" mentions about the fish species and fishers during his journey from Istanbul to Trabzon by sea what he saw at the stop overs in Sinop, Samsun, Ünye, Giresun and Trabzon in 1640's. He gives much more importance to "Hamsi (Anchovy)" which is the common name in all riparian countries, to be first caught during the wintering migration to Turkish coasts in the month of "Hamsin". In his notes, there are special observations how to catch, land and selling of anchovy together with the cooking styles. He says "There are many other kinds of fish in Trabzon such as sea bass, mullet, turbot, red mullet, chub mackerel and mackerel, but the citizens prefer anchovy, more than these, thousands lose their lives to catch and even may fight during the trade". He says "anchovy is valuable not only as food but also its healing feature as pain killer. If there are snake and house centipedes, smoked anchovy could be used to defeat". He pointed out "people of Trabzon can cook 40 different dishes in the categories of soup, boiled, grilled, fried, and sweet and baklava".

Aquaculture business was started with trout farming in ponds at the end of 1960s in Turkey. Later, it was followed by the fattening of eels collected in lagoons in soil ponds. Carp culture in old river beds became popular after 1970's. Aquaculture in the sea started with the on-growing of the fish collected from nature in the 1980s in cages and soon after it was forbidden by Law in order to protect fish populations in nature. There was a significant relationship between captured fisheries and aquaculture.

When the fish was abundant in the nature and harvested products sufficient for the nutrition of the citizens and supplied with considerably low prices, any attempts for fish farming failed due to incompatible prices or remained on trial base; especially on the species under thread in the nature since 1970's. In addition there were very limited cold storage facilities and marketing chains resulting mainly fresh consumption and low prices if the supply is over the demand. Due to environmental pollution, impact of invasive species, climate change and over fishing fish production by captured fisheries declined sharply at the end of 1980's, aquaculture investments and production have started to increase. Today, extensive aquaculture farms, converted to semi-intensive or intensive farms to produce large quantities.

1.2.4. Ukraine

History of aquaculture goes back to time of Soviet Union. It was seen as a strategic resource of the state. In the activity of the fishery complex of Ukraine of the Soviet period, a significant shift towards marine and ocean fisheries was planned at the expense of the development of its own resource base of natural and artificial inland water bodies. As noted above, fisheries in extra territorial waters accounted for up to 74% of the total catch of fish, in the fishing zone of Ukraine (in the Azov-Black Sea basin) - up to 16%, the share of aquaculture production varied within 7-12%, and fisheries in inland waters accounted for only 3% of total production.

In the current conditions of sharp reduction of ocean catch and critically depressed state of inland water bodies, the actualization of the aquaculture segment in Ukraine objectively becomes a sign of an alternative strategic vector of development of the fisheries sector. However, with its rich natural resource potential for large-scale development of fisheries, the state loses these advantages due to the lack of necessary institutional conditions. Thus, according to the State Agency for Fisheries, out of 250 thousand hectares suitable for aquaculture, only half are involved in modern conditions. Of these, 60% are inefficiently used and therefore have low fish productivity.

Aquaculture is a major component of the fisheries and agro-industrial sectors. Aquaculture production, as a source of high quality production mainly at the places of its consumption, which does not require high costs for its transportation (in comparison with the sea and ocean), is a strategic resource of the state.

The Odessa region is part of the Primorsky region of Ukraine, which owns a large stock of fishery reservoirs (lakes, reservoirs, sea estuaries, estuaries of large rivers Danube, Dniester, Dnipro) and is the main fishing region. The main fish processing facilities are located here, as well as scientific and educational institutions of the fishing industry. The enterprises of the coastal region produce more than 90% of the total volume of fish and seafood produced by Ukrainian enterprises. This region of Ukraine in the last 10 years provides from 42.5% to 30.9% of the total fish catch in inland waters of Ukraine. Oceanic fish (mackerel, sardines, horse mackerel, cod) and seafood (crustaceans, molluscs, etc.) harvested in the 200-mile coastal waters of other countries are the major part of the ocean catches of enterprises in the region. The resource potential of the fishery food subcomplex of Odessa region is the largest in Ukraine. The specificity of the region is the presence of large inland reservoirs - coastal lakes and estuaries, two of which are the largest lakes in Ukraine. Most of the reservoirs of Odessa region - ponds, reservoirs, lakes, estuaries, reservoirs-coolers of power plants, special gardens and swimming pools are suitable for fishery use. The fishery reservoirs of the area in which industrial fishing of aquatic living resources is carried out, includes 16 inland water bodies (lakes, estuaries, reservoirs and floodplains) with a total area of 176 thousand hectares, below the rivers. The Danube and the Dniester, as well as about 5500 km^2 of the high-productivity water area of the northwestern Black Sea.

1.3. Main Features of Aquaculture Industry, Entrepreneurship and SMEs Status In Each Partner Territory

Due to geographic, climatic, topographic, ecologic variations, the development of aquaculture has progressed in different directiosn, with different targets and speed due to the limitations (protective status, physical boundaries such as lower depths), and finally decisions of the governing bodies regarding priorities for a given site. From this point of view, Romania and Ukraine have similarities as much as Greece and Turkey do for the development of aquaculture. Therefore it would be better to analyse the aquaculture sector having in mind each country's specific perspective.

1.3.1. Greece

Aquaculture in Greece is a very important sector for the economy. Marine fish farming is dynamic and contributes significantly to the national economy. Commercial fish aquaculture has evolved into one of the most developed sectors in the last decade. Today Greece ranks first in production of cultured fish between the European Union and the Mediterranean countries, and the sector ranks second in export of "food-soft drinks".

Twenty years ago, sea bass and sea bream production practically did not exist, but in 1981 as a result of good climatic conditions, and the extensive and protected coastline, private, national and European investments in the sector, coupled with advances in reproduction technology and feed formulation, contributed to the growth of the industry and production reached 115000 tons by 2008, equivalent to € 376 million. About 70% of this production and 90% of its value comes from sea fish. Shellfish production accounts for 25%.

In Greece the dominant species, from 1956 onwards, was rainbow trout (about 3000 tons per year), while for the past 15 years there have been attempts to breed eel, sturgeon, mugilidae and ornamental fish. Gilthead seabream, *Sparus aurata*, European seabass, *Dicentrarchus labrax* are the basic species in Greece. In addition, 910 tons of fish, equivalent to € 5 million, were produced in lagoons. Producers make a significant effort to differentiate other species as well with the production of *Diplodus puntazzo, Dentex dentex, Pagrus pagrus, Diplodus sargus, Pagellus erythrinus,* and *Solea solea*, with the total production of these species in 2008 reaching 1800 tons. For these species the production of fry at fish hatcheries was developed.

About 80% of Greek aquaculture production is exported, mainly to Italy and Spain. Fish, mainly sea bass and sea bream, are the second exported agricultural product after olive oil, and are considered by the Greek

Government as a strategic product. Production is mainly carried out using sea cages and production costs are among the lowest in Europe due to favorable farming conditions (temperature, drought, long coastline, etc.). Production sites exist throughout the Greek coastline, with higher concentration in the central areas near good infrastructure and road network.

The main fish species currently grown in Greece are the following, in descending order of production:

1. Gilthead seabream (*Sparus aurata*),
2. European seabass (*Dicentrarchus labrax*),
3. Rainbow trout (*Onchorynchus mykiss*),
4. European eel (*Anguilla anguilla*),
5. Sharpsnout seabream (*Diplodus puntazzo*),
6. Red sea bream (*Pagrus major*),
7. White seabream (*Diplodus sargus*),
8. Atlantic bluefin tuna (*Thynnus thynnus*),
9. Common sole (*Solea solea*),
10. Flathead grey mullet (*Mugil cephalus*),
11. Common dentex (*Dentex dentex*)

The first two species account for 95% of total production in Greece, with the rest being produced in very small quantities. Aquaculture is an important sector in Greece, accounting for more than 50% of total fishery production (Μπασιούλη Ιωάννα, 2014).

The following fish and mussel - shellfish businesses are operating in the Region of Eastern Macedonia and Thrace (Table 1.1).

In the framework of this study a questionnaire was compiled and distributed to aquaculture companies operating in REMTH. The questionnaire surveyed the key issues of aquaculture in the REMTH area, such as the Keramoti of Kavala and the Fanari of Rodopi. Businesses operating in these areas grow and sell mussels. The owners said they produce 80-100 tons per year, the cost per kilo is 0.30 € and businesses have both family members and external partners. These establishments do not send on veterinary or health care and do not use hormones, vaccines and antibiotics and shellfish feed is taken from the environment naturally.

Table 1.1 Aquaculture businesses in the Region of Eastern Macedonia and Thrace:

Fish Businesses				
Owner/Organisation	**Location**	**Area (acre*)**	**Species**	**Capacity tons)**
"G.MPERMPERIDIS & STURGEON GREECE SA"	Kefalari, Doxato Drama	10,7 (10.768)	Sturgeon	80
"G.MPERMPERIDIS & STURGEON GREECE SA"	Lake Thisavrou Drama	20	Carp	87
SOUFLERIS KONSTANTINOS	Vathirema Drama	5	Rainbow trout	50
SYMVOLI SA	Vathirema Drama	4,68		40
THALASSELIS NIKOLAOS	Paradise Nestou Kavala	8		121
MICHAILIDOU MARIA	Nea Karvali Kavala	39	Sea bream, sea bass, euryhaline species	120
SIDIROPOULOS KYRIAKOS	Nea Karvali Kavala	22		120
KIRANTZI OSMAN – ISMET TSAOUS	Oraio Mykis Xanthi	10	Rainbow trout	10
Enterprises of shellfish - shellfish farming				
ZAMPAKI PANAGIOTA	Keramoti, Kavala	**20**	Mussel farming	**147**

AFENTOULIS A&X O.E		44		316,575
MPELEZI DIMITRA		20		126
ZAMPAKI PANAGIOTA		10		92,4
TSALKIDOU ELENI		10		86,4
AFENTOULIS ATHANASIOS	Agiasma, Kavala	20		148
AFENTOULIS CHARALAMBOS		20		148
KALOGEROPOULOS MICHALIS		20		140
TSALKIDIS AGGELOS		30		193,2
A.TSALKIDIS – K. PARCHARIDOU O.E.		30		168
TSOUTSOULI MARIA		20		126
PAPANIKOLAOU VASILIKI		48,12		441
ALEXANDRIDIS IORDANIS	Iraklitsa Kavala	50	Mussels-Oysters-Scallops-Cydonia-Achivada	328
PAPTSIKI FRENTZEL MARKOU	Bistonic Bay Rodopi	15,5	Musses farming	86,4
OSTRAKA RODOPIS E.E		22,22		150
OSTRAKA RODOPIS E.E		20,26		158
OSTRAKOKALLIERGIES VISTONIKOU O.E.		23,05	Oysters-Kydonia-Achivada	120
ALEXANDRIDIS GEORGIOS		20	Mussel farming	158
ALEXANDRIDIS IOANNIS		23	Oyster, Kydonia-Achivada	145

* 1 acre = 0.4 ha.

1.3.2. Romania

In Romania, as well as in the South-East Region, aquaculture is carried out on the basis of Emergency Ordinance no. 23/2008 with further modifications and completions and consists of breeding and cultivation of aquatic animals using techniques aimed at increasing the production of organisms beyond the natural capacity of the environment, in a framework in which the respective organisms remain the property of a natural or legal person for the entire period of breeding/cultivation and harvesting.

According to the normative act, aquaculture can be practiced in fish farms, in artificial aquatic ecosystems represented by: ponds, artificial breeding stations, floating cages, reservoirs for aquaculture and other aquaculture facilities. Aquaculture can also be practiced in natural aquatic ecosystems nominated by order of the Minister of Agriculture and Rural Development, at the proposal of the National Agency for Fisheries and Aquaculture, such as: Territorial Danube, Danube Delta and Floodplain; Razelm-Sinoe lagoon complex and coastal lakes; mountain/hill/plain streams, rivers and lakes of mountains, hills, plains and their flood zones, as well as dead arms of rivers; natural ponds and lakes without hydro technical installations for water supply, retention and drainage; accumulation lakes, with their flood-prone areas; the network of master channels in hydro-ameliorative, navigation and hydro-energy systems and their branches; inland sea waters, territorial sea, the contiguous area, the exclusive economic zone of Romania.

For the smooth running of the activities, the fish farms/establishments have assets, such as: dams, monks, pumping stations, water supply installations, water drainage systems, water supply channels, water drainage channels, hatching and breeding halls, administrative centers, primary processing units, stores for sale within the aquaculture farm, feed warehouses, material and fishing gear storage warehouses, as well as other constructions related to an aquaculture farm that are necessary in order to ensure its functionality.

Most of the fish farms/establishments belonging to the public domain are granted to the private administrators who register the unit in the Register of Aquaculture Units (RUA) and receive an aquaculture license, issued by the National Agency for Fisheries and Aquaculture. At the same time, for the functioning of the farms/establishments, the private administrators are required to obtain an environmental authorization, issued by the National Agency for Environmental Protection and a management authorization from "Romanian Waters". At the end of 2019, in the South-East Region of Romania there were 87 units with an aquaculture license, active in the field of aquaculture, distributed by county as follows (Table 1.2., Figure 1.1.):

Table 1.2. Distribution of aquaculture licenses by counties in Romania, 2019

County	# License	%
Tulcea	36	41
Constanța	20	23
Brăila	15	17
Galați	9	10
Vrancea	4	5
Buzău	3	4

Most of the aquaculture units in the South-East region are located in the rural area, with the exception of 7 (seven) units, which are located in the urban area, in small towns from Brăila, Vrancea, Constanța and Tulcea counties.

Out of the 87 aquaculture units, 71 carry out their activity in fish farms/establishments with public ownership, 11 in fish farms/establishments with private owner and 5 in fish farms/establishments with mixed public-private ownership (the public owner having the land of the facility, and the private owner the assets).

The main public owners of the fish farms/establishments in the South-East region, distributed by county, are given in Table 1.3.

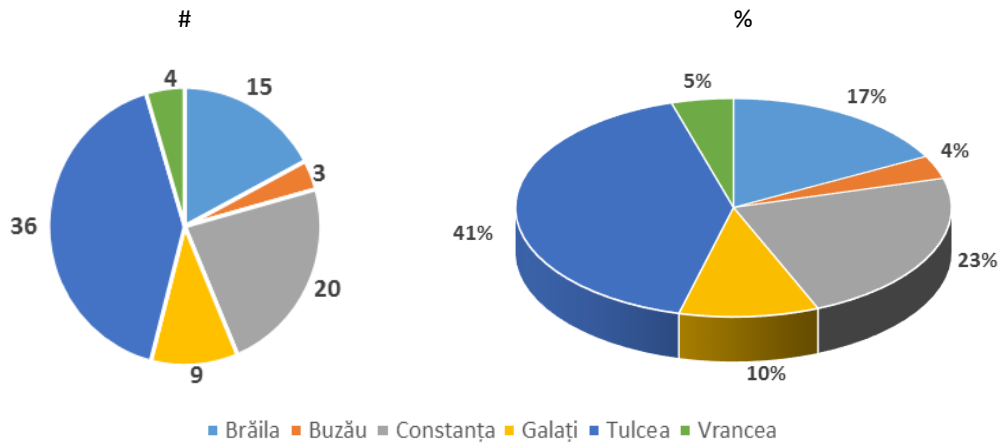


Figure 1.1. Licensed aquaculture units in Southeast Region by 2019

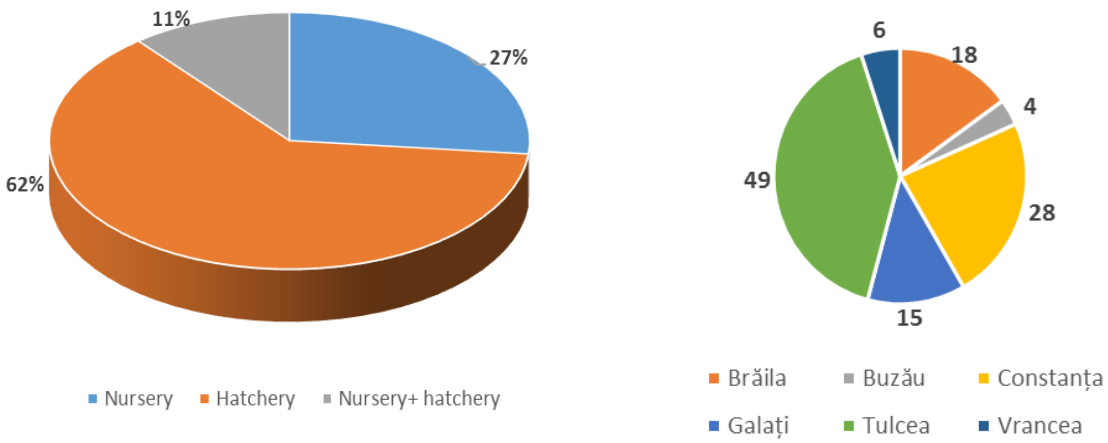
Table 1.3. Distribution of fish farms/establishments in the South-East Region of Romania by counties

County	National Agency for Fisheries and Aquaculture	County Councils / Local Councils	Forestry Directions	The National Administration "Romanian Waters" / Autonomous Public Services
Brăila	5	6	0	0
Buzău	1	1	1	0
Constanța	12	3	0	0
Galați	5	2	0	1
Tulcea	2	27	0	2
Vrancea	1	1	1	0
TOTAL	**26**	**40**	**2**	**3**

The structure of the administrators of the fish farms/establishments is different from the structure of the owners, considering the fact that there are 83 private administrators (eg commercial companies, individual companies, associations, etc.) and only 4 public administrators (research institutes, forestry directions, etc.).

At the end of 2019, the 87 aquaculture units owned 120 licenses, out of which 62% licenses for hatchery, 27% licenses for nursery and 11% licenses for both hatchery and nursery, distributed by county as follows (Figure 1.2):

- Tulcea - 49 licenses, out of which 30 licenses for hatchery, 14 licenses for nursery and 5 licenses for both hatchery and nursery;
- Constanța - 28 licenses, out of which 17 licenses for hatchery, 6 licenses for nursery and 5 licenses for both hatchery and nursery;
- Brăila - 18 licenses, out of which 13 licenses for hatchery, 3 licenses for nursery and 2 licenses for both hatchery and nursery;
- Galați - 15 licenses, out of which 10 licenses for hatchery and 5 licenses for nursery;
- Vrancea - 6 licenses, out of which 4 licenses for hatchery and 2 licenses for nursery;
- Buzău - 4 licenses, out of which 1 license for hatchery, 2 licenses for nursery and 1 license for both hatchery and nursery.



A B

Figure 1.2. Share of aquaculture licenses by type (A) and number by counties (B) in 2019

The areas on which aquaculture is practiced based on these licenses, represented by 34,503.92 ha (3,109.04 ha nurseries, 23,415.16 ha hatcheries and 7,979.72 ha nurseries + hatcheries), are distributed by county in Table 1.4:

Table 1.4. Total area of farms according to production types by counties

County	Nursery areas (ha)	Hatchery areas (ha)	Nursery + hatchery areas (ha)	Total areas (ha)
Brăila	406.73	1 750.22	7.10	2 164.05
Buzău	75.54	803.25	72.72	951.51
Constanța	711.12	5 572.82	2 963.36	9 247.30
Galați	151.97	1 430.46	0.00	1 582.43
Tulcea	1 752.25	13 691.04	4 936.54	20 379.83
Vrancea	11.43	167.37	0.00	178.80
TOTAL	**3 109.04**	**23 415.16**	**7 979.72**	**34 503.92**

Aquaculture in the South-East Region of Romania is carried out in freshwater and is characterized from a technological point of view by the following directions: extensive and semi-intensive growth of cyprinids in polyculture and intensive growth of salmonids.

Breeding cyprinids in polyculture is carried out at most farms/establishments in earthen ponds, in extensive or semi-intensive regime. There are also farms that breed cyprinids in floating ponds, concrete ponds or thermostated basins with recirculated water systems (SAR).

The areas of many fish farms/establishments have the status of NATURA 2000 sites, benefiting for this reason from various financial facilities for the loss of production due to ichthyophagous birds or for the protection of the fauna of the area.

Many of the extensive fish farms/establishments are multifunctional farms where other social and environmental services are provided: ecological tourism, recreational fishing, educational activities related to the knowledge and protection of aquatic biodiversity, improving water management.

Salmonid farming is practiced mainly in trout farms located near the natural course of a mountain river, through intensive farming, for brood, consumption and even sport fishing. There are also farms that practice intensive farming of trout along with sturgeons in a recirculating system.

1.3.2.1. Fish species in aquaculture

The following fish species are prevalent within the fish farms/establishments:

Cyprinidae

Indigenous Cyprinids – common carp (*Cyprinus carpio*), Prussian carp (*Carassius gibelio*), tench (*Tinca tinca*), common bream (*Abramis brama*), white bream (*Blicca bjoerkna*), common barbel (*Barbus barbus*), asp (Asp*ius aspius*), common roach (*Rutilus rutilus*), common rudd (*Scardinius erythrophthalmus*)

Asian Cyprinids – silver carp (*Hypophthalmichthys molitrix*), bighead carp (*Hypophthalmichthys nobilis*), grass carp (*Ctenopharyngodon idella*)
Siluridae – Wels catfish (*Silurus glanis*)
Percidae – zander/pike perch (*Sander lucioperca*), European perch (*Perca fluviatilis*)
Esocidae – northern pike (*Esox lucius*)
Acipenseridae - sterlet (*Acipenser ruthenus*), beluga/great sturgeon (*Huso huso*), Danube sturgeon/Russian sturgeon (*Acipenser gueldenstaedti*), starry/stellate sturgeon (*Acipenser stellatus*), bester, best beluga, American paddlefish (*Polyodon spathula*)
Salmonidae – trout (*Salmo sp*.), rainbow trout (*Oncorhynchus mykiss*), brook trout (*Salvelinus fontinalis*).

In addition to these fish species, crustaceans – crayfish (*Astacus sp*.) and batrachians – frogs (*Rana sp*.) are collected in some farms.

In terms of production, the biggest share belongs to Tulcea and followed by Constanta and Brăila (Figure 1.3). In 2018, out of the total production sold in the South-East Region of Romania (1 554 tons), the highest value was registered in Tulcea (624 tons, 40.15% of the total), Constanța (385 tons, 24.77% of the total) and Brăila (326 tons, 20.98% of the total) (Figure 1.3).

Cyprinids (Asian and native), are the dominant species in the production with the share of 93% while the predatory species, trout and sturgeons have very low percentages (Figure 1.4).

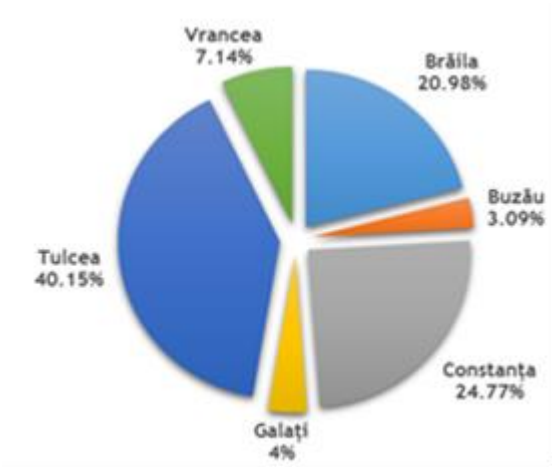


Figure 1.3. Production sold by counties in 2018

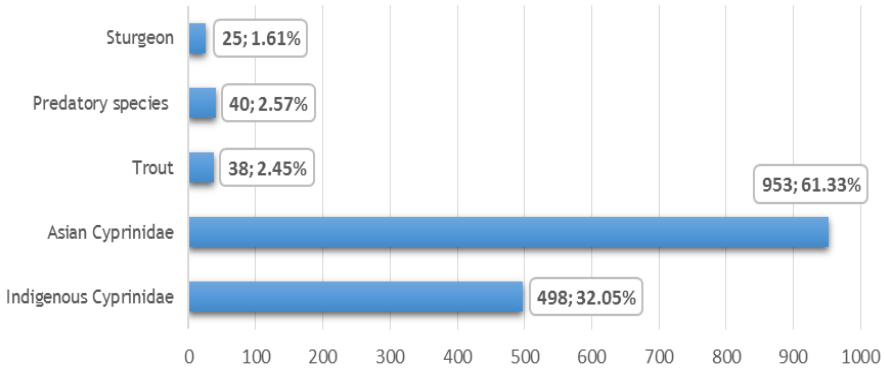


Figure 1.4. Production sold by species (ton/ percentages) in 2018

During 2016-2018, the production sold in the South-East Region of Romania showed an overall decrease each year, reaching from 2064 tons in 2016, to 1 932.70 tons in 2017 and 1554 tons in 2018. The evolution of the production sold by species during 2016-2018 is given in Figure 1.5.

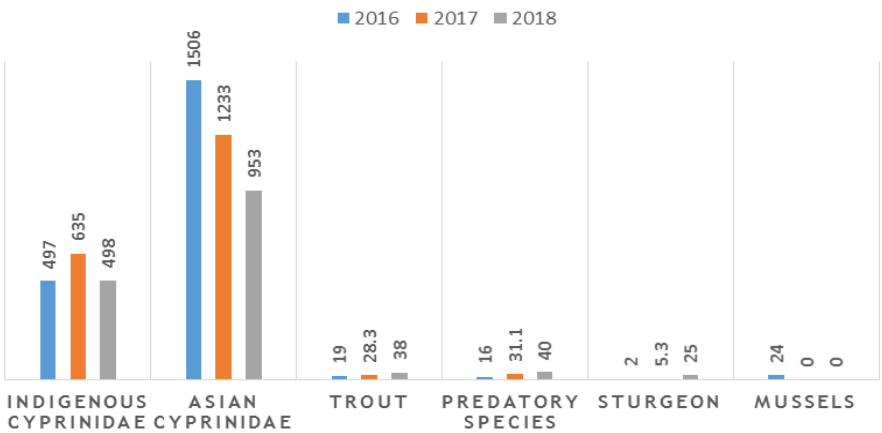


Figure 1.5. Evolution of the production sold by species during 2016-2018 (tons)

According to the data reported to ANPA, the egg and fry production in every county from the South-East Region of Romania during 2017-2018 is given in Table 1.5:

Table 1.5. Egg and fry production by counties

County	2017		2018	
	Egg production (million)	Fry production (number)	Egg production (million)	Fry production (number)
Brăila	625 000		14 650 000	409 000
Buzău			0	0
Constanța		46 345 000	0	6 980 000
Galați		525 000	300 000	0
Tulcea		132 829	0	0
Vrancea	350 000		2 000	0
TOTAL	**975 000**	**47 002 829**	**14 952 000**	**7 389 000**

The evolution of the number of active aquaculture units during 2016-2019 in the South-East Region of Romania is presented in Table 1.6 and Figure 1.6, showing a slow but increasing trend.

Table 1.6. Number of fish farms in the South-East Region of Romania

County	Number of aquaculture units 2016	Number of aquaculture units 2017	Number of aquaculture units 2018	Number of aquaculture units 2019
Brăila	11	11	14	15
Buzău	5	5	3	3
Constanța	21	21	20	20
Galați	7	6	8	9
Tulcea	25	33	23	36
Vrancea	4	4	4	4
TOTAL	**73**	**80**	**72**	**87**

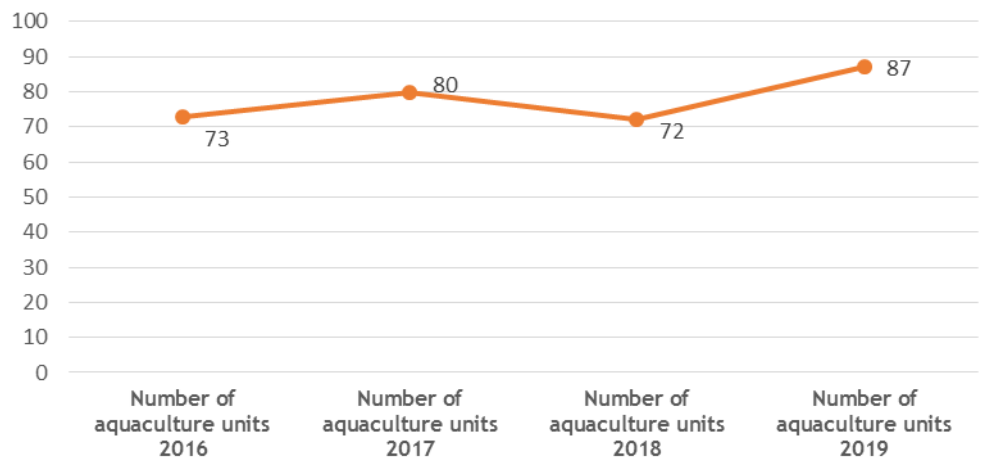


Figure 1.6. Evolution of the number of aquaculture units during 2016-2019

1.3.2.2. Employment

The average number of employees per aquaculture unit in the South-East Region of Romania was 7 in 2017, considering that within the 80 active aquaculture units there were 565 employees and 6 in 2018, the 72 active aquaculture units registering a total number of 422 employees (Table 1.7).

Table 1.7 Number of employees in fish farms

County	2017			2018		
	Number of aquaculture units	Total Number of employees	Average number of employees per aquaculture unit	Number of aquaculture units	Total Number of employees	Average number of employees per aquaculture unit
Brăila	11	83	8	14	92	7
Buzău	5	8	2	3	11	4
Constanța	21	139	7	20	45	2
Galați	6	37	6	8	45	6
Tulcea	33	270	8	23	202	9
Vrancea	4	28	7	4	27	7
TOTAL	**80**	**565**	**7**	**72**	**422**	**6**

The main income of the aquaculture farms comes from fish sales (wholesale and retail), generally registering values in the range of 40-70% of the total income and in some cases even over 70%. The rest of the revenues, registering lower percentages, come from egg and fry sales, brood fish sales or production incentive revenues. Some of the aquaculture farms in the region also carry out other activities, which add value, such as processing, farm restaurant, recreational fishing or agriculture.

Regarding the unit fish production costs, excluding fixed investment expenses, the highest percentage is registered by the feeding costs, the feed supply used being generally either prepared in the farm, or combined (both industrial and prepared in the farm), labour costs and taxes. Rent costs (for land, building, water and water area, etc.) also have a significant share of the total costs, reaching values over 5%. Other expenses, such as egg and fry purchase, service procurement costs (diagnosis, consulting, analysis fees, etc.) or research and development expenses generally account for less than 5% of the total unit costs of fish production.

1.3.2.3. Investments, Research and Supporting Institutions

In order to develop the activity of the aquaculture units, to modernize the fishing facilities or to support the aquaculture sector, the commercial companies and research institutes took advantage of the financing opportunities existing in the field of aquaculture. According to the website of The General Direction for Fisheries – Managing Authority for the Operational Programme for Fisheries and Maritime Affairs (DGP-AMPOPAM)[2], the following commercial companies/research institutes have accessed non-reimbursable funds under the Operational Programme for Fisheries and Maritime Affairs 2014-2020 for the development/support of the aquaculture sector (Table 1.8):

[2] https://www.ampeste.ro

Table 1.8. Commercial companies/research institutes that have accessed non-reimbursable funds in the aquaculture sector in Romania

Measure	Beneficiary	Project value (RON)	Project title	Locality	County
Productive Investments in Aquaculture	SC AGRI DELTA SERV SRL	19 797 144.91	Establishment of Dunavăț II Fish Farm	Murighiol	Tulcea
	SC ANGHILA IMPEX SRL	11 262 697.70	Modernization of ESNA Fish Farm through the purchase of specialized machinery and equipment	Movila Miresei	Brăila
	SC MARFISHING SRL	8 951 539.09	Increasing MARFISHING SRL's Competitiveness by Making Investments in Developing Complementary Activities	Mărășești	Vrancea
	SC ATLANTA ENTERTAINMENT SRL	3 282 626.33	Establishment of the Aquaculture Unit and Developing Complementary Activities within SC ATLANTA ENTERTAINMENT SRL	Gura Teghii	Buzău
	SC FLORENA HOUSE SRL	197 373.40	Modernization of FLORENA Fish Farm	Pecineaga	Tulcea
	SC ECO DANUBE SRL	4 925 027.43	Modernization of Iazurile 1,2 Fish Farms	Murighiol and Iazurile	Tulcea
	SC MASIVA SRL	954 158.12	Productive Investments within Chilia I - Chilia II Fish Farm	C.A.Rosetti	Tulcea
	SC PISCICOLA TOUR AP LUNCA SRL	15 053 353.13	Increasing the Production Capacity of SC PISCICOL TOUR AP LUNCA SRL	Jurilovca	Tulcea
	SC DANUBE RESEARCH - CONSULTING SRL	1 685 230.01	Modernization of Horia Fish Farm	Horia	Tulcea
	SC FISH TOUR DELTA SRL	18 277 082.39	Modernization of Fish Farm within SC Fish Tour Delta SRL	Crișan	Tulcea
	SC GELMIN SRL	1 633 041.50	Investments in Periprava Fish Farm	C.A. Rosetti Commune - Popina – Periprava colony	Tulcea
	SC ROMNAȚIONAL SRL	20 694 951.49	Productive Investment in Aquaculture within Făclia Fish Farm	Peștera	Constanța
	SC RABOLUS SRL	7 361 747.81	Productive Investments in Aquaculture within Iortmac - Saharlale – Ceamurlia Fish Farm	Lipnita	Constanța
	SC ELDORADO SRL	20 725 126.66	Productive Investments in Aquaculture within Chilia I Fish Farm	Chilia Veche	Tulcea
	SC FISH TOUR DELTA SRL	20 712 962.60	Cleaning the Canals of Obreția II Fish Farm	Tulcea	Tulcea
	SC OBRETIN SRL	20 722 139.91	Modernization of AP OBRETIN Fish Farm and Increasing Accommodation Capacity	Crișan	Tulcea
Measure	**Beneficiary**	**Total project value (RON)**	**Project title**	**Locality where the project is implemented**	**County where the project is implemented**
Management, Relief and Advisory Services for Aquaculture Farms	RESEARCH - DEVELOPMENT INSTITUTE FOR AQUATIC ECOLOGY, FISHERIES AND AQUACULTURE GALAȚI (ICDEAPA)	632 448.22	Center for Management, Relief and Advisory Services within ICDEAPA Galați for Aquaculture Farms in order to Improve their Performance and Competitiveness	Galați	Galați

Measure	Beneficiary	Total project value (RON)	Project title	Locality where the project is implemented	County where the project is implemented
Measures on Animal Health and Welfare	RESEARCH - DEVELOPMENT INSTITUTE FOR AQUATIC ECOLOGY, FISHERIES AND AQUACULTURE GALAȚI	528 370.56	Guide to Good Practices on Post-Embryo Reproduction and Development of Freshwater Fish Species from Romania - Basic Model for the Development of the National Fisheries Sector	Galați	Galați
Measure	**Beneficiary**	**Total project value (RON)**	**Project title**	**Locality where the project is implemented**	**County where the project is implemented**
Aquaculture Providing Environmental Services	SC EURO FISH SRL	4 702 441.77	Aquaculture Providing Environmental Services in Babadag Fish Farm	Babadag	Tulcea
	SC AQUAROM ELITE DISTRIBUTIONS S.R.L.	10 263 407.34	Aquaculture Providing Environmental Services in Oltina Fish Farm	Oltina	Constanța
	SC COMPLEX GRUP S.R.L.	8 159 433.71	Sustainable Aquaculture at Natura 2000 Site – Bugeac I Fish Farm	Ostov	Constanța
	SC DELTA SAMITUR SRL	512 752.00	Sustainable Aquaculture in Ghiolul Pietrei Fish Farm - Natura 2000 Sites ROSCI0065 and ROSPA0031	Murighiol	Tulcea
	SC DANUBIU ELITE SRL	1 987 533.86	Aquaculture Providing Environmental Services in Dunăreni Fish Farm	Aliman	Constanța
	SC ESOX PROD S.R.L.	1 046 793.55	Aquaculture through Biodiversity Conservation in NATURA 2000 Sites: ROSCI0005 and ROSPA0004 – Amara Fish Farm	Balta Albă	Buzău
	SC PISCICOLA TOUR AP LUNCA SRL	4 699 492.35	Compensation of Income Losses Caused by the Compliance with the Restrictions and Management Requirements Related to Natura 2000 Site in Lunca Fish Farm	Jurilovca	Tulcea
	SC Obretin SRL	1 288 766.18	Conservation of Natural Heritage in Obretin Fish Farm, Part of the Natura 2000 Community Network Rospa0031 Danube Delta and Razelm Sinoe Complex	Crișan	Tulcea
	SC SINGAMA SRL	767 029.03	Stimulating Sustainable and Efficient Knowledge-based Aquaculture in Sovarca Fish Farm	Oancea	Galați
	SC GELMIN SRL	1 608 591.79	Conservation of Natural Heritage in Popina-Periprava Fish Farm - Part of the Natura 2000 Network - ROSPA 0031 Danube Delta and Razelm Sinoe Complex	CA Rosetti	Tulcea
	SC MON-AL SRL	2 394 856.88	Conservation of Natural Heritage in Tauc Fish Farm, Part of the Natura 2000 Community Network ROSPA 0031 Danube Delta and Razelm Sinoe Complex	Sarichioi	Tulcea
	SC ELDORADO SRL	6 775 132.29	Compensation for Biodiversity Conservation in Chilia I Fish Farm	Chilia veche	Tulcea
	SC DELTA FISH SRL	1 580 108.16	Aquaculture Providing Environmental Services in Babadag Fish Nursery	Crișan	Tulcea

	SC MASIVA SRL	534 172.49	Conservation of Natural Heritage in Chilia I-Chilia II Fish Farm - Part of the Natura 2000 Network - ROSPA 0031 Danube Delta and Razelm Sinoe Complex	Chilia veche	Tulcea
	SC GIP EST SRL	2 643 576.25	Aquaculture Providing Environmental Services in Chilia I-Fish Farm 4	Chilia Veche	Tulcea
	SC ECODELTA SA	1 227 948.21	Aquaculture Providing Environmental Services in Toprichioi Fish Farm	Babadag	Tulcea
	SC STUPINA SRL	705 058.32	Conservation of Natural Heritage in Lunca 3 Fish Farm, Part of Natura Network	Jurilovca	Tulcea
	SC FISH TOUR DELTA SRL	165 904.63	Conservation of Natural Heritage in Obretin II Fish Farm - part of Natura 2000 Network-Rospa 0031 Danube Delta and Razelm Sinoe Complex	Tulcea	Tulcea
	SC RABOLUS S.R.L.	3 699 456.19	Aquaculture Providing Environmental Services in Iortmac - Saharlale – Ceamurlia Fish Farm	Lipnita	Constanța
	SC VICKI POND S.R.L.	2 979 836.34	Compensation of Income Losses Caused by the Compliance with the Restrictions and Management Requirements Related to Natura 2000 Sites in 6 Martie 2 Fish Farm	Sălcioara	Tulcea
	SC HER & STRA CYPRINUS SRL	2 986 405.88	Compensation of the Income Losses Caused by the Natural Area Protected by Community Interest Regime of 6 Martie 1 Fish Farm	Jurilovca	Tulcea
Measure	**Beneficiary**	**Total project value (RON)**	**Project title**	**Locality where the project is implemented**	**County where the project is implemented**
Processing of Fishery and Aquaculture Products	SC ANGHILA IMPEX SRL	8 629 720.56	Fish and Fishery Products Processing Factory	Movila Miresii, Esna Village	Brăila
	SC BLACK SEA STURGEON SRL	2 184 112.61	Processing of Fishery Products at SC BLACK SEA STURGEON SRL	Sfântu Gheorghe	Tulcea
	SC ECO DANUBE SRL	1 921 629.69	Establishment of Fish and Fishery Products Processing Unit	Murighiol	Tulcea
	SC MIADMAR HDP SRL	4 607 805.06	Modernization of the Fish Processing Unit	Tulcea	Tulcea
	S.C. SAT VACANTA GURA PORTITEI S.R.L.	5 346 362.38	Establishment of Fish Processing Factory	Jurilovca	Tulcea

1.3.3. Turkey

1.3.3.1. Aquaculture investments in Turkey and the Black Sea

Turkey is a rich country by means of surrounding seas and inland waters sources hosting diverse fish species. Turkey has long coastlines (8333 km) and wide sea surface area (24 million ha), as well as 200 natural lakes, 822 dam and 507 small irrigation lakes (more than 1.4 million ha), 33 big rivers (177714 km in total length) (DSİ, 2019).

Total number of fish farms in Turkey is 2100 with the total capacity 486786 tons per year. Number of farms producing marine fish species are 426 with the capacity of 254430 tons while there are 1860 farms in inland waters with the total annual capacity of 232356 tons (BSGM, 2018). According to the 2018 data, total aquaculture production is 314537 tons where 209370 tons from marine and 105167 tons from inland aquaculture.

Total of 25175 tons were produced in the Black Sea provinces (8 %); of which 13257 tons in marine and 11918 tons in inland farms.

There are 20 marine fish hatcheries with an annual capacity of 815 million juveniles and 55 inland water hatcheries with a capacity of 541 million juveniles in Turkey. According to the records of the General Directorate of Fisheries and Aquaculture (GDFA), 5 of the 20 marine fish hatcheries run by private sector and produce only sea bream and/or sea bass. Other marine hatcheries produce fish species such as meagre (*Argyrosomus regius*), common dentex (*Dentex dentex*), turbot (*Psetta maxima*), red porgy (*Pagrus pagrus*), sharpsnout seabream (*Diplodus puntazzo*), brown meagre (*Sciaena umbra*), shi drum (*Umbrina cirrosa*), pink dentex (*Dentex gibbosus*), Red banded sea bream (*Pagrus auriga*), sand steenbras (*Lithognathus mormyrus*), axillary sea bream (*Pagellus acarne*), horse mackerel (*Trachurus trachurus*), grey mullet (*Mugil cephalus*) (BSGM, 2018).

Aquaculture in Turkey has developed rapidly over the years both in marine and inland area and reached to 209370 tons in sea and 105167 tons in inland waters, giving the total of 314537 tons as aquaculture production (Table 1.9).

Table 1.9. Fisheries production (tons) and values (TL) in Turkey

Years	Aquaculture Production						Capture Fisheries	
	Marine	%	Inland	%	TOTAL	Value	M +I*	Value
2000	35646	45.1	43385	54.9	79031	139 552 950	503345	367 840 650
2001	29730	44.2	37514	55.8	67244	173 890 600	527733	490 719 350
2002	26868	43.9	34297	56.1	61165	212 248 000	566582	630 759 100
2003	39726	49.7	40217	50.3	79943	415 575 800	507772	878 154 800
2004	49895	53.1	44115	46.9	94010	520 603 300	550482	1 120 965 400
2005	69673	58.9	48604	41.1	118277	704 283 000	426496	1 574 988 300
2006	72249	56.0	56694	44.0	128943	766 229 750	533048	1 706 983 300
2007	80840	57.8	59033	42.2	139873	839 762 500	632450	1 323 151 750
2008	85629	56.3	66557	43.7	152186	850 646 080	494124	1 097 178 400
2009	82481	52.0	76248	48.0	158729	952 935 500	464233	837 387 880
2010	88573	53.0	78568	47.0	167141	1 066 778 000	485939	1 078 515 200
2011	88344	46.8	100446	53.2	188790	1 270 028 140	514755	1 143 272 172
2012	100853	47.5	111557	52.5	212410	1 605 293 700	432442	1 209 028 426
2013	110375	47.3	123018	52.7	233393	1 704 471 151	374121	1 188 432 525
2014	126894	54.0	108239	46.0	235133	2 150 070 890	302212	1 099 738 850
2015	138879	57.8	101455	42.2	240334	2 569 208 590	431907	1 246 810 168
2016	151794	59.9	101601	40.1	253395	3 239 416 760	335318	1 340 901 947
2017	172492	62.4	104010	37.6	276502	4 049 199 270	354318	1 535 702 592
2018	209370	66.6	105167	33.4	314537	5 606 828 410	314094	1 852 664 426

(BSGM, 2018; TURKSTAT, 2018)(Marine+Inland)

This quantity is slightly over than the capture fisheries (314094 tons). The share of aquaculture production was 10% in the early 2000s, increased to 20%, 25%, 44% and 50% in 2005, 2010, 2017 and 2018, respectively; similar to trend of aquaculture in the world. While capture fisheries production has been fluctuated from year to year, aquaculture production has increased every year after 2002. Initially inland aquaculture in soil and concrete ponds had the largest share, then, due to advances in technology and farming methods, aquaculture in the seas became more dominant and production increased rapidly due to use of net cages which can be

installed in a short time, and allow production in large capacities. The share of production in the seas reached 66.6% in 2018.

Aquaculture is one of the main social and economic drivers in the Black Sea due to lack of industry, employment and commerce possibilities. Rivers discharging to the Black Sea and spring waters encouraged local citizens to be interested in trout farming since 1960's. Due to climate and topography of the region, entrepreneurs started trout farming even in small capacities up to 5 tons per year. Rivers born from highlands host endemic brown trout (*Salmo trutta*) and sea trout (*Salmo labrax*), which are popular in the region. When aquaculture developed in other regions of Turkey, the share of the Black Sea started to decrease due to small capacities and lower production even though the number of farms is higher. Figure 1.7 and Table 1.10 show the development of fish farming from 2000 to 2018.

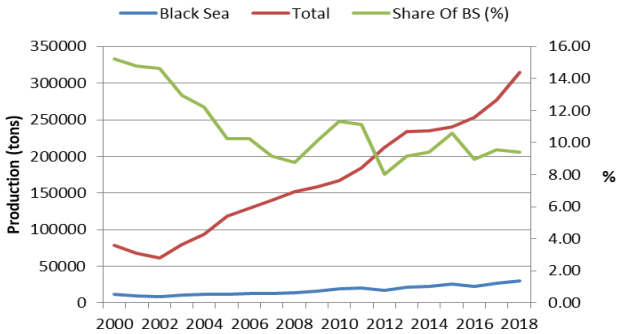


Figure 1.7 Total and Black Sea aquaculture production in Turkey

Table 1.10 Aquaculture production in the Black Sea (tons, %)

Years	Black Sea	Turkey Total	Share of BS *
2000	12030	79031	15.22
2001	9932	67244	14.77
2002	8944	61165	14.62
2003	10350	79943	12.95
2004	11465	94010	12.20
2005	12112	118277	10.24
2006	13233	128943	10.26
2007	12784	139873	9.14
2008	13370	152186	8.79
2009	16008	158729	10.09
2010	18905	167141	11.31
2011	20441	183790	11.12
2012	17063	212410	8.03
2013	21384	233394	9.16
2014	22069	235133	9.39
2015	25454	240334	10.59
2016	22754	253395	8.98
2017	26466	276502	9.57
2018	29586	314537	9.41

*As geographical region defined by TUIK

In 2000, the share of the aquculture production was 15% and gradually decreased to 9% in spite of the improvement of the aquaculture by cage culture in dams and sea. There is a higer increase in the production of farmed species all over the country.

Trabzon is one of the most important provinces by means of total aquaculture production with 5541 tons out of which 5155 tons comes from marine and 386 tons from inland farms. With such marine production, Trabzon is the top producer in the Black Sea (Table 1.11).

Table 1.11 Aquaculture production by selected provinces in the Black Sea

Province	Marine	Inland	Total
Kırklareli		152	152
Bartın		17	17
Sakarya		700	700
Düzce		92	92
Karabük		35	35
Kastamonu		105	105
Sinop	1506	11	1517
Samsun	3951	2715	6666
Ordu	2645	310	2955
Giresun		188	188
Trabzon	5155	386	5541
Rize		1098	1098
Artvin		3229	3229
Bayburt		870	870
Gümüşhane		2010	2010
TOTAL	13257	11918	25175
TURKEY	209370	105167	314537
%*	6.33	11.33	8.00

*Selected provinces from the Black Sea

Rainbow trout (*Oncorhynchus mykiss*) is the most important fish among other trout species due to fast growth rate and high resistance to handling in aquaculture processes. Total amount of production reached to 112427 tons in 2018. The amount of trout (*Salmo trutta*) production was 2070 tons in total (BSGM 2018). Sea bream and sea bass production have reached to 76680 tons and 116915 tons, respectively. Overall production of these two species has significantly increased in the last five years (Table 1.12).

While aquaculture investments and production increases, naturally, there was an increase in the number and capacities of the facilities. The number of farms has increased from 1245 in 2002 to 2326 in 2016. By 2019, the number of active farms is 2100 and 427 of it located at the Black sea coasts (Table 1.13). Majority of farms are family businesses and followed by the medium scaled ones owned by the SMEs.

The highest number of aquaculture enterprises in the Black Sea region is located in the provinces of Trabzon (72), Artvin (43), Rize (40), Tokat (37), Giresun (36) and Gümüşhane (36) (Table 1.3.14).

Rainbow Trout (*Oncorhynchus mykiss*)

Rainbow trout is the dominant species in fish farming in the Black Sea, The total number of farms raising Rainbow trout in the Black Sea region is 418. The highest capacity is 1800 tons (Table 1.15; 1.16). About half of the farms have capacities of less than 10 tons due to land and water limitation and they all are run by family enterprises. Some of them add value to their production by selling/serving in their fish restaurant.

Table 1.12 Aquaculture production by species in Turkey (Ton/year)

Fish species	2010	2011	2012	2013	2014	2015	2016	2017	2018
INLAND WATER									
Rainbow trout	78165	100239	111335	122873	107533	100411	99712	101761	103192
Trout (*S.trutta*)	-	-	-	-	450	755	1585	1944	1695
Common carp	403	207	222	146	157	206	196	233	212
Sturgeon	-	-	-	-	17	28	6	13	2
Tilapia	-	-	-	-	32	12	58	8	12
MARINE									
Rainbow trout	7079	7697	3234	5186	4812	6187	4643	4972	9235
Trout (*S.trutta*)	-	-	-	-	798	685	1073	980	375
Seabream	28157	32187	30743	35701	41873	51844	58254	61090	76680
Seabass	50796	47013	65512	67913	74653	75164	80847	99971	116915
Red porgy	-	-	-	-	106	143	225	20	2
The shi drum	-	-	-	-	39	61	20	125	30
Meagre	-	-	-	-	3281	2801	2463	697	1486
Dentex	-	-	-	-	113	132	43	51	24
Pink dentex	-	-	-	-	75	90	61	107	70
Atlantic Bluefin tuna	-	-	-	-	1136	1710	3834	3802	3571
Mussel	340	5	-	-	-	3	329	489	907
Others	2201	1442	1364	1575	58	102	46	239	129
TOTAL	**167141**	**188790**	**212410**	**233394**	**235133**	**240334**	**253395**	**276502**	**314537**

(BSGM. 2019; TURKSTAT. 2019)

Table 1.13 Fish farms and their capacities in the Black Sea in 2019

Capacity (tons)	# farms in Turkey	# farms in Black Sea	% of BS in total
<10	591	165	28
10-29	679	141	21
30-50	71	14	20
50-100	122	10	8
100-250	188	39	21
250-500	176	21	12
500-1000	185	29	16
1000-2000	63	8	13
2000-3000	24	0	0
3000-4000	1	0	0
TOTAL	**2100**	**427**	**20**

Black Sea salmon (Salmo labrax)

Total number of fish farms producing Black Sea trout is 22 and their capacities vary between 5 to 590 tons (Table 1.17).

Table 1.14. Number of fish farms and their capacities (tons) in the provinces located in the Black Sea Region

Provinces	< 10	10-29	30-50	50-100	100-250	250-500	500-1000	> 1000	Total
Amasya	3	0	0	0	0	0	0	0	3
Artvin	15	12	2	3	3	0	8	0	43
Bartın	5	0	0	0	0	0	0	0	5
Bayburt	2	7	1	0	1	1	0	0	12
Bolu	20	8	1	0	0	0	0	0	29
Düzce	18	2	2	0	0	0	0	0	22
Giresun	31	5	0	0	0	0	0	0	36
Gümüşhane	6	10	2	0	15	3	0	0	36
Karabük	0	4	0	0	0	0	0	0	4
Kastamonu	2	5	1	2	0	0	0	0	10
Zonguldak	4	1	0	0	0	0	0	0	5
Ordu	12	9	2	0	3	3	2	0	31
Rize	13	20	1	4	0	2	0	0	40
Samsun	8	4	2	0	4	5	13	0	36
Sinop	0	2	0	0	0	0	2	2	6
Tokat	7	16	0	0	6	7	1	0	37
Trabzon	19	36	0	1	7	0	3	6	72
TOTAL (N)	**165**	**141**	**14**	**10**	**39**	**21**	**29**	**8**	**427**
TOTAL (%)	**38.64**	**33.02**	**3.28**	**2.34**	**9.13**	**4.92**	**6.79**	**1.87**	**100**

Table 1.15. Fish farms cultivating Rainbow trout and their capacities

Capacity (ton)	N
<10	210
10-29	98
30-50	12
50-100	12
100-250	40
250-500	28
500-1000	14
>1000	4
TOTAL	**418**

Sea bass

The capacity of sea bass aquaculture farms is between 100 tons and 1667 tons and the total number of enterprises is 22 in the Black Sea, Trials with sea bream were not successful due to lower sea water temperatures comparing with the Aegean Sea, More attention was given to sea bass to cover the demands from the region(Table 1.18).

Others

There are one sturgeon, 2 mussel, 3 mirror carp and 1 sea bream producer farms in the Black Sea (Table 1.19).

Table 1.16 Bigger enterprises (SMEs) farming rainbow trout in net cages in the Black Sea Region

Owner/Company	Location	Capacity (tons)
VADİ Aquaculture, R&D, Tourism & Feed Industry Limited	TRABZON	1800
OMEGA 61 Aquaculture Limited	TRABZON	1600
KARSOM Aquaculture and Trading Ltd	TRABZON	1500
YAKAMOZ Aquaculture Limited	TRABZON	1500
YOMRA Aquaculture Limited	TRABZON	1000
KUZEY Aquaculture Limited	SAMSUN	960
SAMSUN Fisheries and Aquaculture Ltd	SAMSUN	950
SAGUN Aquaculture Inc,	SİNOP	950
Black Sea Trout Aquaculture, Marketing & Int, Trade Ltd	TRABZON	950
LADİK AKDAĞ Aquaculture Limited	SAMSUN	922
AYHAN ÇAKIR Aquaculture Limited	SAMSUN	900
MUHAMMET ALİ AKYAZ Aquaculture Ltd	TRABZON	800
OMEGA 61 Aquaculture Limited	TRABZON	800
KIYAK BROTHERS Aquaculture & Int, Trade Ltd	SAMSUN	700
SAMSUN Fisheries and Aquaculture Ltd	SAMSUN	700
KIZILIRMAK Fisheries Ltd	SİNOP	666
DOĞU KARADENİZ Aquaculture and Trading Inc,	TRABZON	600
ARDE - SOM Fisheries and Aquaculture, Marketing & Trading Inc,	ARTVİN	500
LAZONA Marine Fisheries Limited	ARTVİN	500

Table 1.17 Number of Black Sea salmon farms and their capacities (tons)

Owner/ Company	Location	Environment	Capacity
DOĞU KARADENİZ Aquaculture Inc,	TRABZON	Net cages	590
KUZUOĞLU Aquaculture and Trade Limited	ARTVİN	Net cages	500
GÜMÜŞ Aquaculture Ltd	ARTVİN	Net cages	500
YOMRA Aquaculture Ltd	TRABZON	Net cages	500
İBRAHİM BİBEROĞLU	ARTVİN	Net cages	250
TANER YILDIRIM	GÜMÜŞHANE	Net cages	250
ABU Aquaculture Limited	RİZE	Concrete ponds	250
ŞEMSETTİN KELEŞ	GÜMÜŞHANE	Net cages	240
DEVRİM ALTINTAŞ	GÜMÜŞHANE	Net cages	200
ARDE-SOM Aquaculture, Marketing & Trading Inc,	RİZE	Concrete ponds	150
ARSLAN ALTINTAŞ	GÜMÜŞHANE	Net cages	140
ŞEMSETTİN KELEŞ	GÜMÜŞHANE	Net cages	100
ŞEMSETTİN KELEŞ	GÜMÜŞHANE	Net cages	100
MUHAMMET KURU	RİZE	Concrete ponds	15
AHMET ÇOLAK	RİZE	Concrete ponds	14
OFİS Food Inc.	RİZE	Concrete ponds	14
İBRAHİM ÇAVUŞOĞLU	RİZE	Concrete ponds	11
MİSİNA Fisheries Limited	RİZE	Concrete ponds	10
TURGE Limited	RİZE	Concrete ponds	10
SELİM KURU	RİZE	Concrete ponds	9
FATİH KİBAR	TRABZON	Concrete ponds	6
YÜKSEL BİLİR	ARTVİN	Concrete ponds	5

Table 1.18 Sea bass producer companies in the Black Sea

Owner/Company	Location	Environment	Capacity (tons)
Kizilirmak Fisheries Ltd	SİNOP	Net cages	1667
Kizilirmak Fisheries Ltd	SAMSUN	Net cages	709
Doğu Karadeniz Aquaculture & Trade Inc,	TRABZON	Net cages	600
Kizilirmak Fisheries Ltd	SAMSUN	Net cages	591
Kizilirmak Fisheries Ltd	SAMSUN	Net cages	532
Noordzee Fisheries and Export Inc,	SAMSUN	Net cages	450
Samsun Fisheries and Trade Inc,	SAMSUN	Net cages	450
Altaş Aquaculture Inc	ORDU	Net cages	400
Karsom Fisheries Ltd	TRABZON	Net cages	300
Yakamoz Aquaculture Ltd	TRABZON	Net cages	300
Altaş Inc,	ORDU	Net cages	250
Kiyak Kardeşler Aquaculture Ltd	SAMSUN	Net cages	250
Samsun Fisheries Ltd	SAMSUN	Net cages	250
Yomra Aquaculture Ltd	TRABZON	Net cages	250
Marnero Aquaculture and Export Inc,	ORDU	Net cages	249
Lazona Seafood and Turism Ltd	ORDU	Net cages	225
Vadi Aquaculture, R&D and Feed Ltd	TRABZON	Net cages	200
Vona Fisheries Ltd	ORDU	Net cages	175
Muhammet Ali Akyaz	TRABZON	Net cages	150
Omega 61 Fisheries Ltd	TRABZON	Net cages	150
Özbek Fisheries Ltd	ORDU	Net cages	100
Omega 61 Fisheries Ltd	TRABZON	Net cages	100

Table 1.19 Sturgeon, mussel, mirror carp and sea bream farms and their capacities in the Black Sea

Owner/Company	Location	Environment	Species	Capacity (tons)
Mavi Damla Fisheries Ltd	KARABÜK	Concrete pond	Sturgeon	15
Rüstem Mert	GIRESUN	Concrete pond	Mussel	12
Ali Aktürk	TRABZON	Concrete pond	Mussel	4
Burhan Yilmaz	SAMSUN	Soil pond	Common carp	30
Fikri Saygılı	SAMSUN	Small dam	Common carp	10
İsmail Atmaca	SAMSUN	Soil pond	Common carp	29
Kizilirmak Fisheries Ltd	SAMSUN	Net cages	Sea bream	148

Companies were obliged to establish hatcheries and all of the marine farms have to provide all fry/juveniles from those hatcheries established. In addition, in order to compete with other countries, Turkey has increased supply to cover the demand from consumers and export.

The culture of new species has been emphasized and commercial production of many species such as sturgeon, turbot, red porgy, common dentex, white grouper, sharp snout sea bream, shi drum, brown meagre, white sea bream, sand steenbras, meagre, horse mackerel, tuna, grey mullet, pink dentex, carp species, catfish, mangar, African catfish, tilapia, Mediterranean mussel, crayfish, shrimp, leech, frog, snail, Black Sea trout, red-spotted trout have been started with the support of R&D studies. Projects and trials are carried out in the hatcheries of the Ministry and the private sector for the introduction of new species into aquaculture business. One of the good examples is the turbot culture project which was jointly carried out by the Ministry of Agriculture and Forestry and Japanese International Cooperation Agency (JICA). Although the project

finished, hatchery and on-growing units have been still running to supply small turbots to the investors and some bigger ones used for the enhancement of the Black Sea to restore the overfished turbot stocks.

Another important fish species is the Bluefin tuna (*Thunnus thynnus* L), fattened in marine cages in the southern Aegean Sea. According to the quota allocated by ICCAT[3] the fish is caught from nature and fed in net cages from May to mid-autumn. There are currently 6 fattening farms in the Mediterranean where tuna fish is fed in net cages.

The project "Horse mackerel (*Trachurus mediterraneus*) Farming" supported by TAGEM[4] was carried out between 2010 and 2013. It has been observed that horse mackerel fish can be collected from nature and transferred to the cage environment and will not have any difficulty in feed intake. According to this result, it is determined that horse mackerel fish can be grown as fattening (Başçınar et al., 2013).

Technological advances, combined with governmental strategy, and scientific know–how, has facilitated an increase in national aquaculture production in recent decades. The rapid growth of the aquaculture sector has made Turkey the leading producer in the Mediterranean Sea. Currently, Turkey produces large quantities of European sea bass, gilthead sea bream, and rainbow trout. Turkish production extends also to the Black Sea, where sea-raised trout and European sea bass are cultivated. One of the typical characteristics of aquaculture in Turkey is that it is mostly based on intensive aquaculture and new investments are increasing year by year in the Black Sea.

Due to risky character of the business, active work power is very essential in order to be able to apply daily routines for feeding, monitoring ponds, net cages, outdoor on-growing tanks, indoor nursery tanks and incubators, to clean up and remove the dead ones, regular temperature check, water flow, any failures of water intake and electricity cuts.

Another comparison can be made on the capacities; 70 % of the farms have capacities lover than 50 tons in the Black Sea, majority produce rainbow trout in concrete tanks. In recent years the capacity of new farms established in dam reservoirs and sea has increased enourmously due to farming in net cages. A few small ones are specifically working as a hatchery instead of producing fish for markets. There is a big demand for fry from the marine and inland farms using net cages.

1.3.3.2. Fish Species in Aquaculture

Although the number of fish species used in aquaculture business is about 20 in Turkey, the farms in the Black Sea produce only rainbow trout, brown trout, sea trout and sea bass on commercial scale.

Sea bass (*Dicentrarchus labrax*)

Sea bass is valuable fish species of economic importance in Turkey as well as in other Mediterranean countries, having a great marketability across the world. The stocks in the nature have decreased due to overfishing and environmental pollution. Research studies were started on reproduction, larval feeding and growth after 1985 In Turkey. It is carnivorous and prefers to live in shallow waters where prey fish is abundant. Lagoons and river mouths are the other habitats preferred by sea bass. After late spring, it migrates to the coastal waters and lagoons for reproduction.

Sea bass is eurythermal and euryhaline fish. Optimum growth temperature is 22-24ºC, the growth stops at 7-10ºC, prefers 13-15ºC water temperature during spawning period. They are also very tolerant to salinity changes. They can survive waters between 3-35‰ salinity.

[3] The International Commission for the Conservation of Atlantic Tunas is an inter-governmental fishery organization responsible for the conservation of tunas and tuna-like species in the Atlantic Ocean and its adjacent seas.
[4] DG Agricultural Research and Policies, Ministry of Agriculture and Forestry

Sea bass has a long life. They can reach a weight of 15 kg (1.5-6.0 kg on average) and 1 m total length (0.5 m on average). It was found that males grow slower than females. In temperate seas, the growth in the first age group is quite fast and reaches a weight of 250-350 g.

In the Mediterranean and Aegean Seas, males reach sexual maturity at 2-3 years and 25-30 cm in length while females start reproduction at 3-5 years old and 30-40 cm in length.

Eggs are 1.0-1.4 mm (mean 1.15-1.16 mm) in size, spherical and pelagic. The diameter of the oil drop is 0.33 - 0.36 mm. Its fecundity is around 300000 eggs per kg live weight. Eggs hatch in 4-5 days. The first larval length is about 3 mm. Larvae, which consume their food sacs within three days, start to feed on zooplankton.

Rainbow trout (*Oncorhyncus mykiss*)

Rainbow trout is native to Pacific region of North America, particularly Mc-Cloud-River, one of California's mountainous rivers. This species was transferred to other parts of North America and, after 1880, was taken to Europe and then to other countries. This enhancement was initially carried out with the aim of enriching the fauna and then selection studies were carried out in order to obtain forms which grow fast and easy to obtain eggs by artificial fertilization.

As a result of cultivation and intensive selection, different varieties with different colors were obtained but it always keeps its characteristic rainbow coloration. The male rainbow trout is darker in color. In the reproductive period and especially in elderly individuals, a hook-shaped lower jaw is observed.

They reach sexual maturity at 2-3 years. They live in nature for 5 or 6 years, but in exceptional cases have lived 18 years or more. It is generally between 1 and 5 kg, with a maximum weight of 24 kg and a length of 120 cm. Reproduction usually takes place between November and February. Egg yield varies between 1500-3000 pieces per 1 kg live weight and the suitable water temperature for spawning is 7-1°C. Egg size is 4-6 mm. The length of the larvae after hatching is 12-15 mm. Larvae, which consume yolk sac in 2-3 weeks, reach up to 25-30 mm in length. Salinity resistance of trout increases as fish grows, so rainbow trout culture is possible at seawater concentration.

The Black Sea trout (Salmo labrax)

The Black Sea trout is a member of the Salmonidae family and can be distinguished from other subspecies by the presence of a distinct black spot on the gill cover, the presence of irregular black spots on their bodies and the presence of distinct white rings around the red spots.

They spend most of their lives in the sea, where they grow and thrive. They migrate to freshwaters during reproduction periods. They can reach up to 100 cm in length and weight up to 26 kg in the Black Sea. The characteristic feature is that the parents return to the waters where they lay eggs. Because of their reproductive characteristics, these ecotypes migrate between sea and fresh water. In the autumn months, they enter the fresh water flowing into the Black Sea and lay their eggs in the nests they open between the sand and gravel. Hatchlings stay in fresh water for a year and then migrate to the sea. They lay their eggs on a suitable ground at a depth of 20-25 cm.

Fecundity varies between 1500-2000 eggs per kg live weight and the suitable water temperature for spawning is 8-10°C. Egg size is 5-6 mm. The length of larvae hatching is 13-15 mm. The larvae consume their food sacs in 3-4 weeks and reach up to 25-30 mm.

It has been farmed for food in the last 20 years and there is also the production of fry for enhancement of natural stocks.

1.3.3.3. Practices/System of culture

According to the practices in the aquaculture business in the Black Sea, there are two types of farming system in case of Rainbow trout;

Farming for portion fish (about 150-250 g): fish from the hatchery of the farm or supplied from other hatcheries is fed till reaching the market size in concrete ponds.

Farming in dam and marine cages (over 1200 g): Juveniles of 2-3 g in weight are transferred from the hatcheries to the cages in dams in April- June. They are fed and kept in dam cages till 150 to 250 gr for live sales to the consumers or transferred to the marine cages in September -December. If the fish is kept in dam cages it can reach the weight of 1-1.5 kg in the following year and is transferred to marine cages in September -December. Small sized trout reach 1 to 1.5 kg and are sold to fish markets from March to June according to the demand. Big sized ones are fed in marine cages and harvested at 3-5 kg in May-June and are especially sent to the processing plants to be gutted and cleaned, deep frozen for the export.

The new policy of Turkey is to export big sized trout under the brand name “Turkish Salmon” or “Black Sea Salmon”. Due to feed with carotene additives, the color and taste of fish is similar to the Norwegian Salmon, therefore there is an increasing demand from foreign markets.

Unfortunately, the exports are stopped due to Covid-19 pandemics and farmers try to harvest majority of fish to keep frozen for the future opening of the trade possibilities. At present big supermarkets like Migros, Makro Centers and Carefour organize campaigns to sell this valuable fish to the consumers.

In case of *Salmo trutta* culture, fish farms in inland are hatching and on-growing this fish till it reaches the same size as of the rainbow trout, and apply the similar procedures as to transfer them to the cages in dam and sea. But the growth rate is lower than the rainbow trout and is marketed at maximum 700 -800 g in size.

There is no sea bass hatchery in the Black Sea, therefore juveniles are supplied from the hatcheries located in the Aegean Region at the size of 2-3 g and transported in oxygenated tanks by trucks in May. Main sea bass cage farms are established in Persembe Bay, Ordu Province. Sea bass are grown up till 350-450 g portion size and marketed all year long.

About half of the farms have capacities less than 10 tons due to land and water limitation and they all are run as family enterprises. Some of them add value to their production by selling/serving in their fish restaurant.

The types of fish farms in the Black Sea can be classified as:

Small businesses with several concrete ponds, water intake from river, spring or both, buy juveniles and feed to grow them. Main species is trout and marketed at 180-220 g (average 200 g, portion size).

Farms having hatcheries and concrete on-growing ponds, cover their fry needs, if production is high, sell the excess to the other farmers.

The main characteristics of these 2 are that they mostly use their own lands to establish farms, or rent the land from the government.

Inland farming in net cages is mainly carried out in dam reservoirs and natural lakes, cages made from different material (wooden, PE, PEE) in different shapes (square, rectangular, circle) and in different dimensions (2x2 to 5x5 wooden, 10-30 m Ø circle),

Marine farming in net cages is aimed to produce big sized fish, with mechanized feeding system, good for intensive fish densities, capacities calculated for the last harvesting target, up to 100 tons of fish in circular offshore type cages, 20-50 m Ø, and strong mooring system.

The last 2 systems need logistic support: stores in the nearest port, support ships to carry feeds with the feed pump onboard, to pull in or out cages to/from port for loading small fish and to be used in harvesting operations, employing skillful trained staff. Also they need to have trucks with oxygenated tanks onboard to transfer fish from/to cages.

In the other regions, there are fish farms using earthen ponds to produce carp and shrimp in various dimensions which they are called semi intensive fish farms. On the other hand there are several intensive culture farms with closed system that use recirculated water, fully controlled temperature, lighting, feeding and water renewal in different life stages of the fish. Also the latter and the hatcheries producing marine species other than trout should have phytoplankton and zooplankton, artemia and rotifer production units for the essential feeding of the larvae after the consumption of yolk sac. Therefore such investments could be made only by big companies (5 private) and by the hatcheries operated by the government.

In order to produce Mediterranean mussel in aquaculture business, different type of investment is needed. It is rather simple comparing the fish farms; basic need is the allocation of sea area according to the capacity foreseen in the project prepared. There are several systems for mussel culture. The basic one is the raft and rope system. After collection of spats from nature on ropes, they are transferred to the other ropes hanged where they were grown up. The main requirement is the rarefaction of the ropes as the mussels grown up.

1.3.3.4. Human Resource

In aquaculture business there are several types of staff working at various farming stages. By 2018, 10500 workers are employed in aquaculture business. These staff can be classified as:

- Service workers (feeding, cleaning, nursery),
- Technicians (electricity, mechanics, fisheries),
- Engineers (Fisheries, Food, Agriculture),
- Veterinaries (fish diseases and vaccines),
- Biologists (live food production, genetic studies),
- Divers (cage maintenance, net changing, fish harvesting, monitoring).

Number of staff is closely related of the capacity of the farms. Due to fact that the majority of farms have the capacity lower than 50 tons per year, farms are mostly family businesses, employ 1-2 workers and some have small restaurant facility.

Minimum staff employment obligation is determined by the MAF (Aquaculture Regulation) in order to safeguard of the aquaculture business. Main source of the engineers, biologists and veterinaries are the university graduates which are over the potential labor need. At the beginning of the development period in 1970's only the workers and technicians were seen sufficient to produce fish with the consultant support. But, nowadays, graduates who have secondary and tertiary degree, especially on genetics, molecular biology, fish physiology, nutrition, reproductive biology and farm management are employed.

1.3.4. Ukraine

Aquaculture is a major component of the fisheries and agro-industrial sectors. Aquaculture production is a strategic resource of the State, as a source of high quality production mainly at the places of its consumption, which does not require high costs for its transportation (in comparison with the sea and ocean). In the current conditions of sharp reduction of ocean catch and critically depressed state of inland water bodies, the actualization of the aquaculture segment in Ukraine objectively becomes a sign of an alternative strategic vector of development of the fisheries sector. However, with its rich natural resource potential for large-scale development of fisheries, the state loses these advantages due to the lack of necessary institutional conditions. Thus, according to the State Agency for Fisheries, out of 250 thousand hectares of aquaculture

suitable for aquaculture, only half are involved in modern conditions. Of these, 60% are inefficiently used and therefore have low fish productivity.

In the activity of the fishery complex of Ukraine of the Soviet period, a significant shift towards marine and ocean fisheries was planned at the expense of the development of its own resource base of natural and artificial inland water bodies. As noted above, fisheries in extraterritorial waters accounted for up to 74% of the total catch of fish, in the fishing zone of Ukraine (in the Azov-Black Sea basin) - up to 16%, the share of aquaculture production varied within 7-12%, and fisheries in inland waters accounted for only 3% of total production.

The Odessa region is part of the Primorsky region of Ukraine, which owns a large stock of fishery reservoirs (lakes, reservoirs, sea estuaries, estuaries of large rivers Danube, Dniester, Dnipro) and is the main fishing region. The main fish processing facilities are located here, as well as scientific and educational institutions of the fishing industry. The enterprises of the coastal region produce more than 90% of the total volume of fish and seafood produced by Ukrainian enterprises. This region of Ukraine in the last 10 years provides from 42.5% to 30.9% of the total fish catch in inland waters of Ukraine.

Oceanic fish (mackerel, sardines, horse mackerel, cod) and seafood (crustaceans, molluscs, etc.) harvested in the 200-mile coastal waters of other countries are the major part of the ocean catches of enterprises in the region.

1.3.4.1. Resource potential

The resource potential of the fishery food subcomplex of Odessa region is the largest in Ukraine. The specificity of the region is the presence of large inland reservoirs - coastal lakes and estuaries, two of which are the largest lakes in Ukraine. Most of the reservoirs of Odessa region - ponds, reservoirs, lakes, estuaries, reservoirs-coolers of power plants, special gardens and swimming pools are suitable for fishery use. The fishery reservoirs of the area in which industrial fishing of aquatic living resources (VZR) is carried out, includes 16 inland water bodies (lakes, estuaries, reservoirs and floodplains) with a total area of 175.6 thousand hectares (Table. 1.20), below the rivers. The Danube and the Dniester, as well as about 5500 km^2 of the high-productivity water area of the northwestern Black Sea.

Official data on the number of reservoirs in the Odessa region indicate the presence of 1010 ponds and small reservoirs with a total area of 14300 hectares, most of which (up to 50%) are unfit for fishery use. Table 1.21 shows the results of the inventory conducted by specialists of the Western Black Sea Fisheries Protection Department, which showed that the total area of the ponds currently used or can be used for fisheries needs is approximately 9.9 thousand hectares. This fund includes 211 ponds and small reservoirs, located in the basins of small rivers and, as a rule; they are of a complex purpose: fish breeding, irrigation, livestock breeding, and population resting places. These reservoirs are rented out by local authorities. Also, 7 pond fisheries have been built in the region, where the area of feed ponds for the production of commercial fish is 2 thousand hectares, and the ponds for the cultivation of fish planting material - almost 1 thousand hectares. Three pond farms have the status of state breeding nurseries under the authority of the State Fisheries Agency.

Thus, aquaculture activity in the Odessa region is carried out today on reservoirs with an area of 12.9 thousand hectares, which is 7.6% of the total fishery fund of region`s reservoirs. There is an adequate reserve of reservoirs, the use of which has not yet been translated into the channel, lease relations. Among them are 42 reservoirs of local importance, with a total area of water mirror of about 2 thousand hectares, which is almost 58% of the real number of water bodies of local importance. The ratio of fishery uses of reservoirs in the region is presented in Table 1.22.

Table 1.20. The largest fisheries in the Odessa region

Water basin	Area ha
Lake Cahul	8 200-9 300, 9 000
Lake Cartal	1 400
Lake Kuhurlui	8 200, 9 400
Lake Yalpug	14 900
Lake Catlabug (SCF)	6 000
Lake Saf`yany (SCF)	400
Lake Cytai (SCF)	5 000
Lake Sasyk	20 500
Tuzlovski floodplains	20 000
Shabolatsky estuary	3 000
Dniestrovskyi estuary	36 000
Hajibeyskyi estuary	7 000
Tiligulskyi estuary	15 000-17 000

Table 1.21. Structure of use of the fishery reservoirs fund in Odesa region

Water basin	Area		The dominant species of fish
	1000 ha	%	
Inland reservoirs in which fishing is carried out under quotas	83,5	49	carp; herbivorous[5]; pelengas; sturgeons
Natural reservoirs with the introduction of SCF	74,9	44	carp; herbivorous; crucian; pelengas
Inland reservoirs (ponds, reservoirs) for rent	9,9	5,8	carp; herbivorous
Pond farms built on projects (in-house)	2,0	1,2	carp; herbivorous

Artificially created riverbeds include reservoirs with status of both national and local importance. The rates are either rented or under the SCF regime, or combine a lease relationship with the SCF regime. The SCF modes are set for 7-10 years. Aquaculture enterprises are mainly in the form of LLC (Limited Liability Company) and CJSC (Closed Joint Stock Company).

The finding of the availability of reservoirs in the area of suitable fisheries is not representative and sufficient in terms of transparency and efficiency of regional management of this sector. According to experts of the industry, at present all suitable water bodies are actually used, but with different degree of legalization of this business in accordance with the basic law. The use is carried out arbitrarily or on the basis of previously concluded leases of land under water. The new aquaculture requirements require that such agreements be brought into line with the basic law, but this process is poorly motivating for tenants and is not accompanied by a clear mechanism for implementation. As a result, regional authorities and regional fisheries management authorities do not have reliable information regarding the number, forms of organization and ownership of aquaculture enterprises, production productivity, etc.

The fishery use of water bodies of Odessa region is characterized by the following directions:

- aquaculture directly;
- reservoirs in the mode of special commercial fisheries of SCF;

[5] Silver carp, carp and white cupid

- special use of aquatic bioresources under established limits and quotas (Black Sea, Danube River, Dniester estuary and lower Dniester, marine estuaries of the northwestern Black Sea and Kuchurgan reservoir).

Odessa region has a powerful fishery complex with developed infrastructure, which includes the Black Sea seaport, 6 fish processing plants and factories, fish processing plants, 104 fishing enterprises belonging to different forms of ownership, 5 large pond fisheries (with a total area of 5 ponds - 5,5 ponds thousand ha), 7 fish farms, four of which have breeding status. The enterprises of fishery complex (FC) are unevenly located on the territory of the region according to the geographical location of the water lands. All fish and fish processing companies, as well as ponds, are located in nine southern regions of the region - Reni, Bolgrad, Izmail, Kili, Tatarbunar, Belgorod Dnestrovsky, Bilyaev, Ovidiopol and Kominternovsky (Table 1.22).

Table 1.22 Dynamics of fishing in Ukraine [6]

The name of the water body	Approved catch limit t / year			Actual catch, t / year		
	2014	**2015**	**2016**	**2014**	**2015**	**2016**
Black sea with bays	*	*	*	2976	3431,0	**3662,9**
River Danube	*	*	*	245,7	241,1	**477,1**
Lake Cahul - Kartal	1152	1151,5	1151,5	527,554	824,86	**906,367**
Lake Yalpug-Kugurlui	1181	1181	1181	869,512	895	**901,5**
Stentivska floodplain		*	*	0	0	**0**
Lake Kotlobukh	348	388	348	195,023	222	**246,374**
Lake Cytai	238	233	238	123,438	189,21	**148,98**
Lake Sasyk	1257	1286,5	1257	836,523	248,44	**431,7841**
Dniester estuary and the lower reaches of the Dniester river with lakes	*	*	*	576,6	854,1	**1551,0**
Kuchurgan reservoir	*	*	*	6,4	7,7	**18,83**
The Hajibeysky estuary	1030	1281	1030	883,401	421,01	**1005,12**
Tuzlov group of estuaries	*	*	*	5,9	0	**0**
Shabolshatsky estuary	*	*	*	21,12	37,85	**89,414**
Grigoryevsky estuary		*	*		0	**0**
Kuyalnytsky estuary	*	*	*	0	0	**0**
Dauphinsky estuary	60,5	60,5	60,5	10,763	7,41	**1,5**
Tiligulskyi estuary	*	*	*	395,2	773,0	**0**
Kohanivsky pond No1			20			**0**
The reservoir of Zapalisia			112			**0,25**
Perelit·s'ke reservoir			39,12			**0**
Total by area				**7673,4**	**7654,68**	

* - the limit is determined by individual fish species or species are not limited, according to the Office of the State Fisheries Agency in Odessa region (letter from 09.06.2017 No567)

The imbalance of development of FC of Odessa region is manifested in the paradoxical increase in the number of personnel of the main production against the background of the decrease of production capacity.

Aquaculture opens wide prospects for the development of fishery complex in Odessa region. Its formation and development here is facilitated by a whole gamut of natural conditions: a huge area of shallow shelf ACB, rich feed base; Danube and Dniester rivers with deltaic systems; small rivers, lakes, estuaries, reservoirs, ponds;

[6] https://menr.gov.ua/files/docs/eco_passport/Одеська область 2016_r_k.pdf

large number of warm sunny days per year, developed agriculture. The coastal sea waters of the Odessa region have favorable conditions for the cultivation of shellfish (mussels, oysters), the industrial cultivation of which does not require the cost of artificial feed. From one raft with an area of 16x25 m, from which 600 ten-meter collectors are hung, it is possible to obtain more than 4 tons of oyster meat per year. At the same time, since the life of molluscs is related to the filtration of water, they purify water and improve the quality of the aquatic environment. The filtration rate of large healthy oysters can reach 450 liters of water per day.

Organization of mariculture production of mussels and oysters in the coastal regions of Odessa region is constrained by lack of funds, poor coordination of work between organizations, lack of long-term concept of development of mariculture.

At present, in the Azov-Black Sea basin, and in particular in the Odessa region, there is a discrepancy between the production (fish-producing and fish-processing) capacities existing in the region and the state of stocks of the main industrial facilities, especially in the areas of traditional coastal fishing. In this regard, it is advisable to build complex fish farms to increase the population of mullet and flounder fish with a total capacity of up to 300 million units / year of viable rejuvenation.

Of particular importance for the coastal regions of Ukraine is the problem of reproduction of sturgeon in the Azov and Black Seas. The capacity of the country's sturgeon factories and fish farms is around 8 million units. Recharge, and in 2010 their required capacity should be at least 35 million units. Sturgeon rejuvenation is promising in the basin and also the construction of complexes for cultivation, production and processing of seaweed and grasses.

Over the last two decades in the commercial fisheries of Ukraine and the Odessa region there has been a decline (more than 70%) of the volume of cultivation and fishing of commercial fish. This is due to the large reduction (more than 10 times or about 90%) of the use of artificial fish feeds due to their high cost, high tax burden, poor crediting in seasonal conditions and a two-year production cycle. According to the current regulatory documents, a part of a fish that has not reached the marketable status is considered as work in progress until its transfer to the finished product category. The most important components of work in progress are fish planting material, this year and two years.

The region has a developed pond network, but pond fish production is declining annually. The main reasons for the decline in pond fisheries are the increase in the cost of feed, electricity and fuel, as well as payments for water use, with a slight increase in prices for pond fish.

Ignorance the integrity of natural ecosystems leads to direct and indirect damage. The fishing of the Danube lakes was a compulsory measure to compensate for the consequences of harmful projects. The Institute of Hydrobiology of the Academy of Sciences of Ukraine has developed a program, the implementation of which provided for the periodic water exchange of the Danube lakes and their fishing with carp and silver carp. This also applies to recent actions - the implementation of a canal transport project at the mouth of the Bystre (spawning place of 95% of the Danube herring) adversely affects the fishing potential of the Danube.

The current level of inland farming is far behind not only the scientifically sound volumes, but also the planned indicators. There are 11 fish farms on the territory of the region with 1500 hectares of cultivation ponds and 11 hatching shops with a design capacity of up to 700 million larvae. Four farms have breeding status and carry out breeding of white and mottled silver carp, Ukrainian scallop carp, white carp and paddlefish. In addition, there are 937 water bodies (lakes, reservoirs, ponds) in the region, which can be used for fish production. The large coastline of the Ukrainian coast allows the development of marine aquaculture, which is the basis for many years of research in a number of scientific institutions.

It should be noted that in Ukraine there is a fairly rich experience of fisheries, formed in the Soviet times, the analysis and systematization of which can compare the main types of aquaculture with the types of water bodies and forms of economic activity on them.

Aquaculture activities are characterized by high environmental risks that are associated with the impact on the status of water bodies and land of the water stock, the risk of genetic contamination and the genetic degradation of natural fish species. Another important fact is that some of the water bodies in Ukraine are transboundary, which imposes additional requirements on aquaculture enterprises. In this regard, the organization of veterinary control and environmental safety is of particular relevance.

The current crisis socio-economic situation in Ukraine significantly corrects pre-crisis regional management and requires active search and offering to local authorities a set of effective management, economic, organizational and other mechanisms for creating effective regional economies on the principles of decentralization of management. Aquaculture as a sector of economy has serious resource preconditions to get into the mainstream of regional development of Odessa region.

In the Odessa region 90 industrial users are engaged in industrial catching, which use 838 units vessels and 21,000 fishing gear. Specialty commercial fisheries use 11 water bodies with a total area of 74 803 ha, use 178 vessels for 5581 fishing gears. For aquaculture, 38 reservoirs (31 ponds and 7 reservoirs) are used with a total area of 4021.1 ha and a potential cultivation capacity of 3000 tons (Table 1.23., 1.24).

Table 1.23. Industrial fishing in Odesa region

Water object	List of enterprises	Catch volume (t)
Black Sea	SE "Experimental Cephalic Fishery", ISTC "ISTR", MSB "Albina", MSB "Korsar", MSB "Kunashir", PE "VKF Maiaki-2007", PE "Danube", PE "Kalkan", PE "Olymp", South Bessarabia LLC, PE Tiligul, PE Tiligul Plus, PE Jaguar-2005, LLC Sargan, PSC Piskar, AC KRAP Zarya 2, Mercury Aqua LLC, LLC Bora, Vidrodjennia LLC, Red Fisherman LLC, Poseidon LLC, Prydunavie LLC, Brikk Private Company, Kholod-Service LLC, Liman Firm LLC, IE Dunaenko O.A., IE Kedrovsky V.D., IE Morgun O.V., IE Kharkovsky S.V., LLC Terraport, LLC Southern coasts, LLC Ozerne-2012, LLC Krystal Pivden', Zarya, LLC Welk, LLC Ribcomflot-2.	1503,06
Danube river	SE Corsair, SE Kunashir, PE Danube, PE Equator, PE Olymp, PSC Piskar, FC Novonekrasovsky, AC Danube Field, LLC Vilkovskiy Fishery Plant, LLC Odessa sturgeon complex", LLC "Southern Bessarabia", LLC "Pridunavie", LLC "Krystal Pivden'", AC "Orchid", LLC "Soyuzugprom", IE Semenenko V.M., IE Morgun O.V., IE Shevcheneo G.P., ISTC "ISTR", LLC "Southern Shores", LLC "Terraport", LLC "Ozerne-2012"	165,66
Lower Dniester River with lakes and Dniester estuary	Mercury Aqua LLC, Experimental Cephalic Fish Breeding Company, VKF Beacons 2007, PE Chernomorets O.V., PE Dniester, PE Kalkan, Jaguar 2005, Pridnestrovets RS, AC "KRAP Zarya-2", KRAP "Zarya", LLC "Red fisherman", PE "Fishing Enterprise Resolving", PE "Brick", LLC "Triton", PE "Fishing Union Ukrribeksport", LLC "Kholod-Service", LLC Crystal South, IE Kedrovsky V.D., IE Kedrovsky P.D., IE Andronaki V.F., IE Kharkov S.V.	500-1500
Kuchurgan Reservoir	AC "Pridnestrovets"	16
Shabolatsky estuary	PE "Kalkan", AC "KRAP Zarya2", LLC "HTMO", SE "Experimental mullet breeding", PE "Jaguar-2005"	13,53
Tiligul estuary	LLC "Firm Liman", PE "Tiligul", PE "Tiligul plus", PE "Chernomorets OV", LLC "Bora"	5,98

In the classic form, commercial aquaculture in the region functions in pond farms built on projects. Despite the sufficiently developed network of pond farms, the volumes of marketable fish production in aquaculture farms are extremely low (approximately 9-12% of the catch in inland reservoirs) and mainly consist of herbivorous fish species (silver carp, white cupid) (Table 1.25):

Table 1.24. Special commodity fisheries of Odessa region

The name of the water body	Area 1000 ha	Enterprise	Provision
Lake Cahul	8,5	RIF-2012 LLC	craft: 13 units; fishing gear: 498; fishermen: 59
Lake system Yalpug-Kugurlui	22,8	Repida LLC	craft: 51 units; fishing gear: 2456 pcs. fishermen: 117
Katlabug Lake	6,5	Prydunaiska Niva AFC	craft: 13 units; fishing gear: 213; units fishermen: 43
Lake Sasik	20,0	Navy-10 LLC	craft: 66 units; fishing gear: 1182 units fishermen:156
Lake Cytai	5,0	Soyuzugprom LLC	craft: 16 units fishing gear: 122 units: fishermen: 47
The Hajibeiskyi estuary	11,0	SE "RDEK"	vessels: 19 units ; ishing gear: 466 units fishermen;28
Dauphinsky estuary	0,6	FG "Voskhod"	No data available
Zaplazs'ke reservoir	0,177	LLC Zaplazskoe economy	fishing gear: 223 units; fishermen: - 10
Kohaniv pond	0,029	IE Bakin Y.V.	fishing gear: 136 units fishermen: 5
Krychunivski rates	0,06	KPL-LTD LLC	fishing gear: 90 units fishermen: 10
Adamovsky pond	0,019	Law Corporation	fishing gear: 12 units fishermen: 3
Perelit·s'ke reservoir	0,172	Fisherman's Wharf LLC	fishing gear: 183 units fishermen: 6

Table 1.25. Production of commodity aquaculture products in Odessa region

Years	1995	2000	2005	2007	2011	2012	2013	2015	2016	2017	2018
Volume of products of commercial aquaculture, t	802	994	610	798	1330	653	905	1967	1718	1187	1007

Reasons for regressing commercial aquaculture are based mainly on organizational and economic basis: lack of access to water bodies; increase in prices for feed, electricity, fuel and lubricants and more. Many farms in the region have diversified their activities from fisheries to crop production using pond areas.

1.3.4.2. Specialized Commodity Fisheries (SCF).

In order to increase the use of fisheries in the region, a network of specialized commercial fisheries was established. In the Odessa region there are 8 SCFs, which are single users (Lake Katlabukh - "Pridunayska Niva", Lake Cytai - "Blue Field", Dauphinsky Estuary - "Voskhod", Lakes Yalpug-Kugurluy - LLC Yalpug- Kugurlui", Tuzla Group of Estuaries - Poseidon LLC), and 2 others are associations, which included not only fishing but also processing enterprises.

The number of founders of associations can be quite significant. So in the association "Tuzlovsky estuaries" 17 founders. The special regime of water use is developed separately for each SCF by the Odessa branch of the Southern Institute of Marine Fisheries and Oceanography, is coordinated by the State Administration of Ecology and Natural Resources in the Odessa region and the basin body of fisheries and is approved by the State Inspectorate for Conservation, Reproduction of Water Resources and Fisheries Regulation.

An analysis of the work of the SCF indicates that, despite some of the shortcomings associated with the imperfection of the regulatory framework governing their activities, specialized commercial fisheries are by far the most effective form of large-scale fisheries.

Aquaculture is performed in the Great Lakes of the Danube Region in the SCF mode (Table 1.26):

Table 1. 26. Catching of fish by SCF enterprises on Danube lakes (2018)

The name of the water body	Company	Fishing for fish, t	
		reasonable	actual
Cahul	RIF-12 LLC	940	268
Kartal	"ALLA"	95	21
Yalpug-Kugurlui	Repida LLC	1169	899
Katlabukh	Prydunaiska Niva AFC	227	138
Cytai	Soyuz Yug Prom LLC	238	169
Sasik	LLC "VNS-10"	1093	355

CJSC "Odesaribhosp" remains the leading in the Odessa region, which assimilates the introduction of new valuable species of fish (channel and European sheatfish, sterlet, beluga, black carp, multicolored carp).

1.3.4.3. Fish processing base

The Odessa region has a powerful processing base (Fishery Cooking Plant, BelgorodDnestrovsky, Izmail and Vylkovsky fish-canning factories, LLC “Istok” fish factory and “Krasnyj fisher” fish factory). It is believed that the production of canned fish is the most profitable of all types of canned food.

Canning production of fish and other aquatic living resources in the Odessa region is carried out by such entities as: Aquafrost LLC, IE Korolkov Sergey Vladimirovich, LLC Danube Fish Cannery, Mariko LLC, Southern RKK LLC , Fisherman LLC and others.

The main problems of the processing enterprises of the Odessa region are the lack of working capital for the purchase of raw materials and the availability of a significant amount of imported and illegally produced products in the markets of the Odessa region. A serious problem is also the deterioration and poor utilization of canned fish production capacities. Due to a significant decrease in production, fish processing companies are in a difficult financial state.

Three enterprises are engaged in the reproduction of fishery resources in the Odessa region: Bestis System LLC, Frog Agroservice LLC, Yug-Akvaprom LLC, which specialize in growing carp, herbivores and other species.

In the state program "Selection in fisheries and reproduction of aquatic living resources in inland reservoirs and the Azov-Black Sea basin" fishery enterprises of the Odessa region take a small part. Most of the reason for this is the fragmented payments by the state to the enterprises for the fulfillment of the state order, which is a significant motivator for the desire to participate in the program. Thus, in 2005, the funds for the implementation of budgetary fisheries were not allocated, 2006 - the budgetary fishery was performed "Krasnyi fisherman" and "Pridnestrovets", 2007 - the funds for the implementation of budgetary fisheries were not allocated, 2008 - year - the funds for the implementation of budgeting were not allocated, 2009 - budgetary funds were used for LLC "HTMO", "Krasnyi fisherman" and LLC "Odessa sturgeon complex", but for the accomplished volumes of fishing, the funds are not fully transferred; 2010 - funds were not allocated; 2011th year - LLC «Odessa Sturgeon Complex» was involved; 2012th year - “HTMO” LLC, “Red Fisherman” JSC were involved; 2013th year - no funds were allocated.

However, in 2019, the Kuchurgan reservoir was started to be fished. The implantation is carried out at the expense of the user of aquatic bioresources in accordance with the regime of fishery exploitation of reservoirs ("Pridnestrovets"). Yes, 100 thousand copies were released into the reservoir the carp, average weight 40

grams / copies. Also in the near future it is planned to give another 50 thousand copies of carp and 450 thousand herbivorous fish species. Control over the implementation of aquatic bioresources was carried out by employees of the Odessa Fish Guard Patrol. This is the third reservoir of Kuchurgan reservoir in the last 10 years. For the first time the reservoir was inaugurated in 2014 and replenished by 20 thousand copies. fry. The next universe took place in October 2018. And now 600 thousand copies will be released into the reservoir, valuable species of fish.

There are three specialized state-owned fish-farming enterprises in the Odessa region:

- "Regional Experimental and Experimental Complex" (Bilyaivskyi district, Paliyovo village)
- 670 hectares of levered plot in Hadzhibei estuary, SCF regime
- "Experimental Cephalic Fishery" (Belgorod-Dnestrovsky district, Belenke village)
- four ponds of 25 hectares, pumping station, channels for water intake from the Dniester
- "Dniester fish breeding farm" (Belgorod-Dniestrovsky district, Udobnensk village council, Sturgeon site) - 39 ha.

Another group of enterprises in the region that is involved in the process of reproduction of these aquatic bioresources - fishery enterprises with their own fish farms, for which the cultivation of planting material for further sale is one of the main activities. Thus, the production capacities of individual fisheries, such as the AFC "Prydunayska Niva" (incubation capacity of 500 million copies), "Krasnyi fisherman" (incubation capacity of 497 million units), "Novo-Nekrasivsky" (incubation capacity of 150 million units)), CJSC "Odesibirgas" (incubation capacity of 300 million copies) allow to grow about 40-50 million copies, viable fishery material of carp and herbivores for fishing and enhancing the fish productivity of natural reservoirs of Odessa region. It is advisable to note the practice of artificial reproduction of some species of natural ichthyocomplex of bream and ram on the fish farm of the Prydunayska Niva, from which the Katlabug Lake is up to 10 million copies in some years, young bream.

At present, there is only one fish breeding farm operating in the region engaged in the reproduction of the Pilengas - LLC "HTMO" on the Budak Spit of the Shabolatsky estuary. Since 2008, the fish farm has begun to work on artificial reproduction of the Pilengas in the Shabolatsky estuary. In 2009, in the framework of the budget program "Reproduction of aquatic living resources in inland water bodies and the Azov-Black Sea basin", 845.6 thousand copies were issued in the Shabolat estuary. young Pilengas. It is envisaged that further increase in the capacity of LLC "HTMO" fish breeding complex, introduction of the newest technologies in fisheries would allow ensuring stable release of young fish in the salt-water estuaries of Odessa region and in the Black Sea.

Built in 2007, the LLC "Odessa Sturgeon Complex" with the use of modern technologies for artificial reproduction of sturgeon species of fish started from 2009, the year of the Danube river in the youth of Russian sturgeon in the amount of 50 thousand copies. Since in 2009, sturgeon species such as sturgeon and stellate sturgeon were additionally included in the Red Data Book of Ukraine, the capacity of the sturgeon complex LLC “Odessa sturgeon complex” should be used to catch the Dniester and Danube in the future up to 1.5 million copies young sturgeon per year.

1.4. SWOT analysis for the aquaculture sector in partner countries

Results of SWOT analyses show differences according to the specific conditions of the countries; water resouces available, level of fisheries and aquaculture, resource characteristics-capacities, surface areas, depth, water type as running or stagnant, climate, etc., use and/or protection status, priorities and level of development of the states. On the other hand scope and development process of aquaculture business rather

different from EU member countries and non-member ones due to differences and supporting schemes applied in line with current legislations.

1.4.1. Greece

In the framework of this study a questionnaire was compiled and distributed to aquaculture companies operating in REMTH. The questionnaire surveyed the key issues of aquaculture in the REMTH area, such as the Keramoti of Kavala and the Fanari of Rodopi. Businesses operating in these areas grow and sell mussels. The owners said they produce 80-100 tonnes per year, the cost per kilo is 0.30 € and businesses have both family members and external partners. These establishments do not send on veterinary or health care and do not use hormones, vaccines and antibiotics and shellfish feed is taken from the environment naturally. Businessmen have also said that aquaculture remains useful for the economy, increasing employment in this area, promoting blue growth and the proper consumer nutrition. In addition, regarding the strengths, weaknesses, opportunities and threats of aquaculture, the owners reported the following (Table 1.27):

Table 1. 27. SWOT Analyses for REMTH in Greece

STRENGHTS	WEAKNESSES
• The fish-shellfish products have high • nutritional value and are relatively • economical for the final consumer • The water quality is monitored by the state and this reduces the risk mortality	• No compensation is given in case of damage (natural disasters, deaths) • Continuous and long-term engagement is required (labor intensive), • Young people do not want to work in this field • Marine areas suitable for fish farming are scarce • Limited management and sanitation of the lagoons (legal obstacles etc.)
OPPORTUNITIES	**THREATS**
• Promotion and dissemination of this sector abroad • Improvement interventions for the lagoons and their enrichment in spat, shellfish (which thrive in the area) • Lagoons: cultivation of algae and creation – maintenance of overwintering ponds for the fry entering from the sea • Construction of appropriate (packaging – smoking – raw extraction) facilities for fish and shellfish processing and packaging • Creation of cooling facilities for the maintenance and freezing of fish in order to achieve a better market price • Upgrade – replace old equipment with available financial tools (national, European)	• Climate change • Pollution • No upgrading of farm infrastructure

Also, regarding the incentives needed to promote aquaculture entrepreneurship and trade in the REMTH region, the owners stated the following:

<u>Legal Level</u>

- Continuous legal support is required
- Creation of a simpler legal framework for licensing of aquaculture facilities and the use of suitable areas for aquaculture

<u>Administrative Level</u>

- Better coordination between businessmen and competent local administrative bodies
- Need to speed up the installation process and licensing of a farm and to update legislative constraints according to the local specificities of the area

Commercial Level

- Better promotion and dissemination of the sector both in Greece and abroad
- Establishment of additional infrastructure in the fishing shelters and ports of the area
- Mechanization of work due to lack of labor hands

Financing level

- It is not easy to finance shellfish farming
- No insurance coverage
- Financial support is time consuming

Respondents also unanimously stated that they are in favor of international cooperation, the exchange of know-how, the use of innovative technologies in common trade, and stated that they are willing to participate in relevant seminars in the Black Sea region. Regarding their knowledge of the current state of aquaculture in the corporate countries, respondents while fully aware of the situation in Greece are partially aware of the situation in Turkey and not at all aware of the situation in Romania and Ukraine. The main source of information for them is the internet, fisheries associations, organizations and publicized studies. In addition, a table with the values of aquaculture species follows (€/ per kilo) (Δελτία Τιμών ΑΜΘ 2020)(Table 1.28).

Table 1.28. Value of aquaculture species

Species	Retail Average Price in Euro per kg
Mugillidae	5,40
Dicentrarchus labrax	11,08
Oncorhynchus mykiss	5,65
Sparus aurata, fisheries	13,90
Sparus aurata, culture	9,28
Mytilus galloprovincialis	5

Finally, it is worth noting that the momentum in the fisheries and aquaculture sectors is increasing, as is the support for these sectors with the adoption of good practices by the Region of Eastern Macedonia and Thrace in all the Regional Units. The existence of a dynamic University (Democritus University of Thrace), in combination with other research centers (eg ELGO DIMITRA-INALE) and the scientific potential of the Region's services, contribute significantly to its wider field. This is achieved through the interconnection of scientific research with production and the design of a common policy to produce high value-added products that will stimulate productivity, competitiveness and extroversion in the primary PAMTH sector. In the framework of cooperation, visits are made to local research institutes and aquaculture companies. In addition, the REMTH website provides price information leaflets for citizens and an electronic documentation system for those interested. Also, REMTH is a body which in recent years has been a key partner in co-financed European Union programs and leverages the available European funding tools.

On the other hand, more comprehensive SWOT analyses were done based on data from the Special Spatial Planning and Sustainable Development Framework Study for the country based aquaculture sector and its corresponding sector study (ICAP Group) (Table 1. 29). SWOT analysis is a key strategic planning tool that examines and combines the effects of strengths and weaknesses of an industry in this case, the internal environment as well as opportunities and threats to the external environment. Through this analysis it is

possible to identify and exploit the strengths of the aquaculture sector in Greece, to make new investments in them and to use the opportunities that will arise in the future. It is also possible to identify the threats and risks to be avoided. It is a fact that evaluating the existing situation will help shape a new strategy.

Table 1.29. SWOT Analyses for Aquaculture in Greece

STRENGHTS	WEAKNESSES
• Contribution to the national economy, as aquaculture is the state's second most important export sector • A strong pillar of regional development (employment, support for local communities & economies) • Strengthening of mountainous areas with relative activity in inland aquaculture • Ideal climatic conditions, morphology (long coastline, etc.) and geographical location of the country favor the development of aquaculture • Existence of research and technological bodies for staffing the industry with experienced and qualified workforce • Providing expertise in the production of high nutritional value products • Existence of shellfish cultivation with environmentally friendly production methods and focused demand in local markets	• The lack of a national strategic plan despite its strong export character • Inability to set up and operate Producer Organizations • Low level of organization of units • Little co-operation between players in promoting products and finding new markets • High financial requirements of the production process • Slight diversification of types and forms of processing of products • Product sensitivity (short "tradable life") • Late development of new products due to long research and required capital • Continuous reduction of water resources and low level of technology applied in the case of inland aquaculture • Consumers' negative perceptions of the hygiene of shellfish products produced and low demand at national level
OPPORTUNITIES	**THREATS**
• Increasing global demand for fish consumption • Financial opportunities for improving production quality (European Fisheries Fund) • Financial support for market studies / promotions • Incentives to attract new investors to small and medium-sized enterprises • Improvement of methods and techniques of product promotion • Informing and raising consumer awareness of product quality and safety • Development of new technologies, optimization of production protocols to reduce costs as well as production of new products • Improvement of systems for permanent monitoring of environmental parameters and impacts • Implementation of water saving technologies in onshore units to optimize production	• Changes in consumer buying behavior as an impact of the economic crisis • Threats related to the natural environment (liquid waste, strict environmental legislation, rising sea temperatures, etc.) • Vulnerable organisms, susceptible to diseases that can lead to the destruction of the product. • Depletion of fish stocks due to dependence on fish feed (fish meal, fish oil) • Imports of competitive shellfish products to the domestic market • Possible emergence of new competitors from other countries as aquaculture plants are being developed at a significantly reduced production cost

1.4.2. Romania

SWOT analyses for Romanian aquaculture is given in Table 1.30.

Table 1.30. SWOT Analysis for aquaculture in the South-East Romanian Region

STRENGTHS	WEAKNESSES
• real growth potential of the aquaculture sector	• blocking the privatization of fisheries facilities

- nutritionally valuable native species, with tradition in consumption
- the quality of the produced fish and the diversity of the species to be exploited
- dense hydrographic network, favorable for aquaculture
- the possibility of providing the necessary feed for cypriniculture from internal resources
- research institutions in the field
- sustainable activity in accordance with environmental protection/sustainable use of natural biological resources
- newly created jobs that are a financial alternative for commercial fishermen
- reducing the pressure of fishing on the natural environment
- easily certified organic products
- accessible price
- the aquaculture products contribute to human health and food security

- high price for electricity
- unclear laws for the sector
- low financial resources of the aquaculture units for upgrading and increasing production capacity
- insufficient and outdated technological equipment and facilities; insufficiently developed infrastructure in the field
- insufficient staff with proper training in the field
- lack of information on the fish market/ low level of information on the role of fish in human nutrition
- limited access to bank loans and difficult procedures for accessing non-refundable funds
- short-term concession contracts that do not allow for capital recovery in case of major investments
- lack of involvement of the authorities with competence in the field in order to reduce the phenomenon of theft of fish stock

OPPORTUNITIES	THREATS
• large market, high demand for indigenous species • the existence of protected natural areas suitable for fish breeding and feeding • potential for ecotourism and other aquaculture related activities • market niches for certain species • the lands from the existing fisheries facilities are suitable for modernization • financial support from non-reimbursable funds, both for the competitiveness and for the sustainability of the sector • possibility for direct sale from the fish farm • processing of fish in order to provide an easy-to-cook product to the final consumer (evisceration, cleaning, portioning of the fish placed on the market) • forming producer organizations that can negotiate obtaining facilities for the sector (eg legislative, financial, etc.)	• climate change, natural disasters • environmental pollution • use of chemicals and closed recirculation systems • difficult procedures for obtaining permits and authorizations, which discourage new investments • unfair competition arising from tax evasion, fish imports or commercial fishing • losses caused by ichthyophagous birds • excessive bureaucracy with impact on the economic activity • production losses due to the application of environmental regulations • increase of production costs

1.4.3. Turkey

The content of the SWOT analyses were obtained from the questionnaires, interviews, previous reports prepared with the intensive participation of the stakeholders and from the minutes of DACIAT project meetings with the local partners/stakeholders.

According to the results of SWOT analyses (Table 1.31), there are further steps needed to increase aquaculture production, to make the sector attractive for new investors, and clean up the problems reducing the speed of development. It is obvious that all stakeholders agree on the future of aquaculture, important place of aquaculture industry to increase fish production and consumption per capita. If the main problems defined as

weaknesses and threats could be defeated or solved, the production may increase soon up to 500000 tons, exports may reach to 2 billion US$ by 2023 as short term targets.

Table 1.31. SWOT Analyses for Turkey

STRENGTHS	WEAKNESSES
• Strong institutional structure, governance, supporting policies and existence of technology and capacities, • Rich potential of inland and marine waters, rich, diverse flora and fauna, • Existence of suitable areas for aquaculture especially in the seas, • Sufficient knowledge and experience in the sector, • Export potential to neighbor and EU countries and experience, • The presence of dynamic entrepreneurs want to invest in aquaculture sector, • Domestic production of essential materials and equipment, • Developed mixed animal feed technology in domestic industry and presence of feed factories, • Availability of hatcheries and juvenile fish production, • Presence of modern processing, packaging and storage facilities, • Active quality control and residue monitoring program and system, • The presence of new species having high economic value candidate for aquaculture business, • The presence of trained labor force, institutions for education, training and research on aquaculture, institutions on fish farming, aquatic environment and fish health, • Obligation to employ educated/trained staff within the scope of the legislation, • Existence of official farm registry system.	• Lack of efficient/sufficient producer organizations (for market organization, price formation, international trade), • Low success at integrated coastal zone management, • and insufficient attempts to secure potential farming areas under marine spatial planning, conflicting interests with other sectors, • Inadequate extension services, training and public awareness actions on nutritional value of fish to increase consumption, • Insufficient employment of trained staff in the sector, • Lack of efficient traceability program for fish and their feeds, • Inadequate solution-oriented R&D activities, reproduction, larval feeding, live food, • Insufficient attempts for organic fish production and good agricultural practices in fish farming, • Presence of investor orientation towards cheap labor force rather than experience and competences, lower intention to keep well educated, experienced and skillful staff in order to reduce staff costs, • Infrastructure and experienced staff deficiencies on fish diseases and pests, high risks of disease transmission due to uncontrolled transfers of egg and larvae, • Failures to collect safe and reliable data, • Slow/limited introduction of new production methods, lack of poly-culture, targeting on mainly carnivorous species, negletting bivalves and arthropods in aquaculture,
OPPORTUNITIES	**THREATS**
• Presence of diverse marine and inland water (in GAP[7] and DAP[8] Regions) potential, • High export potential, existence of alternative markets worldwide in addition to European countries, • Fast return of investment costs to income, • Supports for R&D projects, • High population of young and nutritional awareness,	• Climate change and limited efforts to reduce the impact of climate change on aquaculture sector and investors. • High production costs (energy, feed, etc,), • Contraction in the European market (sea bass, sea bream), • Price fluctuations in fish feed and raw materials, • Insufficient fish consumption habits,

[7] South-eastern Anatolian Project-dam systems on rivers Tigris and Euphrates, 2235 km in total length, 6481 ha natural lakes ve 129987 ha dam reservoirs

[8] Eastern Anatolian Project – established to support development of 14 provinces in the Region

- Adequate labor force,
- Potential of demand increase for human food, fish feed, pharmaceutical products from macro and micro aquatic plants,
- Possibility to farm alternative species, richness in terms of biodiversity,
- Development of environmental projects by different disciplines and research units,
- Growth of ecological production practices and began to be adopted in Turkey,
- Having an efficient insurance system "TARSİM[9] " for aquaculture companies,
- Existence of many economical crustacean species, especially Mediterranean mussels, in nature and the suitability of aquaculture techniques for Turkey's waters,
- Development of hydro-lysates method in animal waste in feed production,
- Availability of different animal or vegetable protein sources in feed production.
- Prejudices against fish farms and aquaculture products, negative media pressure on aquaculture and products,
- Though simplified a great extent, the need of approval from other public bodies letting to increase,
- Ongoing discharge of domestic, industrial and agricultural wastes without any treatment, reducing potential clean water resources for aquaculture,
- Conflicts with tourism, historical and natural assets, national parks, protected areas and HEPPs[10] on river systems,
- High competition in national and international markets,
- High impact of epidemic fish diseases, pressure on natural stocks (leaks, disease + parasites, chemicals, waste and residues, pressure on the food source),
- Conflicts between degree holder fishery engineers on fish disease and veterinaries authorized by the Veterinary Law,
- Lack of sufficient control and inspection at customs during the import of live species,
- Failure to establish balance of protection and use in terms of ecosystem sustainability

1.4.4. Ukraine

Ukranian SWOT analysis of the aquaculture sector comprimise the categories of economic, social, technical, and environmental situation and infrastructures (Table 1.32).

Table 1.32. SWOT Analyses for Ukraine

STRENGTHS	WEAKNESSES
• Cheap labor (average monthly wage in the agricultural sector is $ 180 / month). • Low rental rate (~ US $ 70-120 / ha per rental year). • Privatization: 12 out of 36 state organizations were added to the list of privatizations (including 6 developing state organizations with great potential) • As the state is not an effective owner in Ukraine privatization will help increase the efficiency of companies. • Financial Assistance Programs for Aquaculture • Enterprises Launched No. 300 CMU). As a result, since 2017, businesses can apply for preferential lending. • The fisheries protection reform was implemented, the Fish Patrol was created, which led to a reduction in illegal fishing. • Deregulation measures: businesses need less time and resources to start and run a business Legislative framework for aquaculture businesses has been created. • Business representatives have not yet experienced	• Decrease in aquaculture production in dollar terms Relatively small exports compared to other countries are caused by the following: international retailers require a minimum volume of supply, which is 10 times higher than the production of Ukrainian companies; • Staff: redundancies in state-owned companies (60% of all industry employees are administrativestaff); lack of skilled labor. • Low concentration of firms and relatively low profitability of the industry. The cost of international certification is too high; export products of Ukrainian manufacturers must undergo separate veterinary analysis when exported to each country. • The considerable time required for customs clearance, as well as the lack of differentiation between exports and imports of living and nonliving objects, which leads to the transportation of these goods illegally. • Lack of state support. No VAT refund for fishery since January 1, 2017.

[9] Agricultural Insurance system
[10] Hydroelectric Power Plants

significant improvements from the initiatives taken.
- Transparency and availability of data.
- Ukrainian aquaculture producers have the necessary business information that can
- The improve market conditions in Ukraine, but not all of the information is useful.
- The largest inland water basin (as of the end of 2015 the reservoirs for commercial fish in Ukraine covered an area of 101,760.6 ha) creates favorable conditions for the development of aquaculture.
- The industry has all the necessary constituents, but it requires additional investment: fish farming and fish processing; restoration and protection of fish stocks; aquaculture ponds and pools; commercial production of fish
- Lack of certification of supply chains.
- Decline of mechanisms of state regulation of functioning of fishery complexEnvironmental issues affecting fish populations: mass pollution of rivers; lack of land reclamation.
- Lack of farms cultivating fish material. Lack of infrastructure needed for aquaculture.
- Significant deterioration of the material and technical base.
- Lack of cold logistics; it is available for companies in other industries.

OPPORTUNITIES

- Introduce VAT refunds or government support for the fisheries sector.
- Possibility to stimulate national feed production.
- Development of small businesses and farms.
- No insurance for the fishing industry.
- Introducing licensing procedures in aquaculture.
- Establishment of certificates of origin for fish to prevent poaching of fish into the national trade network.
- A draft law has been developed that aims to reduce the rent for water of land of the water fund from 3-12% of the regulatory land valuation to 3%.
- Strengthen the protection of water bodies and increase penalties that will reduce illegal fishing and increase demand for legal fishing in the future.
- Create a legal framework for rental rates.
- Establishment of integrated legal structures aqua holdings, aqua parks, research centers and more.
- Creating information centers for aquaculture innovation.
- Implementation of electronic vessel and catch monitoring.
- Development of organic aquaculture.
- Increasing the refrigeration and processing capacity of the regional fishery complex.
- Develop infrastructure for fisheries and cold logistics.
- Creation of aqua farms with development of technologies of cultivation of delicacy products - sturgeon, trout, spearfish, whitefish, crawfish, freshwater giant shrimp, mussels, scallops and oysters.
- Creation of marine fish farms for the cultivation of flounder, mullet and other species of fish.
- Activation of marketing of domestic fishery products.
- Introduction of closed-water aquaculture technologies using mechanical and biological filters for reuse of water in production

THREATS

- High feed cost (~ 60% of total production costs).
- High taxes (businesses claim tax increases and cancellation of VAT refunds.
- Increase in the share of the shadow sector due to overregulation and tax burden.
- Further possible devaluation of the national currency may lead to higher costs.
- Extremely weak competitiveness in foreign markets of domestic fishery products.
- Businesses were not informed about the submission of reports.
- Lack of a regulatory framework for rental rates.
- People's distrust of the State Fisheries Agency.
- Difficulties in passing key laws legislative nonregulation of mechanisms for perspective development of the fish farm.
- Insufficient consideration of the specificities of the fisheries sector in the legal field.
- Low level of institutional capacity of the central fisheries authority to address fisheries regulation.
- Imperfection of powers and deficiencies in the status of state fisheries protection bodies.
- Lack of proper certification of finished and processed fishery products and, at the same time, the availability of technical barriers to its access to world markets.

2. REGULATORY FRAMEWORK IN PARTNER COUNTRIES

2.1. Greece

2.1.1. European legislation in the field of aquaculture (policies, regulations, EU directives, etc.)

Aquaculture can contribute to the overall objective of filling the gap between the consumption and production of seafood in the EU in an environmentally, socially and economically sustainable way. The European Commission seeks to boost the aquaculture sector by reforming the common fisheries policy. In 2013 it published strategic guidelines outlining the common priorities and general objectives at EU level. After consulting all stakeholders, four priority areas were identified:

1. Reduction of administrative burdens,
2. Facilitating access to space and water,
3. Increasing competitiveness,
4. Harnessing the competitive advantages of high quality and stringent health and environmental standards.

In response to the stagnant production of aquaculture, the Commission published in 2002 an Announcement (COM(2002)0511)[11] with title "Strategy for the sustainable development of European aquaculture" . The aims of this strategy are the following:

- the creation of long-term and secure employment, especially in areas dependent on fisheries, and an increase in employment in aquaculture by 8,000-10,000 full-time equivalents for the period 2003-2008
- ensuring the availability of healthy, safe and good quality products to consumers, as well as promoting high standards of animal health and welfare
- ensuring an environmentally industry

However, the strategy did not achieve its objectives, particularly in terms of increasing production and employment: neither the 4% growth target nor the creation of 8000 to 10000 new jobs was achieved.

The main problem of the aquaculture sector is the lack of production growth, in sharp contrast to the high growth rates observed elsewhere in the world. However, aquaculture has made significant progress on issues such as ensuring the quality of products offered to consumers and ensuring environmental sustainability. Beyond the formal barriers and constraints, European aquaculture has been facing, since 2002, increasing competition from third countries, governance crises and, more recently, the consequences of the economic crisis[12].

In order to identify the causes of stagnation in EU aquaculture production, the Commission published its second Announcement on 8 April 2009 (COM (2009) 0162)[13] for the aquaculture. This new Communication was entitled "Building a Sustainable Future for Aquaculture - A New Push for the Strategy for the Sustainable

[11] https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2002:0511:FIN:EL:PDF

[12] http://www.europarl.europa.eu/factsheets/el/sheet/120/%CE%B5%CF%85%CF%81%CF%89%CF%80%CE%B1%CE%B9%CE%BA%CE%B7-F%85%CE%B4%CE%B1%CF%84%CE%BF%CE%BA%CE%B1%CE%BB%CE%BB%CE%B9%CE%B5%CF%81%CE%B3%CE%B5%CE%B9%CE%B1)

[13] https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0162:FIN:EL:PDF

Development of European Aquaculture". Its aim was to ensure that the EU remains a key player in this strategic area, increasing production and employment by implementing the following measures:

A. Promoting the competitiveness of Union aquaculture production through:
   a. research and technological development
   b. promoting spatial planning for aquaculture with a view to solving spatial competition problems
   c. facilitating aquaculture businesses to meet market demands
   d. promoting the development of aquaculture on an international scale

B. Establish the conditions for the sustainable development of aquaculture through:
   a. ensuring compatibility between aquaculture and the environment
   b. forming a high-yield aquaculture industry
   c. ensuring consumer health protection, and recognizing the health benefits of aquaculture products

C. Improving the image and management of the industry through:
   a. better implementation of EU legislation
   b. reducing administrative burden
   c. ensuring the involvement of all stakeholders and providing appropriate information to the public
   d. ensuring adequate oversight of the aquaculture sector

The Strategic Guidelines (COM(2013)0229)[14] published by the Commission on 29 April 2013, aim to assist Member States in defining their national objectives, taking into account their respective starting positions, their national specificities and their institutional arrangements. The Guidelines cover four priority areas:

   a. simplifying administrative procedures and reducing the time allowed for aquaculture units to be licensed
   b. coordination of spatial planning to overcome the obstacles caused by lack of space
   c. enhancing the competitiveness of Union aquaculture
   d. promoting a level playing field

As set out in the new basic Regulation on the Common Fisheries Policy (Regulation (EU) No 1380/2013, Article 34), Member States were required to submit multiannual national strategic plans for the development of aquaculture activities in their territory for 2014- 2020 by 30 June 2014. The Commission should encourage the exchange of information and best practices between Member States and facilitate the coordination of the national measures provided for in the multiannual national strategic plans. In addition, Member States were encouraged to carry out a mid-term evaluation of the implementation of their multiannual national aquaculture strategic plans by the end of 2017.

Parliament has adopted numerous resolutions to further strengthen the EU aquaculture sector[15]:

- Resolution of 16 January 2003 on aquaculture in the European Union: present and future[16]
- Legislative Resolution of 27 April 2006 on the proposal for a Council Directive on the requirements for animal health control of aquaculture animals and their products and on the prevention and control of certain aquatic diseases[17]
- Legislative Resolution of 14 November 2006 on the proposal for a Council regulation on the use of alien species in local aquaculture and locally absent species[18]

[14] https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/com_2013_229_el.pdf

[15] http://www.europarl.europa.eu/factsheets/el/sheet/120/%CE%B5%CF%85%CF%81%CF%89%CF %80%CE%B1%CE %B9%CE% BA%CE %B7-CF%85% CE%B4%CE%B1%CF%84%CE%BF%CE%BA%CE%B1%CE%BB%CE%BB%CE%B9%CE%B5%CF%81%CE%B3% CE%B5% CE% B9 CE%B1

[16] https://eur-lex.europa.eu/legal-content/EL/TXT/?uri=CELEX:52003IP0022

[17] https://eur-lex.europa.eu/legal-content/EL/TXT/?uri=OJ:C:2006:296E:TOC

[18] https://eur-lex.europa.eu/legal-content/EL/TXT/?uri=celex:52006AP0472

- Legislative Resolution of 14 November 2006 on the proposal for a Council Regulation amending Regulation (EC) No. Council Regulation (EC) No 104/2000 on the common organization of the market in fishery and aquaculture products[19]
- Resolution of 4 December 2008 on drawing up a European cormorant management plan to reduce the increasing damage caused by cormorants to fish stocks, fisheries and aquaculture[20]
- Resolution of 17 June 2010 on a new impetus to the strategy for the sustainable development of European aquaculture[21]
- Resolution of 8 July 2010 on the status of fishery and aquaculture products imported into the EU with a view to reforming the Common Fisheries Policy (CFP)[22]
- Legislative resolution of 23 November 2010 on the proposal for a regulation of the European Parliament and of the Council amending Regulation (EC) No. Council Regulation (EC) No 708/2007 on the use of alien and absent species in aquaculture at local level[23]
- Legislative resolution of 12 September 2012 on the proposal for a regulation of the European Parliament and of the Council on the common organization of the markets in fishery and aquaculture products[24]
- Legislative resolution of 10 December 2013 on the Council's first reading position with a view to the adoption of a Regulation of the European Parliament and of the Council on the common organization of the markets in fishery and aquaculture products, amending Regulation (EC) No. And Regulation (EC) No. Council Regulation (EC) No 1224/2009 and repealing Regulation (EC) No. Council Regulation (EC) No 104/2000[25]
- Resolution of 8 September 2015 on unleashing research and innovation potential in the blue economy for job creation and growth[26]
- Resolution of 12 May 2016 on the traceability of fisheries and aquaculture products in catering and retail[27]
- European Parliament resolution of 12 June 2018 'Towards a sustainable and competitive European aquaculture sector: current situation and future challenges[28]

Based on the guidelines, the European Commission and EU countries are working together to increase production and competitiveness of the industry. EU Member States have been asked to develop multi-annual plans to promote aquaculture. The European Commission helps identify barriers and at the same time facilitates cooperation, coordination and exchange of best practices between EU countries[29].

Aquaculture requires pure marine and fresh water. EU environmental legislation - in particular the Water Framework Directive (WFD) Directive 2000/60 / EC, the Marine Strategy Framework Directive (WTP) Directive 2008/56 / EC and the Regulation on the use of foreign and absent aquaculture locally species - ensure that these conditions are met. EU legislation also establishes high standards of health, consumer protection and environmental sustainability, which must be respected in the context of aquaculture activities in the EU. These have cost implications for producers, but which become a competitive advantage if consumers' attention is

[19] https://eur-lex.europa.eu/legal-content/EL/TXT/?uri=OJ:C:2006:314E:TOC
[20] https://eur-lex.europa.eu/legal-content/EL/TXT/?uri=CELEX:52008IP0583
[21] https://eur-lex.europa.eu/legal-content/EL/TXT/?uri=CELEX:52010IP0243
[22] https://eur-lex.europa.eu/legal-content/EL/TXT/?uri=CELEX:52010IP0287
[23] https://eur-lex.europa.eu/legal-content/EL/TXT/?uri=CELEX:52010AP0423
[24] https://eur-lex.europa.eu/legal-content/EL/TXT/?uri=celex:52012AP0333
[25] https://eur-lex.europa.eu/legal-content/EL/TXT/?uri=CELEX:52013AP0538
[26] https://eur-lex.europa.eu/legal-content/EL/TXT/?uri=CELEX:52015IP0291
[27] https://eur-lex.europa.eu/legal-content/EL/TXT/?uri=CELEX:52016IP0222
[28] http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P8-TA-2018-0248+0+DOC+XML+V0//EL&language=EL
[29] https://ec.europa.eu/fisheries/cfp/aquaculture_el

focused on quality, an advantage that can contribute to the acceptance of aquaculture locally. The reform of the Common Fisheries Policy is based on these high standards. Proposal for a reform of the Common Fisheries Policy (CFP) COM (2011) 425 aims to promote aquaculture through an open method of co-ordination, namely an optional co-operation process based on strategic guidelines and multi-annual national strategic plans, to identify common objectives and, where possible, indicators to measure progress towards those objectives.

Aquaculture can have a significant impact on the environment if not properly planned and monitored. As a result, certain environmental effects of aquaculture (eg nutrient and organic enrichment, pollution from hazardous substances) are explicitly addressed by EU legislation.

EU aquaculture businesses face different challenges and opportunities that require tailor-made solutions, but they will all benefit from improved market organization and the structure of aquaculture producer organizations. These are a priority for the reform of the Common Market Organization (CMO) and for the new European Maritime and Fisheries Fund (EMFF). Both EU production and marketing plans and the EU Market Observatory are expected to help aquaculture producers identify opportunities for business and adapt their marketing strategies (European Commission, 2013).

Extensive aquaculture in aquaculture favors biodiversity and is widespread, especially in Central and Eastern Europe, offering significant advantages and business opportunities beyond food production, which can lead to greater competitiveness if properly exploited. The impact of the rules on biodiversity-rich areas such as Natura 2000 sites and loss of income due to protected predators such as cormorant as well as voluntary commitments related to biodiversity protection or water should be recognized by the public authorities. An important factor affecting extensive aquaculture in aquaculture in certain areas concerns predators - in particular cormorants. Council Directive 79/409 / EEC on birds provides for a derogation system for the protection of fisheries and aquaculture interests. Member States may make full use of the derogations to prevent serious damage to cormorants in the fisheries and aquaculture sector. To help Member States, the Commission has recently published a guidance document to clarify the basic concepts behind the application of the derogation system.

2.1.2. National legislation

The legislation governing aquaculture in Greece is as follows:

- Law N.4282/2014 (FEK 182/A/2014) Aquaculture development and other provisions.[30]
- Law N.Δ.420/70 Fisheries Code (FEK 27/A/31-1-1970[31]), as amended and replaced by its provisions N. 1740/1987 (FEK 221/A/14-12-1987[32]) and article N. 2040/1992 (FEK 70/A/23-4-1992[33]).
- King's decree B.Δ 142/1971, Article 1 " Fisheries of aquatic organisms ... and their protection" (FEK 49/A/12-3-1971[34]).
- Law 1845/1989, article 32, paragraph 7(a), for "lease of water land" (FEK 102/A/26-4-1989[35]).
- Law 3208/2003 article 19, paragraph 11, (FEK 303/A/24-12-2003[36]).
- Decision N. 140476/2004 "Defining the concession procedure ... and granting the establishment and operation of units " (FEK 357/B/19-2-2004[37]).

[30] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/%CE%A6%CE%95%CE%9A%20182%20%CE%91%20%CE%BD4282%20_2014.pdf
[31] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/2-Ydat/70_0027A.pdf
[32] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/2-Ydat/87_0221A.pdf
[33] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/2-Ydat/92_0070A.pdf
[34] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/2-Ydat/71_0049A.pdf
[35] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/2-Ydat/89_0102A.pdf
[36] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/2-Ydat/03_0303A.pdf

- Decision 9232.1/1/11/11-01-2011 " Regulation of authorization of marine aquaculture farms and fish farms" (FEK 136/B/09-2-2011[38]).
- Law N. 3199/2003 "Protection and management of water - Harmonization with Directive 2000/60 / EC of the European Parliament" (FEK 280/A/9-12-2003[39]).
- Law. 4014/2011 "Environmental licensing of projects and activities… " (FEK 209/A/21-9-2011[40]).
- Presidential decree Π.Δ. 28/2009 "Animal health requirements for aquaculture animals and their products ... in accordance with Council Directives 2006/88 / EC and EU Commission 2008/53 / EC" (FEK 46/A/16-3-2009[41]).
- Ministry decree 31722/4-11-2011 "Approval of a Special Framework for Spatial Planning and Sustainable Development for Aquaculture…" (FEK 2505/B/4-11-2011[42]).
- Law N. 3852/2010 "New Architecture of Local Government and Decentralized Administration-Kallikrates Program" (FEK 87/A/7-6-2010[43]).
- Ministry decree 521/53656/16-05-2015 " Terms, conditions and procedure for leasing marine and lake water areas." (FEK 1780/B/23-05-2015[44]), corrected by FEK 2069/B/15-06-2017[45]

2.2. Romania

2.2.1. European Legislation

Due to being members of EU, Greece and Romania are applying similar legislations prepared according to different aspects of CFP, Environment, health and welfare, consumer rights etc.,(Table 2.1).

Table 2.1. European legislations on aquaculture

European legislation	Short description
The Common Fisheries Policy (CFP)[46]	The CFP is a set of rules for managing European fishing fleets and for conserving fish stocks. Designed to manage a common resource, it gives all European fishing fleets equal access to EU waters and fishing grounds and allows fishermen to compete fairly. The CFP aims to ensure that fishing and aquaculture are environmentally, economically and socially sustainable and that they provide a source of healthy food for EU citizens. Its goal is to foster a dynamic fishing industry and ensure a fair standard of living for fishing communities. The CFP has 4 main policy areas: - Fisheries management; - International policy;

[37] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/2-Ydat/04_0357B.pdf
[38] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/2-Ydat/11_0136B.pdf
[39] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/2-Ydat/03_0280A.pdf
[40] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/2-Ydat/11_0209A.pdf
[41] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/2-Ydat/09_0046A.pdf
[42] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/2-Ydat/11_2505B.pdf
[43] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/2-Ydat/10_0087A.pdf
[44] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/%CE%A6%CE%95%CE%9A%201780%20%CE%92%202017.pdf
[45] http://www.alieia.minagric.gr/sites/default/files/basicPageFiles/%CE%A6%CE%95%CE%9A%202069%20%CE%92%202017.pdf.
[46] https://ec.europa.eu/fisheries/cfp_en

	- Market and trade policy; - Funding of the policy European Maritime and Fisheries Fund (EMFF) 2014-2020. The CFP also includes rules on aquaculture and stakeholder involvement.
Strategic Guidelines for the sustainable development of EU aquaculture /* COM/2013/0229 final */[47]	In the context of the reform of the Common Fisheries Policy, the European Commission published in 2013 a series of strategic guidelines on the common priorities and general objectives at European level for the sustainable development of aquaculture in the EU. Four priority areas were identified in consultation with all relevant stakeholders: - Simplify administrative procedures; - Securing sustainable development and growth of aquaculture through coordinated spatial planning; - Enhancing the competitiveness of EU aquaculture; - Promoting a level playing field for EU operators by exploiting their competitive advantages. According to the document, EU countries have been asked to set up multiannual plans to promote aquaculture and operational programs covering the period 2014-2020, identifying the actions they intend to finance through the European Maritime and Fisheries Fund EMFF. The European Commission has also been designated to facilitate cooperation, coordination and exchange of good practices between Member States. Through the same document, it was proposed to set up the Aquaculture Advisory Council which should allow the Commission and the Member States to benefit from the knowledge and experience of all stakeholders.
Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013[48]	The Regulation establishes common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and lays down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repeals Council Regulation (EC) No 1083/2006.
Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013, with subsequent amendments[49]	The Regulation establishes provisions on the Common Fisheries Policy, amends Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repeals Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC.
Regulation (EU) No 1379/2013 of the European Parliament and of the Council of 11 December 2013, with subsequent amendments[50]	The Regulation establishes provisions on the common organisation of the markets in fishery and aquaculture products, amends Council Regulations (EC) No 1184/2006 and (EC) No 1224/2009 and repeals Council Regulation (EC) No 104/2000.

[47] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1477555805378&uri=CELEX%3A52013DC0229
[48] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1398847168566&uri=CELEX%3A32013R1303
[49] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02013R1380-20190814
[50] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02013R1379-20150601

Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014[51]	The Regulation establishes provisions on the European Maritime and Fisheries Fund and repeals Council Regulations (EC) No 2328/2003, (EC) No 861/2006, (EC) No 1198/2006 and (EC) No 791/2007 and Regulation (EU) No 1255/2011 of the European Parliament and of the Council. The Regulation presents the objectives, the fields of application, the implementation of the programs at national level, measures financed from the European Maritime and Fisheries Fund. Chapter 1 Article 5 European Maritime and Fisheries Fund (EMFF) contributes to the following aquaculture objectives: (a)promoting competitive, environmentally sustainable, economically viable and socially responsible fisheries and aquaculture; (c)promoting a balanced and inclusive territorial development of fisheries and aquaculture areas; Chapter 2 Articles 45-57 presents the types of operations in the aquaculture sector that can be financed through EMFF, respectively: - Innovation; - Productive investments in aquaculture; - Management, relief and advisory services for aquaculture farms; - Promotion of human capital and networking; - Increasing the potential of aquaculture sites; - Encouraging new aquaculture farmers practicing sustainable aquaculture; - Conversion to eco-management and audit schemes and organic aquaculture; - Aquaculture providing environmental services; - Public health measures; - Animal health and welfare measures; - Aquaculture stock insurance. Chapter 3 Articles 58-69 mentions that EMFF supports the sustainable development of fisheries and aquaculture areas through the implementation of local development strategies under the responsibility of the community, elaborated and implemented by the Local Action Groups in the field of fisheries. The objectives related to aquaculture, which can be financed under the local development strategies placed under the responsibility of the community, are the following: - adding value, creating jobs, attracting young people and promoting innovation at all stages of the supply chain of fishery and aquaculture products; - supporting diversification inside or outside commercial fisheries, lifelong learning and job creation in fisheries and aquaculture areas;

[51] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2014.149.01.0001.01.ENG

	- enhancing and capitalizing on the environmental assets of the fisheries and aquaculture areas, including operations to mitigate climate change; - promoting social well-being and cultural heritage in fisheries and aquaculture areas, including fisheries, aquaculture and maritime cultural heritage; - strengthening the role of fisheries communities in local development and the governance of local fisheries resources and maritime activities.
Aquaculture in EU Policies	
Environment	**EU Water Framework Directive**[52] The purpose of this Directive is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater which: (a) prevents further deterioration and protects and enhances the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems; (b) promotes sustainable water use based on a long-term protection of available water resources; (c) aims at enhanced protection and improvement of the aquatic environment, inter alia, through specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances; (d) ensures the progressive reduction of pollution of groundwater and prevents its further pollution, and (e) contributes to mitigating the effects of floods and droughts.
	Environmental Impact Assessment – EIA[53] The environmental legislation of the Union includes provisions enabling public authorities and other bodies to take decisions which may have a significant effect on the environment as well as on personal health and well-being. Union policy on the environment is based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should, as a priority, be rectified at source and that the polluter should pay. Effects on the environment should be taken into account at the earliest possible stage in all the technical planning and decision-making processes.
	Provisions on Invasive Alien Species in the EU[54] REGULATION (EU) No 1143/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species[55] This Regulation sets out rules to prevent, minimise and mitigate the adverse impact on biodiversity of the introduction and spread

[52] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32000L0060&from=EN
[53] https://ec.europa.eu/environment/eia/eia-legalcontext.htm
[54] https://ec.europa.eu/environment/nature/invasivealien/index_en.htm
[55] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014R1143&from=EN

	within the Union, both intentional and unintentional, of invasive alien species.
Health and welfare	**Animal health conditions of aquaculture animals and products**[56] COUNCIL DIRECTIVE 2006/88/EC of 24 October 2006 on animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals, as amended[57] This Directive lays down: (a) the animal health requirements to be applied for the placing on the market, the importation and the transit of aquaculture animals and products thereof; (b) minimum preventive measures aimed at increasing the awareness and preparedness of the competent authorities, aquaculture production business operators and others related to this industry, for diseases in aquaculture animals; (c) minimum control measures to be applied in the event of a suspicion of, or an outbreak of certain diseases in aquatic animals.
	Provisions on live animals[58]
	Provisions on animal feed including hygiene and medication[59] REGULATION (EU) 2017/625 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 March 2017 on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products[60] COMMISSION REGULATION (EC) No 152/2009 of 27 January 2009 laying down the methods of sampling and analysis for the official control of feed, as amended[61]
	Medicinal products for veterinary use[62] REGULATION (EU) 2019/6 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2018 on veterinary medicinal products and repealing Directive 2001/82/EC[63] This Regulation lays down rules for the placing on the market, manufacturing, import, export, supply, distribution, pharmacovigilance, control and use of veterinary medicinal products. REGULATION (EU) 2019/4 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2018 on the manufacture, placing on the market and use of medicated feed, amending Regulation (EC) No 183/2005 of the European Parliament and of the Council and repealing Council Directive 90/167/EEC[64]

[56] https://ec.europa.eu/food/animals/animalproducts/aquaculture_en
[57] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32006L0088&from=EN
[58] https://ec.europa.eu/food/animals/live_animals/aquaculture_en
[59] https://ec.europa.eu/food/safety/animal-feed_en
[60] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32017R0625&from=en
[61] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02009R0152-20140717&from=EN
[62] https://ec.europa.eu/food/animals/health/veterinary-medicines-and-medicated-feed_en
[63] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019R0006&from=EN
[64] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019R0004&from=EN

	This Regulation lays down specific provisions regarding medicated feed and intermediate products, which are additional to Union legislation on feed.
	Animal welfare[65] Council Directive 98/58/EC of 20 July 1998 concerning the protection of animals kept for farming purposes, as amended[66] This Directive lays down minimum standards for the protection of animals bred or kept for farming purposes.
	Provisions on food hygiene and food-borne diseases[67] Regulation (EC) No 999/2001 of the European Parliament and of the Council of 22 May 2001 laying down rules for the prevention, control and eradication of certain transmissible spongiform encephalopathies, as amended[68] This Regulation lays down rules for the prevention, control and eradication of transmissible spongiform encephalopathies (TSEs) in animals. It shall apply to the production and placing on the market of live animals and products of animal origin and in certain specific cases to exports thereof.
Trade	**Exporting from the EU**[69]
	Import into the EU[70]
Consumer information	**Labelling, presentation and advertising of foodstuffs**[71] REGULATION (EU) No 1169/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 October 2011 on the provision of food information to consumers, as amended[72] This Regulation establishes the general principles, requirements and responsibilities governing food information, and in particular food labelling. It lays down the means to guarantee the right of consumers to information and procedures for the provision of food information, taking into account the need to provide sufficient flexibility to respond to future developments and new information requirements. A pocket guide to the EU's new fish and aquaculture consumer labels[73]
	The common organisation of the markets in fishery and aquaculture products[74]

2.2.2. National Legislation

There are also several national regulations regarding fisheries and aquaculture in Romanis (Table 2.2)

[65] https://ec.europa.eu/food/animals/welfare_en
[66] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:31998L0058&from=EN
[67] https://ec.europa.eu/food/safety/biosafety/food_borne_diseases/tse_bse_en
[68] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32001R0999&from=EN
[69] https://madb.europa.eu/madb/indexPubli.htm
[70] https://ec.europa.eu/trade/import-and-export-rules/import-into-eu/
[71] https://ec.europa.eu/food/safety/labelling_nutrition/labelling_legislation_en
[72] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32011R1169&from=en
[73] https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/eu-new-fish-and-aquaculture-consumer-labels-pocket-guide_en.pdf
[74] https://ec.europa.eu/fisheries/cfp/market/consumer-information

Table 2.2. National legislations in Romania

National Laws	Brief description
Government Urgency Ordinance no. 23 dated March 5 regarding fishing and aquaculture with further modifications and completions[75]	This urgency ordinance regulates protection, preservation, administration and exploitation of aquatic living resources, *aquaculture activity*, processing and trading of products obtained from fishing and aquaculture, when such activities are performed on the Romanian territory. The implementation of the actions provided by this ordinance is done by the National Agency of Fisheries and Aquaculture. According to the ordinance, *aquaculture includes all activities of animal or vegetal production within the aquatic environments* and should be developed taking into account the following issues: • Aquaculture is performed in arranged aquaculture farms and aquatic ecosystems, with their owner/administrator consent, and only in designated, natural identified ecosystems, under the terms set by order of the Ministry of Agriculture and Rural Development, upon proposal of the National Agency for Fisheries and Aquaculture, on the basis of the multiannual national strategic Plan for aquaculture. • Aquaculture development aims diversity of quantity and quality offer for fish and other aquatic creatures highlighting all fisheries, irrespective of their owner. • Using water for aquaculture activity within fisheries is done under the applicable terms of law for waters. • The period for concession is set by the concession provider on the basis of an opportunity study, in order to ensure legal safety and predictability of any kind of contracts regarding the aquaculture activity for any purpose, as well as to stimulate investments in aquaculture. • Public institutions, as well as trading companies mostly with state owned capital, that own fisheries, have the obligation to communicate on yearly basis, by the 30th of November, to the National Agency for Fishing and Aquaculture, the inventory of fisheries of any kind that are used or can be used for aquaculture activities, according to this Urgency Ordinance. • The level of royalty/rent required for fisheries will take into account the categories of fisheries creditworthiness existing in Romania, established on the basis of some studies issued by specialized institutions in the fisheries sector. On the basis of such studies, the level of royalty/rent required for aquaculture activity will be established according to the provisions of art. 4 in the Government Urgency Ordinance no. 54/2006 regarding the status of concession agreements for public property goods, approved with modifications by Law no. 22/2007. Aquaculture development is performed by the following actions: ▪ encouraging the extensive and semi-intensive aquaculture which

[75] http://legislatie.just.ro/Public/DetaliiDocument/90207

	creates environmental values; ▪ improvement of trading and consumers information system; ▪ training of aquaculture producers; ▪ implementing good practices actions in technological processes in order to ensure bio-safety and food safety of aquaculture products; ▪ insurance of aquaculture production for force majeure events; ▪ aquatic environment and biodiversity safety; ▪ development of research and technological progress; ▪ protection and encouragement of aquaculture producers through specific regulations; ▪ homologation/certification/approval of fishing nurseries. The actions for aquaculture development aim: ▪ upgrading of processes for reproduction and culture of fish species and other aquatic creatures, in relation with the environment safety norms; ▪ ensuring the access to waters and space for operators in aquaculture, under the terms of law; ▪ setting quality indicators and ecological, economic and social sustainability indicators; ▪ proper use of fisheries; ▪ marine and continental aquaculture development, under the conditions of ensuring animal health and welfare; ▪ ensuring long-term employment in aquaculture, especially in fishing-dependent areas; ▪ other actions required by the aquaculture development needs. The *Register of Aquaculture Units* of administrative kind, including all production capacities, is set within the National Agency for Fisheries and Aquaculture. Any modification related to the change of the owner or administrator, as well as modifications related to change of production capacity and cultured species should be communicated to the National Agency for Fisheries and Aquaculture, in order to update the Register of Aquaculture Units and issue a new aquaculture license, as applicable. The production units in aquaculture are registered in the Register of Aquaculture Units and receive aquaculture licenses, issued by the National Agency for Fisheries and Aquaculture. The registration in the Register of Aquaculture Units and the issue of aquaculture licenses are done under the terms set by the Ministry of Agriculture and Rural Development, approved by Order of the Ministry of Agriculture and Rural Development, upon the proposal of the National Agency for Fisheries and Aquaculture. Partial or total change of production capacities destination in aquaculture is done on the basis of some assessment studies on environmental impact and will be approved by Order of the Ministry of Agriculture and Rural Development. The introduction of exotic or locally absent species in culture in open system fisheries is made with the approval of the Ministry of Agriculture and Rural Development and the Ministry of Environment,

	Waters and Woods, on the basis of some studies establishing also the terms for quarantine and control in order to avoid escapes into natural environment. Recovery of assets and fisheries located on the state public/private domain is done, if applicable, by concession, lease, rent or other forms provided by law. Marine aquaculture is performed in fish wells located in natural aquatic environments. Marine aquaculture is done through concession of the marine water surface area and the access to it, by the administrative authority responsible for waters management, for a 10 years period, with possibility for extension, under the terms of law. The terms and conditions for issuing and withdrawal of the approval for marine aquaculture are set by Order of the central public authority that is responsible for fishing and aquaculture, through the National Agency for Fisheries and Aquaculture. The introduction of fish species and other cultures into marine fisheries, irrespective of their origin, is made with approval from the central public authority in charge with fisheries and aquaculture and the central public authority in charge with the environment. ***Market organization for fishery products*** Upon proposal of the National Agency for Fisheries and Aquaculture, the Ministry of Agriculture and Rural Development sets actions regarding the trading and processing of products obtained from fisheries and aquaculture, especially for: ▪ compliance with quality standards for fishery products during the entire trading process period in order to ensure transparency on the market and to make the proper information of consumers possible, especially regarding the origin of the products; ▪ compliance with the norms related to trading of products resulted from fishery and aquaculture, according to the norms for preservation and safety of living aquatic resources; ▪ encouraging and support of fishery products processing; ▪ quality improvement and promoting of fishery products; ▪ increasing the extent of use and added value for the raw material obtained from fisheries and aquaculture. *Trading of fishery products* It is forbidden to trade fishery obtained products, of any origin or source, which have a lower size or weight than the one provided by the applicable regulations or their obtaining manner is not according to the established norms or is against the sanitary-veterinary norms. *Liabilities and penalties* Failure to comply with the dispositions of this urgency ordinance by natural or legal persons results in administrative, civil, or criminal liability, if applicable. In order to ensure the compliance with the laws in the field of fisheries,

	aquaculture, processing, transport, trading of fishery products and other related activities, the National Agency for Fisheries and Aquaculture organizes permanent actions of inspection and control through fishery inspectors. The persons who are subject to control have the obligation to allow access to the headquarters and branches of the controlled units, to all fishing ships/crafts, fishing tools and installations, aquaculture farms and installations, annex-buildings, vehicles, processing, trading and public feed units and to provide for the personnel with rights for inspection and control all the documents and means needed to fulfill their inspection and control function and also to provide statistical data according to the activities provided by community statistic programs and legal documents in the fishery sector.
Order no 332 dated May, 24, 2008 of the Ministry of Agriculture and Rural Development, regarding the registration of the aquaculture production units in the Register of Aquaculture Units and the issuing of the aquaculture license, with further modifications and completions[76]	The Order stipulates the operation of the *Register of Aquaculture Units (RUA),* within the National Agency for Fisheries and Aquaculture, having administrative kind and including all production capacities. The aquaculture production units are registered in the Register of Aquaculture and receive a license for aquaculture issued by the Agency. As per the Order, the aquaculture license is not transmittable and is issued for non-determined period. Any modification regarding the change of owner/administrator, production capacities and cultured species will be communicated to the Agency within 30 days after occurrence, in order to update the Register of Aquaculture Units and issue a new aquaculture license, if applicable. Upon proposal of personnel with rights for inspection and control, the aquaculture license is cancelled/suspended for a 90 days period, in case the economic operator does no longer comply with the conditions that were the basis of releasing the aquaculture license or uses the production capacity for other purposes than the ones declared. The production units in aquaculture for which the aquaculture licenses were cancelled will be excluded from the Register of Aquaculture Units.
Romanian Government Decision no. 1016 dated September, 3, 2008 regarding the amount of the fees for licensing and approval in fisheries and aquaculture[77]	This decision *sets the amount of fees charged by the Romanian State for the approval of fisheries and aquaculture activity,* for issuing of permits, licenses and approvals by the National Agency for Fisheries and Aquaculture. A fee amounting to 150 lei (approximately 31 euro) is paid by the administrator or approved representative for the issuing of an aquaculture license.
Romanian Government Decision no. 748	This Decision sets up a state aid scheme for enterprises that perform

[76] http://legislatie.just.ro/Public/DetaliiDocument/93609
[77] http://legislatie.just.ro/Public/DetaliiDocument/97179

dated September, 20, 2018 regarding the set-up of a state aid scheme for reducing the excise duty on gas oil used in aquaculture, with further modifications and completions[78]	their activity in production, processing and trading of products obtained from aquaculture. This scheme is applied on the entire Romanian territory. Scheme beneficiaries may be small and medium-sized enterprises that perform their activity in aquaculture, respectively: ▪ certified natural persons, individual and family type enterprises, established according to the provisions of the Government Urgency Ordinance no. 44/2008 regarding the performance of economic activities by certified natural persons, individual and family type enterprises, approved with modifications and completions by Law no. 182/2016; ▪ legal persons. The state aid scheme means reduction of excise duty that is granted as reimbursement. The amount of reduced excise duty for gas oil used for activities in aquaculture is 99 498 lei/1 000 litres (approximately 20 728 euro/1 000 litres). In order to access the state aid scheme, the beneficiaries provided in art. 3 should meet all the following eligibility criteria: ▪ are recorded in the Register of Aquaculture Units; ▪ provide ANPA with statistic data regarding surfaces and achieved production, according to the activities provided in European statistic programs and legal documents for fisheries sector.
Law no. 28 dated 2019 regarding the approval of the Program for supporting the producers in the fisheries and aquaculture sector[79]	The law sets up a state aid scheme aiming the implementation of the Program for supporting the producers in the fisheries and aquaculture sector, in order to improve the performance and sustainability level of the aquaculture farms, through production improvement. The state aid is granted to beneficiaries producers in the fisheries and aquaculture sector, as follows: ▪ certified natural persons, individual and family type enterprises, established on the basis of Government Urgency Ordinance no. 44/2008 regarding the performance of economic activities by certified natural persons, individual and family type enterprises, approved with modifications and completions by Law no. 182/2016; ▪ legal persons. The eligible expenses needed to make investments based on the provisions of this law are: ▪ building of reproduction centres for fish species used in aquaculture or species that are about to be introduced; ▪ upgrading and/or extending of existing centres for fish reproduction; ▪ purchasing or leasing of machinery and equipment; ▪ general costs related to investments provided at letters a)-c), such as fees for specialists and consultants, fees for counseling regarding

[78] http://legislatie.just.ro/Public/DetaliiDocument/205095
[79] http://legislatie.just.ro/Public/DetaliiDocument/209956

	environmental and economic sustainability, including feasibility studies; ▪ purchasing or development of software; ▪ investments aiming to decrease the negative impact or increase the positive effects upon the environment and increase the efficient use of resources; ▪ investments resulting in a considerable decrease of the impact of aquaculture enterprises on water use and quality, by reducing the chemicals, antibiotics and other drugs used or by improving the resulted water quality, including by using multitrophic aquaculture systems. (1) The extent of the state aid for the eligible expenses provided above is 40% of the total eligible expenses. (2) The intensity of the state aid can be increased by 20%, but not more than 90%, for the eligible expenses provided at letters a)-f), for: ▪ farmers who have worked for at least 5 years in aquaculture and young farmers; ▪ investments that are done in areas facing natural or other specific restraints; ▪ members of aquaculture producer organizations.
Order of the Ministry of Agriculture and Rural Development no. 267 dated April, 9, 2019, for the approval of the eligibility conditions, eligible expenses, the manner of funding, as well as the manners of verification and control on the application of the provisions of Law no. 28/2019 regarding the approval of the Program for supporting the producers in the fisheries and aquaculture sector[80]	The Order sets up the eligibility conditions, eligible expenses, the way of funding, as well as the manner of verification and control on the application of the provisions of Law no. 28/2019 regarding the approval of the Program for supporting the producers in fisheries and aquaculture sector.
Order of the Ministry of Agriculture and Rural Development no. 171 dated April, 19, 2002 regarding the approval of the commercial names of fish species and other aquatic living creatures that can be exploited on the Romanian territory, with further modifications and completions[81]	The Order sets up the commercial names of fish species and other aquatic living creatures that can be exploited on the Romanian territory. Economic Agents trading fish species and other aquatic living creatures have the obligation to comply with the commercial names provided by this order.

[80] http://legislatie.just.ro/Public/DetaliiDocument/212930
[81] http://legislatie.just.ro/Public/DetaliiDocument/36064

<table>
<tr>
<td>Order of the Ministry of Agriculture and Rural Development no. 772/2007 regarding the criteria for the recognition of producer organizations in fisheries and aquaculture sector, with further modifications and completions[82]</td>
<td>The fishing areas and the minimum volume of annual production, measured in tons reached/number of members/represented trading fishermen, that are required to recognize producer organizations in fisheries and aquaculture is as provided in annex no. 1

Annex 1
<table>
<tr><td>Type of producer organization</td><td>Area/minimum volume of annual production/minimum number of members/represented trading fishermen</td></tr>
<tr><td>2. Aquaculture</td><td>If the said organization produces minimum 30% in weight from the total production for a species or group of species in aquaculture, at national level</td></tr>
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2.3. Turkey

2.3.1. Fisheries Law, No: 1380[83]

Law is about 50 years old and amended several times due to update the contents in line with the changes by international conventions, FAO fisheries management principles (Code of Conduct), harmonization with EU Common fisheries Policy after 2000 and other international initiatives (marine pollution, climate change, biodiversity, invasive species, etc.). The last update was done on 06/11/2019 to be active on 01,01,2020 with the Law 7191.

Fisheries Law is formed by 9 chapters and 39 articles. First chapter defines the scope and aim of the Law and some of the terms mentioned in the related articles to prevent any possible confusions. Second Chapter regulates fishing activities: certification, renting public sites for fishing and aquaculture (short and long term, to be detailed in aquaculture regulation), procedures to clarify the borders of aquaculture site, measures need to be protecting natural habitats (determined by MAF). Article 4 and 13 regulates aquaculture investments more briefly:

“The areas in the sea and inland waters needed to be used for aquaculture either owned by the Treasury or the General Directorate of State Hydraulic Works, or under the jurisdiction of the State, for the construction of the farms on land or inland waters, or other aquaculture investments to be made on the basis of the project by rehabilitating these areas, the leasing method and technical conditions, duration and annual costs of the aquaculture permissions in the sea and inland waters are determined by the Ministry of Agriculture and Forestry, taking into account the characteristics of the production sites, These places can be leased by the Ministry of Agriculture and Forestry, to real or legal entities, incomes to be transferred to Provincial Special Administrations, and to the Office of Investment Monitoring and Coordination if they are absent”.

The lease transactions of the terrestrial areas that will be needed for the investments to be made with a project, within the framework of the provisions of this article; If the immovable is registered, it is made by the owner of the property, and if it is among the areas that are under the terms of the State, and by the units of the General Directorate of National Real Estate.

Appropriate opinion is obtained from the Ministry of Environment and Urbanization and the Ministry of Culture and Tourism when determining aquaculture areas on land by taking water from sea and inland waters

[82] http://legislatie.just.ro/Public/DetaliiDocument/86176
[83] https://www.resmigazete.gov.tr/arsiv/13799.pdf; https://www.resmigazete.gov.tr/eskiler/2019/11/20191122-1.htm

or from these places; if no response is given within sixty days, appropriate opinion is deemed to have been given.

The procedures and principles regarding the commercial, amateur, recreational hunting and fish farming activities to be carried out in the areas where the right of lease is rented, and the types that are rented out, are determined by the regulation issued by the Ministry of Agriculture and Forestry.

Chapter 3 is focused on development, incentives and protection, In order to increase production, investors are encouraged by the MAF, if they are involve in research and development activities for the new species, or subsidized in order to support business to increase production sites and capacities.

Chapter 4 regulates prohibitions and provisions, mainly for capture fisheries.

2.3.2. Fisheries Regulation[84]

This regulation has been prepared by the Ministry on the basis of Article 13 of the Fisheries Law No, 1380, and published in the Official Gazette Dated: 29,06,2004, No: 25507, The purpose of the Regulation is to use potential of water resources of Turkey with the most productive way ensuring sustainability in aquaculture, by protecting the environment and providing aquaculture investments in a planned way for quality / safe food supply, and effective inspection and monitoring during production processes.

It covers wide range of aquaculture investments to be established in seas, inland waters and adjacent localities, site selection, implementation method and evaluation process of demands, preliminary permit, project approval (final permission), project cancellation, project changes, trial production, mandatory site changes, establishment of integrated facilities, project transfers to third parties. Bluefin tuna fattening farms, organic seafood culture, certification process for aquaculture farms, import of egg, juveniles and brood fish, employment of technical staff, health and sanitation issues, environmental impacts, and protection and control issues.

2.3.3. Aquaculture Regulation (Dated 29.06.2004, OJ No: 25507)[85]

The purpose of this Regulation is to use potential of water resources of Turkey with the most productive way ensuring sustainability in aquaculture, by protecting the environment and providing aquaculture investments in a planned way for quality / safe food supply, and effective inspection and monitoring during production processes.

First section of the regulation defines the terms used in the document in order to prevent any misunderstandings. Second section focuses on the procedures to establish fish farms and requirements. More practical process for the implementation of farms; permits, approval of the applications, project phase are the main topics in section three for the use of investors. There are clear information about the possibility of trial production, transfer of the farm to another investor, aquaculture certificate, cancellation and changes in the project, mandatory location changes, etc.(Annex 1).

2.3.4. Directive on the Implementation of Aquaculture Regulation[86]

In order to simplify procedures for the investors, this directive (2006/1) was prepared in relation with the Amended Regulation on the Fish Farm Implementation Regulation dated 15,10,2005, No: OJ 25967, Some articles of the Directive have been reorganized and the procedures and principles regarding implementation are given more briefly (Annex 2).

[84] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=4988&MevzuatTur=7&MevzuatTertip=5
[85] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=5217&MevzuatTur=7&MevzuatTertip=5
[86] https://www.tarimorman.gov.tr/Belgeler/Mevzuat/Genelgeler/2006_1genelge.pdf

2.3.5. The regulation on the aquatic animals for health conditions and diseases against diseases[87]

This regulation aims:

a) regulate the health conditions to be applied for aquatic animals or their products while they are imported, or transit process and presented to the market.

b) to increase the awareness of the competent authority, fish farmers and parties in the processing industry regarding minimum preventive measures,

c) Minimum control measures to be taken in case of suspect to any fish diseases or carry out the protocols if any diseases occur.

Scope of the regulation covers the registry of fish farms, species, processing plants and their activities; measures to control fish diseases, health conditions for fish and products to be applied in farm, processing plant, in market and imports. Other aquaculture activities such as production of ornamental fish, animals raised in non-commercial aquariums, wild aquatic animals collected or caught directly from the nature such as pets kept in pet stores, garden ponds, commercial aquariums or wholesalers, in establishments without direct contact with the country's natural waters or in enterprises with a waste treatment system that reduces the risk of disease contamination to natural waters to an acceptable level, are not covered by this regulation.

This Regulation is based on the Veterinary Services, phytosanitary, food and feed Law No. 5996 dated 11/6/2010; The European Union Council Directive on the Animal Health Requirements and the Prevention and Control of Specific Diseases in Aquatic Animals and Animal Health Requirements for Aquatic Animals and Products dated 24/10/2006 and numbered 2006/88 / EC; In parallel with the Commission Decision dated 12/12/2008 and numbered 2008/946 / EC on the Requirements for Quarantine Aquatic Animals.

2.3.6. Regulation on the requirements of fish wholesale and retail sales[88]

This Regulation has been prepared in order to ensure that the fishery products are supplied to the consumer in fast and reliable manner in accordance with the hygiene, quality and standards in free competition conditions.

Its scope is to cover the minimum requirements on general, technical, hygienic, physical and infrastructure conditions to be complied with in the wholesale markets and retail shops to be established by municipalities and / or natural and legal persons, and the establishment, their operation, management and the procedures and principles regarding the conditions that employees in the salesplaces should have, and the matters of control and inspection. This Regulation has been prepared on the basis of Articles 23 and 26 of the Fisheries Law No. 1380, amended by Law No. 3288 (OJ dated 19/06/2002, N0:24790).

2.3.7. Circular on Granting Work Permit to Fish Processing Plants[89]

It is very important today to establish fish processing facilities in accordance with technical and hygienic conditions, to carry out the processing process within the framework of these conditions, and to supply quality and safe seafood products suitable for human consumption to the market. In order to ensure these, aquaculture plants must firstly meet the infrastructure, technical and hygiene conditions specified in the fisheries legislation. If the facilities are in compliance with the required conditions and will work within these conditions, it is documented with the facility work permit. Accordingly, the circular has been prepared in order to enable the processing facilities to start working before they become operational, to determine the

[87] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=15854&MevzuatTur=7&MevzuatTertip=5; https://www.tcmevzuat.com/normlar/yonetmelik/ su-hayvanlarinin-saglik-kosullari-ile-hastaliklarina-karsi-korunma-ve-mucadele-yonetmeligi/#
[88] https://www.tarimorman.gov.tr/Belgeler/Mevzuat/Yonetmelikler/suurunleri_toptanveparekende_satisyerleri_yonetmeligi.pdf
[89] https://www.tarimorman.gov.tr/Belgeler/Mevzuat/Genelgeler/suurunlericalismaiznigenelge.pdf

procedures to be followed with the work permit, and to clarify the procedures to be performed in this direction for the operating facilities and to provide unity in practice (Circular No. 2002/17).

2.3.8. Environment Law[90]

Environment Law (No: 2872) enacted in 1983 (OJ dated 11/8/1983, No: 18132) aims to protect the environment, which is the common asset of all living things, in line with the principles of sustainable environment and sustainable development. Inland and marine waters, soil, air and water pollution, pollutants, ballast waters, invasive species, treatment, biodiversity, habitat and habitat conservation, special protected and marine protected areas are the components of Environment Law.

2.3.9. Regulation on water pollution monitoring[91]

The purpose of this Regulation is to determine the legal and technical principles necessary to achieve the prevention of water pollution in line with sustainable development objectives, in order to protect the country's potential for underground and surface water resources and to ensure its best use.

This Regulation covers the quality classifications and uses of water environments, planning principles and prohibitions for the protection of water quality, the principles of wastewater discharge and discharge permits, the principles regarding waste water infrastructure facilities, and the monitoring and inspection procedures and principles to be carried out to prevent water pollution (OJ dated 31.12.2004, No: 25687).

2.3.10. Communique on the determination of areas where fish farms could not be installed in closed bay and gulfs[92]

The purpose of this Communiqué is to clarify the principles for the determination of sensitive areas with high risk of eutrophication in closed bay and gulf areas, in accordance with the clause (h) of Article 9 of the Environmental Law No. 2872 dated 9/8/1983 and the temporary second article (OJ dated 24.01.2007; No: 26413). According to the legislation, cage units can only be installed at the places over 30 m depth, 0.6 nautical miles off the coast and minimum 0.1 m per second current speed (OJ dated 24.01.2007, No: 26413).

2.3.11. Communique on monitoring of fish farms in the seas[93]

The purpose of this Communiqué is to determine the principles for the monitoring of the pollution that may result from fish farming activities of installed or to be installed in the seas. It has been prepared based on the relevant provisions of the Environmental Law No. 2872 dated 9/8/1983 and Article 54 of the Water Pollution Control Regulation published in the OJ dated 31/12/2004; no 25687.

It describes the method locating the cage units regarding current direction, water sampling from production sites and store conditions, analyses and parameters used in monitoring process (OJ dated 13.06.2009, No: 27257; amended OJ 09.04.2010, No: 27547).

2.3.12. Communique on water quality standards related to shellfish farming[94]

This Communiqué aims to determine the quality standards of waters in which shellfish farming will be carried out, to protect the waters production site from various harmful effects of pollutants discharged into these waters, improve the quality of waters by creating monitoring and pollution reduction programs.

[90] https://www.mevzuat.gov.tr/MevzuatMetin/1.5.2872.pdf
[91] https://www.jmo.org.tr/mevzuat/mevzuat_detay.php?kod=135
[92] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=11034&MevzuatTur=9&MevzuatTertip=5
[93] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=13117&MevzuatTur=9&MevzuatTertip=5
[94] https://cygm.csb.gov.tr/tebligler-i-441

It covers the issues related to the determination of the water quality standards of shellfish farming sites, water sampling and monitoring protocols, determination of the suitability of the waters for shellfish farms established in future as well as protection and pollution reduction action programs together with inspection methods.

This Communiqué has been prepared based on the provisions of the Fisheries Law No. 1380 dated 22/3/1971 and the Environmental Law No. 2872 dated 9/8/1983 (OJ Dated 06.11.2009, No: 27398)

2.3.13. Statistics Law[95]

The purpose of this law is to determine basic principles and standards concerning the production and organisation of official statistics; and to regulate the formation, duties, and authorities of the Turkish Statistical Association (TURKSTAT); previously was Turkish Statistical Institute, which is to compile and assess data and information, produce, publish and disseminate statistics on the areas that country needs, and to ensure coordination among institutions and organizations that are involved in the statistics process prescribed in the Official Statistics Programme.

Official statistics are produced, disseminated and published by the Presidency of the Turkish Statistical Institute and institutions and organisations specified in the Programme. The Programme shall clearly define the duties and authorities of the institutions and organisations regarding the compilation, evaluation and publication of data relating to official statistics in the context of their work areas. These institutions and organisations are obliged to submit any compiled data to the Presidency on time, upon request. The principle of confidentially is duly observed in the maintenance and protection of data and information submitted to the Institute by determining the confidentiality principles in other legislative arrangements. The Presidency is authorised to publish and disseminate the official statistics compiled by institutions and organisations.

The work carried out by institutions and organisations in statistical areas which are not covered by the Programme and the results of censuses or surveys conducted by real persons and legal entities under special law shall not be considered official statistics.

In case the real persons or legal entities under special law who conduct surveys containing statistical outcomes and make their results public through the media, they are obliged to inform the public about the coverage, sampling method, sampling volume, data compilation method and implementation time together with the survey results.

2.4. Ukraine

2.4.1. European legislation in the field of aquaculture

The aquaculture industry is a significant maritime food sector, which is worth about EUR 4 billion to the European Union's (EU) economy annually. Moreover, aquaculture has increased in importance with the depletion of wild fish stocks and has evolved over the past decade into a sector that is heavily regulated at minimum 0.1both EU and national levels in the Member States.

This section presents a brief overview of the relatively complex and disparate laws on the management of aquaculture in the EU. As will be seen below, EU legislation touches all aspects of the industry, both directly and indirectly, including licensing, planning, environmental protection, consumer safety, as well as providing a framework for resolving conflicts with other uses of the marine environment in the form of maritime spatial planning measures. Furthermore, aquaculture is one of the five strands that make up the EU's Blue Growth Strategy, and its future development can thus contribute to the economic prosperity of the Member States

[95] http://www.turkstat.gov.tr/UstMenu/yonetmelikler/StatisticsLawOfTurkey.pdf

through the creation of employment in the so-called blue economy and by providing high quality products to the European and global seafood markets.

At appropriate points in the text below, reference is made to a number of specialist studies on the subject. At the outset, a number of preliminary points may be made about aquaculture in general and the EU approach to aquaculture law and policy more specifically. First, aquaculture accounts for nearly one fifth of total fish production in terms of volume in the EU.

In some instances participants in these industries have opposed the licensing of aquaculture on the grounds that it poses a threat to a public amenity – namely, the coastal environment. Furthermore, these conflicts have been aggravated by the fragmented nature of the regulatory environment, as well as inadequate provisions in the planning code and laws applicable to the use of the foreshore and the coastal zone in many Member States.

The term 'aquaculture' has a number of meanings in international, EU and the national law of the Member States. EU law defines the term to mean [the] the rearing or cultivation of aquatic organisms using techniques designed to increase the production of the organisms in question beyond the natural capacity of the environment; the organisms remain the property of a natural or legal person throughout the rearing or culture stage, up to and including harvesting.

A similarly expansive approach is taken by the EU to the definition of 'aquaculture products', which is understood to mean 'aquatic organisms at any stage of their life cycle resulting from any aquaculture activity or product derived therefrom'. This broad inclusive approach is also evident in the law of several Member States, where the term aquaculture is used as a blanket description to describe all forms of fish farming and shellfish production. This may cover the many processes involved in rearing fish species through the provision of food and protection from predators and disease. In the case of shellfish farming, it usually involves growing shellfish beyond the natural capacity of the marine environment to initiate and sustain such growth. Furthermore, the definition is not limited by reference to the uses to be made of aquaculture products. Thus the rearing of organisms for purposes other than for human consumption comes within the scope of the definitions as does presumably the farming of ornamental fish as well as the production of aquatic products for the biotechnology and pharmaceutical industries.

Moreover, there also appears to be considerable scope for the industry to grow to meet the shortfall in supply if appropriate management measures and policies are adopted and implemented by the Member States over the coming decade.

European Court of Auditors (ECA), which published a highly critical report regarding measures to support aquaculture in September 2014. ECA concluded that the framework to develop aquaculture at both EU and Member State level was weak, and the measures actually taken did not deliver sufficient results.

At EU level, the Common Fisheries Policy (CFP) and European Fisheries Fund [EFF] did not provide a suitable framework to develop the sector. There was a lack of guidance from the Commission services on key environmental issues such as the water framework directive and the environmental impact assessment directive. There was insufficient comparability between data on aquaculture from different EU sources, which makes the results of aquaculture measures difficult to assess.

At Member State level, national strategic plans and operational programmes did not provide a sufficiently clear basis for the support of aquaculture, and there was no coherent strategy for the sector. The lack of appropriate spatial planning, coupled with complicated licensing procedures, acted as a brake on sustainable development. The aquaculture projects which received funding from the EFF were often poorly selected and, with some exceptions, did not deliver the expected results or value for money.

As a result, EU aquaculture has failed to develop to anywhere near its potential in marked contrast, as discussed in the introduction to this volume, with global developments in the industry. In order to better understand these findings the next section outlines some regulatory and policy milestones concerning the development of the policy in the EU since the 1980s and highlights some legislative reforms and policy initiatives that aim to address the shortcomings revealed by the COA report.

With the benefit of hindsight, if one compares aquaculture with commercial sea fisheries in Europe, it is clear that the former has only come within the spotlight of EU legislators and policy-makers over the past decade or so. Most noticeably and mainly for reasons associated with the national sovereignty of the Member States, little effort was made by the European institutions to develop a distinctive aquaculture policy for the sector during the first 20 years of the CFP from 1983 through to 2002. In the main, the principal focus of European Community (EC) policy in the 1980s and 1990s was directed at supporting the marketing of aquaculture products and mitigating the environmental impacts through the prescription of standards for water quality and food safety. The initial focus was on the farming of salmon, trout and oysters. The EC provided financial assistance to the Member States to help the development of aquaculture. This aid was considerable and amounted to EUR 300 million from European funds during the period 1994 to 1999. Most noticeably, during that particular period, EC law had little or no bearing on the licensing or management of aquaculture enterprises in the Member States. With the enlargement of the EC, however, the cultivation of crustaceans and molluscs (mussels and clams predominantly) became increasingly important for the sector, and it became apparent that there was a need for a more comprehensive and integrated policy at EU level with a view to drawing the disparate regulatory strands together in a more coherent fashion.

From a management perspective, the first major milestone arose during the course of the deliberations leading up to the reform of the CFP in 2002. In particular, the European Commission sought to integrate a broad number of measures aimed at improving food safety and protecting the environment into a discrete aquaculture policy. These objectives were addressed in a Communication published by the European Commission, which set out a strategy for the sustainable development of European aquaculture published in 2002 (Communication from the Commission to the Council and European Parliament – A Strategy for the Sustainable Development of European Aquaculture. COM(2002) 511 final). This strategy aimed to improve the competitiveness, productivity and sustainability of the industry at a pan-European level. Furthermore, for the first time, the Strategy acknowledged the important role that aquaculture plays in rural and coastal development.

From a legislative standpoint, the adoption of Regulation 2371/2002 by the Council of Fisheries Ministers marked the start of a more integrated approach by European institutions to the future regulation of the industry in so far as it provided an express legal plinth for the adoption of management measures. This regulation reflected many of the principles set out in the 2002 Aquaculture Strategy. More specifically, the Regulation clearly stated that the scope of the CFP extends to the conservation, management and exploitation of aquaculture, as well as to the processing and marketing of aquaculture products, where such activities are practiced on the territory of Member States or in the then Community waters (now EU waters).

Furthermore, one of the objectives of the CFP is to provide for the sustainable exploitation of aquaculture taking into account environmental, economic and social considerations. The Regulation also provides a new organizational structure for the formulation of aquaculture policy in that it provides a role for both the Advisory Committee for Fisheries and Aquaculture and the then [Regional] Advisory Councils in the formulation of management measures. The latter body has a purely advisory role in the framing of policy and has representatives from the aquaculture sector and other interest groups. Following on from the adoption of Regulation 2371/2002, much of the emphasis in EU policy was on providing EU finance for development of the

industry and for supporting applied research into aquaculture in the Member States. A comprehensive regulatory framework was also adopted promoting food safety relating to fish and fishery products.

The European Commission updated its strategy for the sector in 2009 (Communication from the Commission to the European Parliament and the Council. Building a Sustainable Future for Aquaculture. A New Impetus for the Strategy for the Sustainable Development of European Aquaculture. COM (2009) 162 final) and the EU's approach to aquaculture policy was examined during the course of the reform debate concerning the CFP during the period 2011–13. This in turn resulted in the adoption of new regulatory provisions as part of the revised CFP, which came into effect in January 2014.

The EU has exercised its competence through the adoption of policy, fiscal and legal measures. Notably, the principal framework for EU management and policy measures is set down in the Basic Fisheries Management Regulation No 1380/2013 (Basic Regulation).

Despite the gradual creep of EU measures, it should also be borne in mind that the regulation of the planning and management of aquaculture is primarily a matter for the Member States. Many of the key management decisions that are shaping the sector are matters, nonetheless, that come within the scope of shared competence, that is to say in instances where the EU and the Member States share legal powers. In line with the general scheme of EU law, however, the Union must exercise its legislative competence in areas of shared competence in accordance with the principles of proportionality and subsidiarity.

There are many ambulatory references to aquaculture in the Basic Regulation, as well as in specific provisions of Part VII therein, which are aimed at advancing a more coherent EU approach to the management and regulation of the sector in the Member States and at pan-European and global levels in context of trade and marketing measures. According to the Basic Regulation, the CFP should ensure that aquaculture activities contribute to long-term environmental, economic and social sustainability, as well as to the traceability, security and quality of aquaculture products.

In light of the different licensing conditions that apply to aquaculture in the Member States, European institutions are committed to establishing a more strategic approach to improve competiveness and the prospects for the future growth of the industry. In this regard, mechanisms are to be adopted that facilitate the exchange of best practice information between Member States on matters concerning 'business security, access to Union waters and space, and the simplification of licensing procedures'.

Sustainability is one of the leitmotifs of the EU's approach to aquaculture management under the scheme advanced by the Basic Regulation. Importantly, the policy is informed by normative principles such as the precautionary and ecosystem-based approach with a view to protecting and preserving the marine environment and the resources that it supports. The Basic Regulation places an obligation on the Member States to undertake research and innovation programs to improve the quality of scientific advice that inform management decisions.

Clearly, the future growth of the sector is very much contingent upon appropriate action by the Member States. In order to ensure an integrated EU approach, the European Commission must adopt strategic guidelines to inform the national plans of the Member States and which are aimed at improving industry competitiveness, development and innovation, reducing administrative red-tape and make EU law 'more efficient and responsive to the needs of stakeholders', encouraging economic activity, contributing to the 'diversification and improvement of the quality of life in coastal and inland areas' and integrating aquaculture activities into spatial planning.

The European Commission published the Strategic Guidelines for the Sustainable Development of the Aquaculture Industry in 2013 (Communication from the Commission to the European Parliament, the Council,

the European Economic and Social Committee and the Committee of the Regions. Strategic Guidelines for the Sustainable Development of EU Aquaculture. COM(2013) 229 final). They are aimed at assisting 'the Member States in defining their own national targets taking account of their relative starting positions, national circumstances and institutional arrangements'.

Clearly, the Guidelines are not legally binding but set down a range of actions that are intended to shape the future pace and growth of the sector. As such, they are intended to inform the approach taken by the Member States to the substance and form of their multiannual national plans. Pointedly, they identify three crucial objectives that need to be addressed by the competent national bodies: the simplification of the administrative procedures in the Member States, the promotion of maritime spatial planning and the improvement of competiveness through marketing and labeling initiatives.

As a result of the reform agreed to in 2013, one of the most notable features of the EU's approach to aquaculture management is the voluntary commitment placed on Member States to adopt and implement multiannual national strategic plans for the period 2014–20. Indeed, access to funding under the European Maritime and Fisheries Fund (EMFF) is contingent upon compliance with this 'voluntary' obligation. According to the EU's Strategic Guidelines Plainly, Member States enjoy considerable discretion on the form and substance of the measures and policies set out in their multiannual national strategic plans. Such plans will differ considerably across the EU and may also reflect regional differences within a Member State. Indeed, a brief perusal of the Spanish Strategic Plan for Aquaculture reveals that it is an elaborate document that advances four strategic objectives – namely, the simplification of the legal framework and the enhancement of stakeholder engagement including industry representation; the improvement of production and sector planning through the process of spatial planning including the selection of new zones for aquaculture development; strengthening competitiveness in the sector through research, development and innovation; and enhancement of marketing and greater support for producers' organizations.

The licensing of aquaculture and the regulation of fish farms is a matter for the Member States. In this regard, they are compelled to ensure compliance with EU environmental legislation, particularly in relation to environmental impact assessment and the protection of biodiversity under the Habitats and Birds Directive, as well as EU measures to control disease and to ensure food safety law.

In order to update the requirements for aquaculture animal health and in response to the disparate approaches taken by Member States to the licensing of the industry at national levels, the European institutions adopted harmonization measures in the form of Directive 2006/88, as since amended and implemented by Commission instruments. Directive 2006/88 provides for the authorization of aquaculture installations and businesses with a view to establishing a common framework aimed at preventing, controlling and eradicating diseases. For this purpose, it prescribes common EU-wide standards that must be fulfilled by aquaculture production businesses and installations with respect to both their establishment and operation. In order to reduce the regulatory burden, the EU measures can be combined with the authorization systems in place in the Member States, such as those aimed at ensuring compliance with environmental obligations.

Importantly, under the Directive Member States are required to refuse to issue an authorization if the activity in question would pose an unacceptable risk of spreading diseases to other aquaculture animals or to wild stocks of aquatic animals.

The EU has adopted an extensive body of environmental legislation that applies to aquaculture, including the Water Framework Directive (WFD), the Marine Strategy Framework Directive (MSFD), 94 as well as EU legislation on dangerous substances and on the marketing of veterinary medicinal products. In addition, EU legislation on the introduction and management of alien species aims to assess and minimize the possible impact of the introduction of such species by establishing a permit system and by protecting native

biodiversity and ecosystem services. The obligations to undertake an environmental impact assessment (EIA) and strategic environmental assessment (SEA) for certain categories of aquaculture projects, plans and programs are some of the principal means of addressing and mitigating the impacts of aquaculture development in the Member States. The European Commission has published non-binding guidelines that are aimed at ensuring the compatibility of aquaculture development with EU nature legislation, with specific emphasis on the EU network of protected areas known as Natura 2000.

Aquaculture products are subject to European food law and the common framework applicable to marketing of products for human consumption. Council Regulation 178/2002 lays down the general principles and requirements on food safety and provided a legal basis for the establishment of the European Food Safety Authority..

The State Fisheries Agency of Ukraine refers to the following documents on its website :

Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC

COM(2002) 511 final (COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT A Strategy for the Sustainable Development of European Aquaculture) 2002

Association Agreement between the European Union and Ukraine involves the process of approximation and implementation of only one directive:

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

The Habitats Directive (more formally known as Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora) is a European Union directive adopted in 1992 as an EU response to the Berne Convention. It is one of the EU's directives in relation to wildlife and nature conservation, another being the Birds Directive. It is one of European nature's policies that establishes one organised network — Natura 2000, which intends to protect nature and wildlife. The Habitats Directive requires national governments to specify areas that are expected to be ensuring the conservation of flora and fauna species.

The directive assures the conservation of endangered native animal and plant divisions. It aims to protect 220 habitats and approximately 1000 species listed in the directive's Annexes. These are species and habitats which are considered to be of European interest, following criteria given in the directive. It directs member states of the EU to take measures to maintain the "favourable conservation status" of protected habitats and species.

Overall, however, it is relatively easy to conclude that EU law and policy pertaining to aquaculture remains highly prescriptive diffuse and requires further reform with a view to ensuring that it is internationally competitive. Specifically, measures need to be adopted urgently to address the seafood supply deficit in the EU that is currently served by the import of aquaculture products from third countries to the detriment of the industry in the Member States. Although it is beyond the scope of this chapter to canvas in any great detail the substance and form of future reform measures, there are nonetheless a couple of obvious axis for EU legislative intervention.

2.4.2. National legislation in the field of aquaculture

In the course of fisheries reform, in recent years, the legislative framework for the functioning of the industry has been significantly updated, which has contributed, among other things, to a certain actualization of business interests in aquaculture in Ukraine. In the Law of Ukraine “On Fisheries, Industrial Fisheries and

Conservation of Aquatic Bioresources" aquaculture, defined as the deliberate use of fisheries aquatic objects (parts thereof) to obtain maximum amounts of useful biological agricultural products (fish, molluscs, invertebrates, algae, other aquatic organisms) by their artificial breeding and keeping.

According to Art. 1 of the Law of Ukraine "On Fisheries, Industrial Fisheries and Conservation of Aquatic Bioresources" Fisheries - an economy whose task is to study, protect, reproduce, cultivate, use aquatic bioresources, their extraction (extraction, capture, harvesting), sale and processing for the purpose of obtaining food, technical, feed, medical and other products, as well as ensuring the vessels navigation safety of the fishing industry fleet. The basis of fisheries is fishering farming and fishing.

It should be noted that current legislation uses the terms "fisheries" and "aquaculture" as synonyms. In particular, in Art. 1 of the Law of Ukraine "On the National Fisheries Development Program of Ukraine for the period up to 2010" enshrines two identical definitions of the concepts of fisheries (sub-sector of fisheries) and aquaculture. A broader and more detailed definition of these concepts is contained in Art. 1 of the Law of Ukraine "On Aquaculture", according to which aquaculture (fisheries) - agricultural activities for artificial breeding, keeping and cultivation of aquaculture objects in wholly or partially controlled conditions for obtaining agricultural products (aquaculture products) and its sale, production of feed, bioresources reproduction, breeding work, introduction, resettlement, acclimatization and re-acclimatization of hydrobionts, replenishment of aquatic bioresources, conservation of their biodiversity and providing recreational services. Thus, it can be concluded that the legislation contains a broad and narrow definition of aquaculture.

This rule separated aquaculture from other types of possible activities on water bodies, combined by the definition of "special use of aquatic bioresources". However, in order to regulate the legal, economic, social and organizational principles of aquaculture in the complex, a special separate document was required, which became the Law of Ukraine "On Aquaculture", which came into force on July 1, 2013 (hereinafter - the basic one) law).

This document gives aquaculture the status of a separate type of agricultural activity in the system of agro-industrial production, - activity related to the cultivation of aquatic bioresources under controlled conditions, which consists in "artificial breeding, keeping and cultivation of aquaculture objects in wholly or partially controlled conditions for obtaining and sale of agricultural products (aquaculture products), feed production, reproduction of bioresources, in breeding work, introductions, resettlement, acclimatization and re-acclimatization of hydrobionts, replenishment of aquatic bioresources, conservation of their biodiversity, and provision of recreational services." Thus, aquaculture is differentiated from other fisheries, which is due to the characteristics of aquaculture activities, which is significantly different from fishing, requires greater human intervention in production and, as a consequence, requires a separate management approach. The technical assistance of the Government of Ukraine through the State Fisheries Agency of Ukraine in the development of the Law on Aquaculture was provided by FAO specialists within the framework of the technical cooperation program TCP / UKR / 3301 baby 3: Development of a new law on aquaculture in Ukraine.

According to the legislation, aquaculture can be carried out in inland water bodies (parts thereof), fishery technological reservoirs, inland sea waters, territorial sea and exclusive (maritime) economic zone of Ukraine, as well as on land areas of the territory of Ukraine, specially allocated for aquaculture purposes.

For a systematic understanding of the specificity of aquaculture in Table 2.3., its classification by key characteristics.

Table 2.3. Classification of aquaculture by main features

Sign	Types of aquaculture	Contextual content characteristic
Types of cultivation environment	***Freshwater***	Breeding, maintenance and cultivation of facilities in lakes and reservoirs
	Brackish water	Breeding, keeping and growing aquaculture facilities in estuaries and lagoons
	Mariculture	Breeding, maintenance and cultivation of aquaculture objects in inland seawater, terriapia sea and exclusive (maritime) economic zone of Ukraine with the use of floating gardens, other technological devices using seawater.
Consumption of finished products	***Food***	Used for direct consumption or processing for food fish.
	Non-food	It is used for production of forages, for reproduction of bioresources and replenishment of their stocks, for carrying out breeding and breeding work.
The level of production intensification	***Intense***	It is made from compacted plantings with intensive artificial feeding of compound feeds, balanced in composition according to the biological needs of particular hydrobionts, other forages with high nutrition.
	Semi-intensive	It is carried out with the use of certain means of intensification, including with limited artificial feeding of feeds of different nutrients.
	Extensive	It is carried out using natural fodder resources of fisheries water bodies without the use of intensification means.
Organizational and technological forms of fisheries	***Grazed***	Extensive cultivation through the introduction of aquatic aquaculture diverse age groups into fisheries water bodies to enhance the utilization of their bioproductive potential
	Pond.	Breeding, maintenance and cultivation of aquaculture facilities using fish ponds, artificially created reservoirs, separated from mother bodies of water, estuaries, flooded peat quarries and the like.
	Industrial	Breeding, keeping and growing with the use of fishing and floating gardens, fishing pools, other technological devices, including the use of installations of closed water supply (UZV).

The basic law also states that aquaculture activities are aimed at increasing the production of useful biological agricultural products (fish and other aquatic bioresources), preserving biodiversity and replenishing aquatic bioresources in fisheries water bodies (their parts) of Ukraine, as well as on the implementation of fisheries activity by environmental means. That is, in a single regulatory field, two types of fisheries are combined - reproductive and commodity, significantly different from each other in terms of goals, technologies, regulatory mechanisms, etc. The reproduction of living aquatic biological resources (JWRS) has traditionally remained one of the priority tasks for the state in the field of environmental management, regardless of the fact that the process of reproduction to aquaculture has been referred to by the law and is the most normatively regulated. Reproductive fisheries are aimed at preserving the diversity of the WSSD, maintaining the ecological balance in aquatic ecosystems - that is, predominantly nature conservation. The main directions of state support for fisheries (aquaculture) and fishing farming are defined respectively in Art. 22 of the Law of Ukraine "On Aquaculture" and Art. 53 of the Law of Ukraine "On Fisheries, Industrial Fisheries and Conservation of Aquatic Bioresources".

Commodity fisheries, in turn, is aimed at providing the population with food fishery products and has the characteristics of agricultural activities. As a consequence, there is a corresponding imbalance of interests

when attempting to regulate all components of aquaculture within the framework of a single basic law, which is most clearly manifested at the regional level.

Aquaculture in Ukraine, unlike many other leading countries in the world, is not subject to licensing (!) In the classical form, this can be considered as a certain preference for national aquaculture enterprises. However, the legislation provides for other mechanisms of state regulation of aquaculture: such as conducting state registration of concluded contracts for the use of fisheries water bodies, fishery technological reservoirs; submission of information regarding intentions of breeding and cultivation of alien and non-native aquatic species, production volumes of aquaculture products; coordination of project documentation for construction of objects used in aquaculture. That is, the legislator specifies that individuals should be registered as entrepreneurs. Depending on the particular type of economic activity in the fisheries sector, the legislation defines additional requirements for business entities. It is obligatory to have positive veterinary and sanitary assessments of the status of industrial sites of fisheries water bodies of national importance and indicators of safety of fish, other aquatic living resources, etc.

The Basic Law lists the directions of state support for aquaculture (Art. 22). Most of them relate to only one component of aquaculture - the reproduction of living aquatic bioresources (WSWR), so they create a certain imbalance of interests. An additional reason for this is the reinforcement of individual measures of state support by budget programs, namely, "Reproduction of aquatic living resources in inland waters and the Azov-Black Sea basin", "Selection in fisheries and reproduction of aquatic bioresources in inland waters and the Azov-Black Sea basin", "Organization of activities of fish protection bodies and fish breeding complexes". These documents provide mechanisms for the financial and organizational implementation of such areas as, for example, breeding works, including the creation and maintenance of tribal subjects, breeding herds and gene pools of aquaculture objects; restoration of populations of rare and endangered species of aquatic organisms and the like. As for the state support of commodity aquaculture, the basic law provides directions of stimulating nature only, without their specification and constructive mechanisms of implementation. For example, the declared promotion of the development of national feed production for aquaculture facilities; promoting the production of quality and environmentally friendly aquaculture products that are competitive in the domestic and foreign markets.

Fishery and fishing farm products are agricultural products. According to the Law of Ukraine “On stimulating the development of agriculture for the period 2001–2004” fish and seafood are attributed to agricultural products, fisheries and fishing farming to agricultural enterprises. The ownership of fisheries entities by producers of agricultural products is a form of state support.

The said provision was also enshrined in the Law of Ukraine "On Fisheries, Industrial Fisheries and Conservation of Aquatic Bioresources" , according to which the subjects of the fishery complex, the activity of which is related to the industrial capture of aquatic bioresources at water bodies of national importance, breeding, cultivation and processing of own production, are recognized as producers of agricultural products (Article 53).

Fisheries and fishing farming are characterized by specific object composition. The list of objects of legal relations in the field of fisheries (aquaculture) and fishing farming is enshrined in the Law of Ukraine "On Fish, Other Aquatic Living Resources and Food Products" whose life is impossible without being in the water. Aquatic living resources include: freshwater, marine, anadromous and catadromous fishes at all stages of development; cephalopods, algae and other aquatic plants.

In pursuance of Art. 11 of the Law of Ukraine "On the Protection of Animals from Cruelty", the Cabinet of Ministers of Ukraine Decree No. 1402 of November 16, 2011 approved the Rules for the Transport of Animals,

which set requirements for the carriage of animals by air, road, rail, sea and river. In the item 65-78 of the said Rules defines the peculiarities of transportation of fish and other aquatic organisms.

According to Part 1 of Art. 14 of the Law, a fishery water body for aquaculture purposes is leased to a legal or natural person in accordance with the Water Code of Ukraine. Paragraph e) of Part 2 of the Final and Transitional Provisions of the Law of Ukraine "On Aquaculture" was set out in the new wording of Art. 51 " Use of water objects on lease terms " Water Code of Ukraine. It provided for approval by the Cabinet of Ministers of Ukraine the Model Agreement on the Lease of Water Resources as well as the approval by the central executive body that provides the formulation of state environmental policy Methods of determining the amount of payment for leased water bodies. It should be noted that these tasks have been fulfilled for today: the Decree of the Cabinet of Ministers of Ukraine May 29, 2013 No. 420 approved the Model lease agreement for water bodies, and the order of the Ministry of Ecology and Natural Resources of Ukraine dated May 28, 2013 № 236 approved the Methods of determining the amount of payment for leased water bodies. Thus, we can state positive changes in the process of leasing the use of fisheries.

3. GOVERNANCE AT LOCAL, REGIONAL AND NATIONAL LEVEL, MAIN AUTHORITIES INVOLVED IN PARTNER COUNTRIES

3.1. Greece

3.1.1. Public and private institutions

Public and private aquaculture organizations aim to implement research, technological development and innovation projects whose research results are exploited and integrated into value chains for the sector. Their main objective is to create the necessary knowledge basis in the aquaculture sector by enhancing research and technology, in order to promote innovation, increase the competitiveness of the industry and stimulate productive activity at regional and national level. In addition, they seek to develop technical, scientific or organizational knowledge in aquaculture farms, which in particular will reduce the impact on the environment, reduce dependence on fishmeal and fish oils, enhance a sustainable use of aquaculture resources and improve or facilitate new viable innovative production methods, develop or market new aquaculture species with good market prospects, new or significantly improved products, or improve valued management and organization systems, and investigating the technical or economic feasibility of innovations, products or processes.

3.1.1.1. Public Organizations in Greece

3.1.1.1.1. Ministry of Rural Development and Food[96]

The responsibilities of the Ministry of Agricultural Development and Food (Ministry of Agriculture) include, among others, agricultural and livestock policy, vegetable and animal production and veterinary public health (health policy).

3.1.1.1.2. General Secretariat for Agricultural Development and Food:

The responsibilities of the General Secretariat for Agricultural Development and Food include agricultural and livestock policy, vegetable and animal production and veterinary public health (health policy).

3.1.1.1.3. Directorate-General for Fisheries

It is the administrative department of the Ministry of Agricultural Development and Food, which manages the sectors of collecting fisheries, aquaculture and marketing-processing of fishery products. The Directorate-General for Fisheries has a strategic aim of highlighting the primary sector through the development of collective fisheries and aquaculture, with the aim of optimizing the management of fisheries resources, implementing control of activities and promoting issues within the EU. and International Organizations.

[96] http://www.minagric.gr/index.php/el/

The Directorate-General for Fisheries is set up by the Directorates (FEK 138 A'15-09-2017) "Organization of the Ministry of Rural Development and Food".

3.1.1.1.2. Directorate of Fisheries Policy and Exploitation of Fishery Products
- **3.1.1.1.2.1.** Department of Planning and Fisheries Applications
- **3.1.1.1.2.2.** Section of the Common Market Policy of the Common Fisheries Policy
- **3.1.1.1.2.3.** Department of International Organizations and Regional Fisheries Management and International Relations Organizations
- **3.1.1.1.2.4.** Department of Fishery Product Development and Promotion

3.1.1.1.3. Directorate of Fisheries and Fisheries Management
- **3.1.1.1.3.1.** Department of Collective Fisheries Development
- **3.1.1.1.3.2.** Department of Collective Fisheries Management
- **3.1.1.1.3.3.** Department of Ecosystem Management of Fisheries Resources

3.1.1.1.4. Directorate of Aquaculture
- **3.1.1.1.4.1.** Department of Aquaculture Development
- **3.1.1.1.4.2.** Department of Aquaculture Management
- **3.1.1.1.4.3.** Department of Extensive Aquaculture
- **3.1.1.1.4.4.** Aquaculture Sector Data Department

3.1.1.1.5. Fisheries Activities and Products Control Division
- **3.1.1.1.5.1.** Department of Coordination of National Audit Activities (Single Audit Authority)
- **3.1.1.1.5.2.** Department of Audits
- **3.1.1.1.5.3.** Department of Data Recording and Management Systems
- **3.1.1.1.5.4.** Department for Combating Illegal, Illicit and Unregulated Fisheries

3.1.1.2. Public Organizations in Region of Eastern Macedonia and Thrace

3.1.1.2.1. Directorate-General for Regional Agricultural Economics and Veterinary Medicine[97]

The Directorate-General for Regional Agricultural Economics and Veterinary Medicine is responsible for coordinating and monitoring the operation of all its organic units and ensuring their proper functioning. It should be in constant cooperation with the Ministry in charge of dealing with the problems and cases of their responsibility better.

3.1.1.2.2. Directorate of Agricultural Economy - Department of Fisheries

The responsibilities of the Agricultural Economy Directorate are in particular the preparation of annual and multiannual regional development programs for agriculture, livestock and fisheries, the preparation and evaluation of relevant policy studies and measures, and the development and quality improvement of agriculture and quality. Livestock breeding in the field of crop production and livestock production respectively, in combination with the measures necessary for the development and modernization of agricultural holdings, n. Communicates with the relevant departments of the competent Ministries and implements national policies in the area of its competence in accordance with their instructions, collaborates, communicates and provides information to the municipalities of the region on the issues of its competence and provides the guidelines regional services, which carry out the responsibilities of agriculture, livestock and fisheries at regional level. In addition, joint events can be organized with the Primary Local Authorities or other bodies to better inform the farmers and serve them in general.

3.1.1.2.3. Directorate Land Policy

The responsibilities of the Directorate of Land Policy include in particular the allocation of land to legal or natural persons and local governments, the sale, exchange and protection of residential land and the issuance, correction and cancellation of title deeds, the compilation of topographic programs, the establishment of

[97] https://www.pamth.gov.gr/index.php/el/dioikisi/ypiresies/g-dnsi-perifereiakis-agrotikis-oikonomias-kai-ktiniatrikis

topographic services by technicians, the compilation, maintenance and completion of thematic maps with locally collected data, as well as the periodic updating of local thematic maps with changes made, providing certificates and charts for customer service, as well as investigating construction review dossiers.

3.1.1.2.4. Directorate of Veterinary Medicine

The responsibilities of the Veterinary Directorate include in particular the protection of livestock throughout the Region, the safeguarding of animal health, the decision-making on animal diseases that may be epidemic and the taking of public health measures. The Directorate of Veterinary Medicine communicates with the competent services of the responsible Ministries, implements national and Community policies in the areas of its competence, in accordance with their instructions. The Directorate of Veterinary Medicine cooperates, communicates and provides information to the first-level regional TABs on matters of its competence and provides guidance to regional services dealing with Veterinary Medicine at the regional level.

3.1.1.2.5. Directorate of Agricultural Economy & Veterinary (Regional Entity of Drama)

Department of Fisheries

3.1.1.2.6. Directorate of Agricultural Economy & Veterinary (Regional Entity of Kavala)

Department of Fisheries

3.1.1.2.7. Directorate of Agricultural Economy & Veterinary (Regional Entity of Xanthi)

Department of Fisheries

3.1.1.2.8. Directorate of Agricultural Economy & Veterinary (Regional Entity of Rodopi)

Department of Fisheries

3.1.1.2.9. Directorate of Agricultural Economy & Veterinary (Regional Entity of Evros)

Department of Fisheries

3.1.1.2.10. Directorate of Agricultural Economy & Veterinary (City of Orestiada)

Department of Fisheries

The Department of Fisheries in each Regional Unit has a wide range of activities, with the most important being:

- Development of studies and programs for the development of fisheries.
- Management and exploitation of all water lands suitable for aquaculture.
- Determining the duration, beginning and ending of the period of prohibition of fishing in the rivers and lakes of territorial jurisdiction in a specific regional entity
- Monitoring and taking measures in all forms of contamination and pollution
- Recommendations for the preparation of multiannual and annual Fisheries Development Programs
- The approval and modification of the fisheries cooperatives' statutes
- The supervision and control of fisheries in the area of jurisdiction of the municipality.
- Collection and maintenance of aquaculture and inland fisheries data.
- Keeping records of all fish farms.
- Granting a fishing license
- Monitoring and implementation of EU Regulations and National fisheries legislation
- Organizing information meetings with fishermen, aquaculture workers and generally workers in fisheries enterprises

3.1.1.3. Private Organizations

- Professional Organizations (professional fishermen, aquaculture producers, fishery processors, fishery traders - traffickers)
- Environmental Organizations
- Non-Governmental Organizations
- Hellenic Aquaculture Producers Organization

3.1.1.4. Local development agencies

- Aitoliki Development Company SA
- Development Company Dwdekanisou SA
- Development Company Evoia SA
- Development Company Thessaloniki SA
- Development Company Cyclades SA
- Local Development Company Lesvos SA
- Development Company Halkidiki SA
- Pieriki Development Company SA

3.1.1.5. Social and Financial agencies

- Hellenic Association of Development Companies
- Greek network LEADER
- Panhellenic Confederation of Unions of Agricultural Cooperatives
- Geotechnical Chamber of Greece
- Association of Greek Food Industries
- Panhellenic Association of Shipowners of Professional Vessels
- Hellenic Seafood Association
- Panhellenic Association of Small and Medium-sized Fish Farmers
- Panhellenic Frozen Food Business Association
- Hellenic Association of Public Fisheries Professionals
- Athens Central Market Organization

3.1.1.6. Environmental agencies

- Greek Protected Areas Management Network
- Hellenic Society for the Protection of Nature
- WWF HELLAS - World Fund for Nature
- ARCHIPELAGOS Marine Protection Institute
- ARCHELON Association for the Protection of the Sea Turtle
- HELMEPA Hellenic Association for the Protection of the Marine Environment
- Society for the Study and Protection of the Mediterranean Seal
- MEDASSET – Mediterranean Association for the Salvation of Sea Turtles

3.1.2. National, regional and local strategies and programs

The great development of the Greek aquaculture, which took place during a period of thirty years starting in the 1980s, has led to the emergence of Greece as a leader in the relevant markets. According to the data contained in the study of the Special Framework for Aquaculture, in 2009 Greece was the largest producer of sea bream and sea bass in the world and represented about 50% of the total Mediterranean production. This picture has changed in recent years due to the problems faced by the largest business groups in the sector, with the country now ranked second.

The development of the activity resulted in a lack of guidance on the location of the units, but without a specific sectoral policy. The individual licensing of the plants, based on the requests of the stakeholders, has led to the concentration of areas with comparative advantages not only in their physical characteristics, but also in the movement of products and in places where aquaculture has already been shown to be suitable for aquaculture operation of older units. Thus, progressive areas of aquaculture activity were created, reinforced

by subsequent legislative efforts to organize this activity. The first such effort was the Strategic Framework for the Development of the Marine Aquaculture in Greece prepared in 2000 at the Ministry of Environment and Physical Planning and the ΠΟΑΥ (Areas of Organized Development of Aquaculture) studies carried out either in the framework of the Fisheries Operational Program 2000-2006 or in the Regional Operational Programs (MIP) 2000-2006 (*Κάρκα, 2013*).

3.1.2.1. Strategies

The Department of Aquaculture and Inland Water at the Ministry of Rural Development and Food, in close cooperation with the relevant public services, research institutes and industry actors, has drafted the "**Multiannual National Strategic Plan for Water Development in Greece 2020**". The preparation of the strategic plan followed the common strategic guidelines adopted by the European Commission [COM (2013) 229 final / 29.4.2013], taking into account the specific circumstances of the country, the state of the aquaculture sector in Greece and the legislative, institutional and administrative framework governing the operation of the sector. *(Ministry of Rural Development & Food, Multiannual National Strategic Plan for the Development of Aquaculture in Greece, 2014).*

In 2011, the **Special Spatial Planning Framework for Aquaculture** (SEA) was introduced. Organized Aquaculture Development Areas are the key tool not only for the implementation of the SEA but essentially for the development of the industry. The management bodies of the Organized Aquaculture Development Areas are composed of companies, in which chambers, local authorities, etc. can participate. (*Κάρκα Λ., Κανελλοπούλου Κ., 2018*).

The **Zones of Development of Productive Activities** (ZAPD) were introduced by Article 24 of Law 1650/1986. ZAPD were designated areas or areas suitable for the development of industrial, mining, quarrying or tourism activities or for agricultural exploitation. Reference to aquaculture zones was not included unless it could be considered to fall under the category of agricultural holdings.

A systematic approach to the creation of zones for productive activities is attempted in Law 2742/1999. Section 10 of the law that perfects the preceding article 24 of Law 1650/1986, refers to **Productive Activity Development Areas** (PDOs) which generally follow the same philosophy as the previous legal regime. The most interesting element of the new law is its specific references to aquaculture. The special provision for the activity already emerges from the definition of zones: 'Areas of organized productive activity development (CDDP) are defined as marine areas and land areas ...'. A second element of the law that is worth highlighting is the emphasis placed on the HRDO body and, more generally, the change of philosophy in the treatment of zones.

At the time of the adoption of the Special Framework for Spatial Planning and Sustainable Development for Aquaculture (2011) the situation in the aquaculture sector had changed dramatically with the creation of significant concentrations in some areas. A key issue was now the protection of existing units from abusive practices that jeopardized both the unit's existence itself and the environment in their area from overloading, as well as the protection of activity from competitive uses. The Organized Aquaculture Development Areas were therefore reduced to a tool for delimiting activity and to safeguards aimed at not exceeding environmental strengths as opposed to the past, which provided for only a threshold for capacity generation (at least 500 tonnes). Two large categories of areas were identified in the accompanying Map of the Framework: areas that were considered to be suitable for aquaculture development using macroscopic criteria, and areas for the establishment of aquaculture sites that are highly prestigious and within the PA areas (*Κάρκα Λ., Κανελλοπούλου Κ., 2018, Ειδικό Πλαίσιο Χωροταξικού Σχεδιασμού και Αειφόρου Ανάπτυξης για τις Υδατοκαλλιέργειες ΦΕΚ 2505/Β/2011*).

In the framework of the implementation of Regulation (EU) No. Commission Regulation (EC) No 717/2014 (OJ L190 / 45, 28.06.2014) grants of state aid to the aquaculture sector after the necessary checks have been completed. The amount of the payment is covered by the regular budget to support beneficiaries who have suffered severe reductions in their fishing activities due to adverse weather conditions. Eligible beneficiaries are approved after audits by the Directorate-General for Fisheries of the Ministry of Rural Development and Food.

The Integrated Fisheries Activities Monitoring and Recording System (IPSF)[98] is implemented by the Directorate-General for Sustainable Fisheries in the framework of the implementation of the rules of the Common Fisheries Policy, Control Regulation and the IUU. 90% of the funding for the project comes from the European Commission under Council Regulation (EC) No 861/2006 and Commission Regulation (EC) No 391/2007 as approved by No 011/431 / EU (code Project: EL / 11/01) Commission Implementation Decision and 10% of the RAP, of a total of € 2,070,000 available EU assistance and financing eligibility deadline on 30th / 6/2015. For the implementation of the project signed on 2.3.2012 Programming Agreement with the Information Society SA according to the number 5000.1 / 62/2011 (Government Gazette 3049 / B / 2011) Decision, within the framework of which ISA SA conducted an open international competition and a contract was signed with the association of PWC and IKNOWHOW companies, and no.591 / 63346/2013 (FEK 1299 / B / 2013) was adopted to define the funding framework for IT SA.

In addition, the Greek Government is planning to set up the National Aquaculture Council and to regulate the functioning of the Organized Aquaculture Development Areas. The National Aquaculture Council will deliver an opinion to the Minister for Rural Development and Food on aquaculture policy issues. In particular, it will deliver an opinion on:

- The formulation and implementation of the National Aquaculture Development Program.
- The institutional reforms needed to support the sector's development strategy, through development-financing programs, as well as any other institutional arrangements.
- Any other matter assigned to it by the Minister of Rural Development and Food

3.1.2.2. Programs

Fish farms are subsidized in Greece and their subsidies are highly absorbent. Greece is the second country to receive subsidies from EU funds. The most important competitor countries of the European Union as a whole are those of Asia and Latin America. For Greece, the biggest challenge comes from neighboring Turkey. The European Commission is trying to set a vision for the sustainable development of aquaculture. The objectives are to promote competition, encourage sustainability and promote the products of fish farming.

The adoption of cage farming technologies by the salmon industry, the increased market demand for these species and the natural conditions provided by the Greek climate and the extensive coastline have made it the country of choice for the development of the sector. Large-scale aid programs by the European Union and private entrepreneurs have led to a sharp increase in production and Greece has become the largest producer of these species (seabass and seabream) in the world (Μπασιούλη Ιωάννα, 2014).

- **National Aquaculture Development Program**

In the aquaculture sector a national development program is referred to as the National Aquaculture Development Program. This program OPAC, within the framework of the European Union's Common Fisheries Policy (EU), comprises the national development objectives, in accordance with the guidelines of national spatial planning. It is approved by a decision of the Minister of Rural Development and Food, following the opinion of the National Aquaculture Council of Article 3. The priorities of the program are:

[98] http://www.alieia.minagric.gr/?q=ospa

a. Sustainable aquaculture development to become a key driver of the development of the primary sector and of the Greek economy in general, by improving the productivity of existing aquaculture units, expanding their activity and promoting innovation
b. Settling relationships with other users, especially the coastal zone, to eliminate the conflict of interest and make effective use of land uses
c. Simplify and modernize the institutional framework for licensing, control of activity and relationships between administrative and productive actors, to enhance efficiency and create a friendly environment for attracting new private investment
d. Encouraging research and innovation
e. Promoting social equality and cohesion through :
    i. encouraging the involvement of all stakeholders (management, aquaculture, wholesalers and retailers and consumer associations) in the decision-making process related to the development policy of the sector,
    ii. the production of high quality and nutritional products that meet the current nutritional needs of consumers and
    iii. increasing the employment of science and labor, especially in border regions and remote islands (*LAW 4282/FEK A 182/29.08.2014*)

- **Fisheries and Maritime Operational Program** 2014-2020[99]

The vision is to promote environmentally sustainable, resource-efficient, innovative and competitive fisheries and aquaculture, and to promote blue sea development and maritime skills in Greece.

Basic aims of the program:

a. Improving the competitiveness of the aquaculture and processing sectors
b. The sustainability of marine fisheries and the sustainable development of traditionally dependent areas
c. Protecting and restoring the marine environment and living resources, controlling fishing activities, collecting fisheries data and improving knowledge of the marine environment

- **Innovation in aquaculture of the Fisheries and Maritime Operational Program**[100]

The Program is addressed to research organizations (Universities, Research Centers, Institutes, Technological Bodies) according to the definitions of Law 4310/2014 and Law 4386/2016 as applicable, and to aquaculture companies for the implementation of projects aimed at:

a. Developing technical, scientific or organizational knowledge in aquaculture farms, which will in particular reduce the impact on the environment, reduce dependence on fishmeal and fish oils, enhance a sustainable use of aquaculture resources, improve livelihoods or improve livelihoods new sustainable innovative production methods
b. Development or introduction of new aquaculture species with good market prospects, new or significantly improved products, or improved management and organization systems
c. Investigation of the technical or economic feasibility of innovations, products or processes

- **Operational Program "Competitiveness, Entrepreneurship and Innovation" with Specific Actions "Aquaculture" - "Industrial materials" - "Open innovation in culture"**[101]:

The specific aquaculture action is co-financed by the European Regional Development Fund (ERDF) under the NSRF Competitiveness, Entrepreneurship and Innovation. The action aims to collaborate between dynamic

[99] https://www.espa.gr/el/pages/staticOPMaritimeFisheries.aspx
[100] https://www.espa.gr/el/pages/ProclamationsFS.aspx?item=3535
[101] https://www.espa.gr/el/Pages/ProclamationsFS.aspx?item=3473

businesses and R&D organizations to implement research, technological development and innovation projects whose research results are valued and integrated into value chains.

3.2. Romania

3.2.1. Public and private Institutions

Public and private institutions in Romania	Main activities
The Ministry of Agriculture and Rural Development (MADR)[102]	The Ministry of Agriculture and Rural Development is organized and activates according to the provisions of the Government Decision no. 30/2017 with further modifications and completions.[103] The Ministry of Agriculture and Rural Development is a specialized body of the central public administration, with legal personality, reporting to the Government, having responsibilities in agriculture and food production, rural development, land improvements, as well as in related fields: specialized scientific research, preservation and sustainable management of soils and vegetal and animal genetic resources. The aquaculture related goals of The Ministry of Agriculture and Rural Development are the following: • ensuring national food safety by increasing and diversifying agricultural production, in order to guarantee sufficient, safe and nutritive food products for the population; • increasing the competitivity of Romanian agro-food and fishery products on the European and global markets in order to offset the agricultural trade balance, including through specific information actions; • absorption of Community funds intended for the funding of specific fields; • development of the fishery sector. The Ministry of Agriculture and Rural Development also has the function of Managing Authority for the Operational Programme for Fisheries and Maritime Affairs – POPAM 2014-2020.
General Direction for Fisheries – Managing Authority for the Operational Programme for Fisheries and Maritime Affairs (DGP-AMPOPAM)[104]	The General Direction for Fisheries – Managing Authority for POPAM activates according to MADR Order no. 1656/R/25.09.2018 regarding the approval of the organizational and operational Regulations for the Ministry, with further modifications and completions.[105] DGP-AMPOPAM has the following organizational structure: a) Technical Assistance Department b) Control Department c) Regional Departments

[102] https://www.madr.ro/
[103] http://legislatie.just.ro/Public/DetaliiDocument/188281
[104] https://www.ampeste.ro/
[105] https://www.madr.ro/organizare/regulamentul-de-organizare-si-functionare-al-madr.html

	d) Contracting Selection Department - Assessment-Selection Office - Contracting Department e) Local Development Department f) Programmes, Methodology and Monitoring Service g) Payments Approval Direction - Beneficiaries Purchases Service - Management Verifications Service The General Direction for Fisheries – Managing Authority for POPAM has duties regarding the development of strategies for the fisheries and aquaculture sector, of the Operational programme for Fisheries and Maritime Affairs 2014-2020 and of other funding programmes for fisheries and aquaculture. DGP-AMPOPAM issues the Applicant Guides for Project Calls, organizes project calls, performs evaluation and selection of funding applications submitted under the projects calls, performs the contracting of projects, approves procurement files and applications for reimbursement/payment, makes project payments and monitors the projects for a period of 5 years after the final payments are made. Project funding in the aquaculture sector can be done by accessing non-reimbursable funds available through the Operational Programme for Fisheries and Maritime Affairs 2014-2020 under the calls for projects launched by DGP-AMPOPAM[106] DGP-AMPOPAM, through the Local Development Department, gives support to Fisheries Local Action Groups (FLAGs) in implementing the strategies for local development of the fishery and aquaculture areas.
The National Agency for Fisheries and Aquaculture (ANPA)[107]	The National Agency for Fisheries and Aquaculture is organized and operates according to the provisions of the Government Decision no. 545/2010, with further modifications and completions.[108] The National Agency for Fisheries and Aquaculture operates under the Ministry of Agriculture and Rural Development and has the following functions regarding/related to aquaculture: • developing and implementing the national strategy and regulations regarding: preservation and management of the living aquatic resources existing in the natural fishery habitats, aquaculture, processing and organizing of the fisheries products market, fisheries and aquaculture structures; • management of living aquatic resources from the natural fishery habitats, except for those within the "Danube Delta" Biosphere Reserve; • inspection and control; • privatization of the trading companies with fishing profile and the

[106] https://www.ampeste.ro/popam-2014-2020/ghidul-solicitantului-popam.html
[107] http://www.anpa.ro/
[108] http://legislatie.just.ro/Public/DetaliiDocument/119997

	fisheries/fish farms within their portfolio; • concession of lands whereon fisheries/fish farms are located, except for those within the "Danube Delta" Biosphere Reserve, as well as other related lands from the public domain of the state, under the terms of law; • sale of lands that are private property of the state, whereon fisheries are built, including special installations located on land; ANPA's duties related to aquaculture: ▪ setting up actions for the higher exploitation of the genetic potential, by introducing some valuable species in aquaculture ▪ setting up actions to increase the quality of aquaculture products; ▪ adopting actions for ensuring aquaculture production in case of force majeure; ▪ setting up actions to ensure animal health and welfare; ▪ setting up actions to adapt production to market requirements; ▪ setting up actions for introducing good practices in aquaculture; ▪ encouraging the application of reproduction and culture technologies for species with high economical value and promotion of organic fishery products; ▪ organizing and updating the Register of Aquaculture Units and issuing aquaculture licenses; ▪ setting up other actions required by the needs of aquaculture development, according to the law; ▪ setting up criteria for introducing new species in Romania. Relevant information for aquaculture is available at the website[109].
Administration of Danube Delta Biosphere Reserve (ARBDD)[110]	The Administration of "Danube Delta" Biosphere Reserve is the public institution with legal personality that operates under the Ministry of Environment, Water and Forests, according to the Government Decision no. 1217/2012 regarding the approval of the organizing and operating regulations and the organizational structure of The Administration of Danube Delta Biosphere Reserve, with further modifications and completions. The territory of the "Danube Delta" Biosphere Reserve includes the area of national and international ecological importance provided in art. 1 of Law no. 82/1993 regarding the establishment of the "Danube Delta" Biosphere Reserve, with further modifications and completions, consisting of the following physical-geographical units: Danube Delta, Sărăturile Murighiol-Plopu, Razim-Sinoe lagoonal complex area, the maritime Danube up to Cotul Pisicii, Isaccea-Tulcea sector with its flood zone, the Black Sea coast from Chilia Branch to Capul Midia, the inland maritime waters and the territorial sea, up to the 20 m isobath included. As to administrative territorial organization, the Reserve extends on the territories of Tulcea, Constanţa and Galaţi Counties. The Reserve Administration manages the natural patrimony according to the legal provisions on the legal status of public property, evaluates

109 http://www.anpa.ro/?cat=10
110 http://www.ddbra.ro/

	ecologic condition of the Reserve's natural patrimony and initiates scientific research programmes in the reserve, based the on management plan, ensures the needed actions for preservation and protection of genepool and biodiversity. ARBDD manages the fishery resources within the state public domain, according to the provisions of the management plan and reserve regulations, and fulfills environment authority function, under the terms of the law, on the reserve's territory. Information regarding documents issued by ARBDD for aquaculture development in its competence area is available at the website.[111]
The National Administration "Romanian Waters" ("Apele Române")[112]	Established by the Government Decision no. 107/2002, with further modifications and completions, the entity is the sole operator for natural or arranged surface water resources, regardless of the holder of the development, and for groundwater resources regardless of their nature and related facilities, for which purpose it allocates the right to use the water resources with their natural potential, under the terms of law, except for those expressly provided by applicable specific regulations. Information regarding the documents issued by the National Administration "Romanian Waters" ("Apele Române") needed to initiate projects/affairs in aquaculture is available.[113]
The National Environment Protection Agency (ANPM)[114]	The National Environment Protection Agency has competencies in implementing the policies and laws in the field of environmental protection, granted on the basis of the Government Decision no.1000 dated October, 17, 2012, with further modifications and completions. ANPM's mission is to take action for ensuring a healthy environment for the population harmonized with the economic development of the country. ANPM has the following duties: • environmental strategic planning; • environment factors monitoring; • approval of activities with environmental impact; • national and local implementing of environmental legislation and policies; • -reporting to the European Environment Agency on the following fields: air quality, climatic changes, protected areas, soil, water contamination. ANPM has 42 subordinated county agencies fulfilling the duties of the National Environment Protection Agency to implement the policies, strategies and legislation in the field of environment protection for each county and Bucharest. The County Agencies issue environmental

111 http://www.ddbra.ro/accesul-la-informa-iile-publice-de-mediu
112 http://apele-romane.ro/
113 http://apele-romane.ro/ro/page/informatii-de-interes-public
114 http://www.anpm.ro/

	approvals for the plans to be implemented on their county territory or in Bucharest, giving prior information to the National Environment Protection Agency and carry out the procedure for issuing the integrated environmental authorization. Information regarding documents issued by the National Environment Protection Agency needed to initiate projects/affairs in aquaculture is available[115].
The National Sanitary Veterinary and Food Safety Authority (ANSVSA)[116]	The National Sanitary Veterinary and Food Safety Authority operates as a regulatory authority in the sanitary-veterinary area and for food safety, on the basis of the Government Decision no. 1415/2009, with further modifications and completions. The Authority's mission is accomplished through health protection along the entire food chain – meaning in each stage of the production process from farm to consumer – preventing food from being contaminated and promoting food hygiene and transparent information of consumers regarding food and animals' health and welfare. ANSVSA's activities are the following: • Approval and certification in sanitary-veterinary and food safety areas; • Monitoring and control of activities in sanitary-veterinary and food safety areas; • Elaboration of the legal framework and specific regulations for activities in the sanitary-veterinary and food safety areas; • Laboratory testing; • Certification of private laboratories; • Establishing export protocols with third party countries; • Management of crisis situations; • Pesticides monitoring; • Supports fighting against food waste. ANSVSA is represented for each county by sanitary-veterinary and food safety directions, and locally, by area sanitary-veterinary divisions and sanitary-veterinary and food safety divisions. Information on documents issued by the National Sanitary Veterinary and Food Safety Authority is available.[117]
Fisheries Local Action Groups (FLAG)	The Fisheries Local Action Groups are public-private partnerships, consisting of representatives of local public authorities and institutions, private sector and civil society, having the same interests and goals to elaborate and implement a development strategy for fishing and aquaculture. Within the programming period 2014-2020, at national level, DGP-AMPOPAM selected 22 FLAGs[118].

[115] http://www.anpm.ro/legislatie
[116] http://www.ansvsa.ro/
[117] http://www.ansvsa.ro/ansvsa/modele-de-formulare/
[118] https://www.ampeste.ro/docs/POPAM/Ghiduri/FLag-uri_/Lista_FLAGs_contact_teritorii_POPAM_2014_2020.pdf

	The Fisheries Local Action Groups (FLAGs) that perform their activity in the South-Eastern Development Region: • Association Local Group for Promoting the Integrated Development of the Fisheries Area of Braila County[119] • Association for Sustainable Development „Prut-Dunăre" Galaţi[120] • Association "Local Group for Sustainable Fisheries in the Danube Delta " [121] • Association Fisheries Local Action Group for the Old Danube – Macin Branch[122] • Association FLAG Mangalia Litoral[123] • Association Fisheries Local Group DOBROGEA NORD[124] • Association Fisheries Local Group DOBROGEA SUD[125] • Association FLAG DUNĂREA DOBROGEANĂ[126] The fisheries local action groups implement local development strategies, within which projects dedicated to the aquaculture sector may be funded.

3.2.2. National, regional and local strategies and programmes

National, regional and local strategies and programmes	Document description
The National Strategy for the Fisheries Sector 2014-2020 (SNSP)[127]	The National Strategy for the Fisheries Sector 2014-2020, document issued on the basis of a socio-economic study, in conjunction with national policies and the EU Common Fisheries Policy, has as a general objective to contribute to food safety and public health in Romania by increasing production of fish and fish products from internal production, of higher quality, in compliance with the sustainability rules of the sector. Specific goals proposed within SNSP have been structured according to the following directions for action: 1. Encouraging innovative, competitive and knowledge based fisheries and aquaculture, including related processing; 2. Promoting sustainable and efficient fisheries and aquaculture from the point of view of resource utilization, including related processing; 3. Strengthening the control, inspection system and implementing and improving data collecting activities;

[119] https://www.pescuitbraila.ro/
[120] https://www.flagalati.ro/
[121] http://www.flagdelta.ro/
[122] https://www.flagbratulmacin.ro/
[123] http://afml.ro/
[124] http://www.flagnord.ro/
[125] http://www.flagsud.ro/
[126] http://www.afdd.ro/
[127] https://www.madr.ro/docs/fep/programare-2014-2020/Strategia-Nationala-a-Sectorului-Pescaresc-2014-2020-update-apr2014.pdf

	4. Increasing employment and territorial cohesion. Specific goals in SNSP regarding aquaculture will be achieved according to the Multiannual National Strategic Plan for Aquaculture 2014-2020. The financial resources needed to implement the actions provided by the strategy will be provided from the National Budget, the European Fund for Fisheries and Maritime Affairs and from the own contributions of the European funds beneficiaries managed by DGP-AMPOPAM.
The Multiannual Strategic Plan for Aquaculture 2014-2020[128]	The general objective of the plan is fostering environmentally sustainable, resource-efficient, innovative, competitive and knowledge-based aquaculture. The strategic objective for the 2014-2020 period is to support the aquaculture sector in order to achieve a fish production of 36 thousand tons. In order to carry out the plan, the following directions for action were established: 1. Upgrade and retooling through technological development, innovation and knowledge transfer. 2. Enhancement of the competitiveness and viability of aquaculture enterprises, including the improvement of safety and working conditions, in particular of SMEs. 3. Promoting a resource-efficient aquaculture. 4. Promoting the aquaculture that provides environmental services. 5. Promoting conversion to eco management and audit schemes and ecological aquaculture. 6. Promoting animal health and wellbeing actions, as well as public health and safety. 7. Development of professional training, new professional skills and lifelong learning. 8. Stimulating innovation in aquaculture in order to develop technical, scientific or organizational knowledge within aquaculture farms that reduce environmental impact, promote the sustainable use of aquaculture resources, improve animal welfare or facilitate new sustainable production methods. The measures regarding the proposed actions for the development of Romanian aquaculture consist of: • Upgrading the existing aquaculture farms, active and inactive, of extensive or semi-extensive type; • Building of new aquaculture farms, including those of intensive type; • Increasing the range of culture species used in the Romanian

[128] https://www.madr.ro/docs/fep/2015/popam-2014-2020/PSNMA-2014-2020-versiune-oficiala-15.04.2015.pdf

	aquaculture; • Promoting business diversification within aquaculture farms to ensure additional sources of income and sustainable aquaculture growth; • Exploitation of the main competitive factors of the aquaculture sector, represented by the high standards on environment, animal health and welfare and consumer protection; • Sustainable development of aquaculture through coordinated planning of: available land surfaces for building new aquaculture farms and water surfaces in the Black Sea coastal area to locate mariculture farms; • Development of environmental friendly aquaculture technologies; • Development of extensive aquaculture in reservoirs; • Development of ecological aquaculture; • Simplifying the administrative procedures; • Ensuring aquaculture stocks by covering losses caused by natural disasters, unfavorable climatic phenomena, sudden changes in water quality beyond farmer's liability and diseases in the aquaculture sector, damage or destruction of production facilities beyond farmer's liability; • -Training of producers in Romanian aquaculture regarding EU regulations on aquaculture; • Promoting fair competition conditions for operators by capitalizing on their competitive advantages; Financial resources needed for the implementation of the action plan are supported on a share of about 46% of the European Maritime and Fisheries Fund (EMFF) allocation for Romania, to which the amounts from national budget and own contribution of potential beneficiaries are added.
Operational Programme for Fisheries and Maritime Affairs 2014-2020 (POPAM[129])	The general objective of POPAM 2014-2020 aims: increasing the production in aquaculture and processing; increasing the profitability of operators; preserving biodiversity and environment protection; maintaining and creating jobs, especially in the fisheries area; strengthening the role of scientific and research institutions, including for data collection improvement; improving the organization of the internal market in order to promote local production. Within POPAM 2014-2020, for the aquaculture area, the following types of actions are proposed for funding: *Union Priority 2 (PU2) – Fostering environmentally sustainable, resource-efficient, innovative, competitive and knowledge-based aquaculture* 1. Support to strengthen technological development, innovation and technical knowledge transfer, that will allow the

[129] https://www.ampeste.ro/popam-2014-2020/programul-operational-pentru-pescuit-si-afaceri-maritime-2014-2020.html

	development of technical, scientific or organizational knowledge in aquaculture farms, production diversification with species having a good potential on the market, significant improvement of products, processes and organizational systems at farm level; technical and economic feasibility studies on products and innovative processes. 2. Enhancement of the competitiveness of aquaculture enterprises, including the improvement of safety and working conditions, in particular of SMEs. The aim is the support for achieving a competitive development of aquaculture when establishing and modernizing aquaculture farms. This will include all types of investments related to added value of the products, increase of production and resources efficiency, including waste treatment and complementary activities related to basic activities of aquaculture enterprises. 3. Protection and restoration of aquatic biodiversity and the enhancement of ecosystems related to aquaculture and the promotion of resource-efficient aquaculture through investments leading to increase of energetic efficiency and resources, and reducing the use of water and chemical substances. Also, Romania's intention is to support establishing the real production potential of the aquaculture sites. 4. Promotion of aquaculture having a high level of environmental protection and the promotion of animal health and welfare, improvement of water quality, wet areas and aquatic biodiversity by providing environmental services through farms that are subject to specific management requirements resulted through the appointment of Natura 2000 areas. For PU2 funding, within POPAM 2014-2020, the amount of 89 489 843.00 euro was allocated from the total of 168 421 371.00 euro that will be provided from FEPAM. The applicant's guides for project calls launched by DGP AMPOPAM are available at their website. [130]
Development strategies for FLAGs in the South-East Region	Within POPAM 2014-2020, Union Priority 4- Increasing employment and territorial cohesion, the Fisheries local action groups implement local development strategies, within which projects dedicated to the aquaculture sector may be funded. FLAGs' strategies in the South-Eastern Development Region are available at the following addresses: Association Local Group for Promoting the Integrated Development of the Fisheries Area of Braila County[131] - Association for Sustainable Development „Prut-Dunăre" Galaţi[132] Association "Local Group for Sustainable Fisheries in Danube Delta "[133]

[130] https://www.ampeste.ro/popam-2014-2020/ghidul-solicitantului-popam.html
[131] https://www.pescuitbraila.ro/wp-content/files/SDL_actualizata_conform_AA4.pdf
[132] https://www.flagalati.ro/strategie/136-strategia-de-dezvoltare-a-zonei-pescaresti-prut-dunare-galati
[133] http://www.flagdelta.ro/popam-2014-2020.html

	Association Fisheries Local Action Group for the Old Danube–Macin Branch[134] Association FLAG Mangalia Litoral[135] Association Fisheries Local Group DOBROGEA NORD[136] Association Fisheries Local Group DOBROGEA SUD[137] Association FLAG DUNĂREA DOBROGEANĂ [138]

3.3. Turkey

3.3.1. Public Organizations

3.3.1.1. Ministry of Agriculture and Forestry (MAF)

MAF with the Provincial Directorates is the designated authority for the fisheries and aquaculture activities: investment, monitoring and control, inspection and monitoring, research and development, marketing and fish diseases in the field of fish farming.

The MISSION of MAF is to;

- achieve accessibility to safe food and quality agricultural products needed in markets,
- ensure sustainable use of agricultural and ecological resources,
- determine and implement policies in order to raise the standard of living in rural areas,

With the VISION as to;

- provide the highest level of producer and consumer satisfaction,
- make Turkey the leading country and to become a global actor in the world.
- Sub-directorates in the organogram of MAF related with aquaculture activities are given below.

3.3.1.1.1. General Directorate of Fisheries and Aquaculture (GDFA)

Main functions and responsibilities of GDFA are summarized below;

- to specify and encourage the principles of sustainable fishing, aquaculture and fishing in seas and inland waters,
- to protect fisheries and aquaculture resources, determining the areas of protection, production and aquaculture, and taking essential measures to protect these areas from any kind of losses,
- to determine the principles regarding the fisheries and aquaculture products to be imported and exported and their inputs,
- to carry out activities related to the development of fisheries and aquaculture production resources and to increase efficiency, to carry out controls and audits,
- to take measures regarding the supply of inputs necessary for increasing fisheries and aquaculture production and efficiency,

[134] https://www.flagbratulmacin.ro/wp-content/uploads/2017/07/STRATEGIA-DE-DEZVOLTARE-LOCALA-FLAG-DUNAREAN-VECHE-BRATUL-MACIN.pdf
[135] http://afml.ro/strategia-de-dezvoltare.html
[136] http://www.flagnord.ro/documente/SDL%20-%20FLAG%20DOBROGEA%20NORD%20revizuita.pdf
[137] http://www.flagsud.ro/strategie.pdf
[138] http://www.afdd.ro/strategia-de-dezvoltare.html

- to determine the principles regarding the fields of harvest suitable for fisheries and aquaculture, and to determine the minimum qualifications and conditions of rental vehicles, the principles of lease and use,
- to work on fisheries and aquaculture production, development and research projects,
- to establish an information system related to fisheries and aquaculture.

3.3.1.1.1.1. Directorate of Aquaculture (DA)

MISSION of the DA is defined as;

- to protect aquatic living resources and habitats,
- to exploit by considering the balance of protection and use,
- to provide sustainability by establishing an effective control and inspection system.

In order to reach the targeted mission, the VISION of DA is

- to ensure supply security in aquaculture,
- to increase the income and welfare of the fish farmers,
- to be a competent institution to operate the industry with responsibility awareness.

The duties of the Directorate of Aquaculture are as follows:

- to specify areas suitable for aquaculture development, to make or order to make border determinations of these places,
- to determine the principles of aquaculture investments, to approve projects of real and legal persons,
- to develop and expand environmentally friendly production models,
- to monitor the environmental impacts of aquaculture activities and take necessary measures,
- to prepare joint projects with the aquaculture unions and related sectors about duties,
- to carry out the procedures for leasing aquaculture areas, to prepare or order to prepare and implement projects to ensure the sustainability of resources,
- to develop proposals related aquaculture incentives and supports, and contributing to applications,
- to develop and spread the cultivation of alternative species,
- to determine the egg, juvenile and brood fish qualities and import conditions of the inland and marine fish to be used in aquaculture,
- to certify aquaculture products and to create a registration and follow-up system for them.

3.3.1.1.1.2. Directorate of Resource Management and Fisheries Infrastructures (DRMFS)

Duties of DRMFS are to:

- monitor and evaluate the impact of fish farm and farming activities on the ecosystem,
- determine and apply the principles regarding artificial reef applications in order to increase the resource efficiency of aquaculture,
- carry out the works and transactions related to the lease of aquaculture areas,
- supervise and monitor water quality criteria in water resources,
- evaluate and supervise the activities to be done such as filling, drying, changing its shape, taking sand, gravel in aquaculture areas.

3.3.1.1.1.3. Directorate of Statistics and Information Systems (DSIS)

Duties and responsibilities of DSIS regarding aquaculture is:

- to establish and operate information systems for fisheries and aquaculture,
- to collect and evaluate all kinds of statistical data on fisheries and aquaculture, and create a database,

- to cooperate with internal and external units on data sharing and information exchange,
- to carry out statistical studies on aquaculture support,
- to determine and evaluate the socio-economic situation related to seafood,
- to prepare statistical reports and evaluations about the data collected on aquaculture and fisheries,
- to determine the principles of imports and exports of captured and cultured fish.

3.3.1.1.1.4. Directorate of Administrative Affairs and Coordination (DAAC)

DAAC is responsible to:

- prepare the legislative proposals on fisheries and aquaculture on behalf of DGFA, the subjects falling within the field of duty of the DG, to ensure that opinions are formed about the drafts, to form the opinion of the DG regarding the laws, regulations etc, legal arrangements from other institutions,
- cooperate with the relevant departments of the Ministry in the fields of preparation and realization of national and international training programs of the staff in the projects carried out by the DG,
- ensure coordination in the works related to the delegations and persons to be sent abroad and to come from abroad,
- provide coordination with countries and international organizations in matters within the scope of the DG, to ensure that opinions are formed within the framework of international bilateral and technical cooperation agreements, to help realize the issues stipulated in the agreements in cooperation with the relevant department of the Ministry,
- prepare the annual publication program draft of the DG, to ensure that the works decided to be published are reviewed and printed by the publishing committee,
- ensure the preparation and implementation of annual in-service training programs of the GeneralDirectorate in coordination with the Department of Education, Training and Publications,
- monitor the physical and cash performance of internal and external projects in certain periods, and to send the reports on developments to the relevant units.

3.3.1.1.2. General Directorate of Agricultural Research and "Policies (GDARP)

Main function is the research and policy development in agricultural business; with the declared Mission:

- to achieve access to reliable food and quality agricultural products needed by national and international markets,
- to ensure the sustainable use of agricultural and ecological resources,
- to set and implement policies to raise the standard of living in rural areas.

and Vision:

- to ensure the highest level of producer and customer satisfaction in the field of food and agriculture,
- to make Turkey the leader in the region and global actor in the world.

Aquaculture related duties of GDARP can be summarized as follows:

- to determine agricultural research and development strategies and priorities in line with national development plans, to prepare, prepare, implement and implement projects,,
- to develop and register races and variates, and to produce their core materials,
- to protect and develop domestic gene resources, to provide access to gene resources and to share their benefits, work on authorizing, monitoring and auditing works,
- to make researches for the development and rational use of soil and water resources,
- to determine the research targets of the research institutions affiliated to the Ministry and to supervise these organizations,

- to conduct research on vaccines, serum, biolOJical and chemical substances and protection drugs used in animal and plant diseases, and effective and auxiliary substances included in their composition,
- to carry out scientific researches about aquatic organisms in seas and inland waters and to support them,
- to carry out research and development activities in national and international platform and support projects within this scope,

3.3.1.1.2.1. Directorate of Livestock and Aquaculture Research (DLAR)

DLAR aims to;

- prepare, or order to prepare, implement, monitor, and evaluate research projects on the protection of aquaculture stocks in inland waters and seas, increasing production and quality, determining aquaculture production areas,
- to ensure the registration of the results obtained from the research studies, and to maintain the brood stock,
- to prepare or order to prepare, implement, monitor and evaluate projects related to collection, conservation and evaluation of animal husbandry and aquaculture gene resources,
- to cooperate with relevant institutions and organizations in order to extend and transmit the findings and results obtained from the research studies.

3.3.1.1.3. General Directorate of Forestry

3.3.1.1.3.1. Directorate of Nature Protection and National Parks[139]

Duties of this Directorate are to manage terrestrial hunting, biodiversity, nature protection, sensitive areas, natural parks, wildlife.

3.3.1.1.4. General Directorate of Food and Control[140]

Established by pursuant to Article 413 of the Presidential Decree No. 1 on the Organization of the Presidency. The duties and authorities of the General Directorate of Food and Control are as follows:

- To provide reliable food and feed supply, to carry out studies for establishing policies in this respect and to inspect the implementation
- To determine the principles for the traceability of food, food additives and substances and materials in contact with foods at all stages of production, processing and marketing
- To specify the qualifications of workplaces producing food, food additives and substances and materials in contact with food and the principles of permission and registration thereof, to make their transactions of permission and registration, to register these workplaces in the food register, to make or have controls and inspections of production and sales places.
- To determine and announce the entrance and exit customs gates of food, food additives and feeds and substances and materials in contact with food by receiving the opinions of relevant institutions; to specify veterinary border control points and their working principles
- To identify and audit the principles regarding the registration, sale and inspection of feed and feed additives
- To determine the approval principles of enterprises engaged in the production and sale of feed and feed additives and to make their approval procedures,

[139] https://www.tarimorman.gov.tr/DKMP
[140] https://www.tarimorman.gov.tr/GKGM/Menus/103/Legal-Basis

- To establish the animal identification system and to control animal movements,
- To determine health conditions related to the foreign trade of live stocks, plants, animal and vegetable products, food and feed; to identify and carry out border control points and their operating principles
- To take measures for the purpose of protecting consumers and public health by considering plant, animal, food and feed safety,
- To make studies in order to provide animal welfare,
- To determine and audit the principles for certification of laboratories operating in animal and plant health and food and feed,
- To carry out control and follow-up procedures related to processing and marketing of animal products and to determine the relevant principles,
- To conduct animal health services and fighting animal diseases and to determine relevant principles,
- To determine and announce the conditions of manufacturing, sale, transportation and storage of therapeutic and protective substances used in animal health and their active and auxiliary substances,
- To specify the principles of institutions and organizations operating in animal health, diagnosis and treatment services, and principles related to animal sales, slaughtering and training places and shelters,
- To protect plant health, to fight against plant diseases and pests and to determine the relevant principles,
- To establish plant passport system, to control plant and plant product movements, to determine the norms and characteristics of the products used in plant protection and principles related to giving approval, to make approval and control procedures,
- To determine the principles of risk management in order to ensure plant and animal health and food and feed safety, to make risk assessment and to ensure risk communication,
- To specify the qualifications, working procedures and principles of the staff to be assigned in the protection of animal and plant health and food and feed control.

3.3.1.1.5. MAF Affiliated Organizations

3.3.1.1.5.1. General Directorate of Meteorology[141]

Fishing and aquaculture is very closely depanded to climatic and daily meteorological parameters. The duty of this organization is to provide uninterrupted, high quality and reliable meteorological products and services that prioritize life and property safety, improve the quality of life, meet sectoral expectations, and provide socio-economic benefits.

To be a pioneering institution that offers meteorological products and services in a reliable manner at international standards in the light of scientific and technological developments.

3.3.1.1.5.2. General Directorate of State Hydroulic Works (GDSHW)[142]

To provide our country's water resources in accordance with science and technique, and to ensure that our water and related soil resources are developed in line with environmental awareness and sustainability principles.

Their target is to be the leading institution in the protection, development and management of these resources.

In case af aquaculture GDSHW is responsible to determine the area and the place of cage farming in dam reservoirs and permits water intake from the surface or water discharge to the fish farms.

[141] https://mgm.gov.tr/
[142] http://en.dsi.gov.tr/

3.3.1.1.6. MAF Related Organizations

3.3.1.1.6.1. Agriculture and Rural Development Support Institution[143]

Decree on the ARDSI Organization (Presidential Decree No. 4 - Thirty-Fifth Chapter) Law on Services for Supporting Agriculture and Rural Development (Law No. 5648)

3.3.1.1.6.2. National food reference laboratory

The project for the establishment of National Food Referance Laboratory (NFRL) was combined and presented with "The Reconstruction and Consodilation of Food Safety and Control System in Turkey" project and came into effect in year 2005 Turkey National Program with TR 05 03 04 code number.

The tender process was completed with the contruction tender on 27 November 2006, inspection tender on 31 October 2006, procrument tender on 10 August 2007 and at last technical support tender on 15 October 2007. The construction of the building, which officially started on May 29, 2007, was completed on 24 November 2009.

The establishment of the Ministry of Agriculture and Welfare (Food, Agriculture and Livestock) of UGRL in the province of Ankara as a direct provincial organization was decided by council of ministers on 25 February 2008 and published in the Official Journal dated 1 March 2008 / no 26803 according to Article 17 of the Law No. 3046 on 27 September 1984. The Regulation on the Establishment and Duties of the National Food Reference Laboratory Directorate is published in the Official Gazette dated 14 January 2009 / no 27110. The laboratory has been put into service by making the official opening on 11 November 2010. Acredited and performs all kinf of food and feed analyses.

3.3.1.2. Ministry of Environment and Urbanisation (MoEU)[144]

The mission of MoEU is to protect the natural environment, create sustainable cities and settlements, carry out planning, transformation, safe construction, real estate management and all services related to the housing sector and the environment with a regulatory and supervisory approach, which revitalizes the identity of cities and is based on horizontal architecture.

3.3.1.2.1. General Directorate of Environmental Management (GDEM)[145]

As a mission, GDEM aims to take measures to prevent human health and reduce environmental pollution within the framework of sustainable development principles, this provides a healthy use of administrative, legal, financial, human and environmental resources, is to be a respected and pioneering institution that guarantees the right to live in the environment.

In order to reach these targets GDEM try to prevent and control of all disturbing factors affecting environmental pollution for a habitable environment, as vision. In this context, by;

- maintaining air quality; minimizing air pollution, noise and vibration,
- taking the necessary measures regarding global climate change, depletion of the ozone layer and is renewable. To support the use of clean energy, especially energy sources,
- allowing healty ground and ground waters, seas and lands leaving it in a way that can be used comfortably by the citizens,
- establishing and setting up laboratories that will make all kinds of environmental measurement, monitoring, analysis and controls

[143] http://www.tkdk.gov.tr/?lang=en
[144] https://www.csb.gov.tr/
[145] https://cygm.csb.gov.tr/

• being scientifically compatible with the developing and changing conditions of the day,
• classifying, collecting, transporting of all kinds of wastes by minimizing them at the source, temporary storage, recovery, reuse, purification, conversion to energy, disposal and setting an example for other countries on their final storage,
• looking for the ways research in cooperation with international organizations for environmental protection and development make; setting environmental standards; various organizations and local administrations related to environmental protection to ensure coordination between; supporting public institutions and organizations; environmental education to spread environmental awareness by implementing programs
• developing the studies as transparent, accountable, participative and pluralist rational management of environmental resources with improved quality,to be a respected and pioneering institution working for.

3.3.1.2.1.1. Marine and Coastal Management Department (MCMD)[146]

Department carry out duties by the four branch offices:

• Environmental Management of Maritime Operations
• Risk Management and Emergency Response
• Marine Environment Management
• Sea and Coastal Water Quality

Duties of MCMD are as follows:

- In order to use, protect, prevent or eliminate pollution of sea and coastal waters; to set goals, principles and policies, to prepare action plans for pollution removal and control, to determine the procedures and principles, to ensure their implementation,
- To monitor the national and international developments regarding the prevention and protection of pollution of the sea and coastal waters and its environment, to conduct the negotiations, to evaluate and to carry out studies to determine and implement policies and strategies on the subject, to carry out the national focal point tasks before the relevant international organizations,
- To determine and implement the procedures, principles and measures regarding pollutant removal and control of pollutants and pollution in order to ensure the use of marine waters by protecting them, preventing marine pollution with an integrated and ecosystem-oriented approach and establishing a good environmental condition, targets for Turkey's prevention of maritime jurisdiction caused by ships in the area of marine pollution, to determine the principles and policies, to identify the principles and procedures for the removal and control of pollution, making efforts to implement, to create a decision support system, to prepare action plans to prepare,
- To prepare and prepare the national and regional environmental management strategy and action plans in this context,
- Taking into account the ecological structures of the sea and coastal waters, to make the quality classification in order to ensure its sustainability in line with the principles of protection and use, to determine the pressures on these areas, to establish a program of measures to achieve the specified environmental quality targets, to develop technologies, to prepare risk maps, to ensure their implementation. to determine the procedures and principles for controlling the discharges made, to establish the monitoring policy and strategy,
- To determine policies, strategies and procedures and principles regarding the management of coastal waters and prevention of pollution within river basin management plans.

[146] https://cygm.csb.gov.tr/birimler/deniz-ve-kiyi-yonetimi-dairesi-baskanligi/205

- To take the necessary precautions to determine the procedures and principles regarding intervention and compensation of damages in emergency situations, to be prepared, to increase the capacity of intervention and struggle in the pollution of the marine environment with oil and other harmful substances; Within this framework, to make and have emergency response plans, restoration and rehabilitation plans and management plans for accidental wastes,
- To determine the procedures and principles regarding the bottom dredging activities to be carried out in coastal and sea waters and the discharge of dredging materials to be formed as a result of these dredging activities, to carry out the necessary studies,
- To determine the procedures and principles regarding the environmental management of activities that may create pollution risk in marine and coastal waters, especially in aquaculture, oil exploration and the removal of sunken ships, to reveal the effects of such activities on the marine environment, to conduct risk analysis, to identify risky areas, to do the necessary work,
- To protect the waters used for swimming and recreation and to prevent pollution,
- To determine the standards of wastewater discharges to be made to sea and coastal waters, sea discharge and deep sea discharge design principles and criteria, to carry out approval procedures,
- Preparing / preparing strategic action plans for marine litter, determining, applying, implementing the procedures and principles,
- To conduct researches and projects to protect and improve sea and coastal waters.

3.3.1.2.1.2. Climate Change and Adaptation Department (CCAD)[147]

Duties of CCAD are to:

- follow up and coordinate national and international studies to combat climate change and to protect the ozone layer, to prepare legislation on necessary issues,
- ensure national coordination and fulfill national focal points, within the framework of international organizations and conventions for combating climate change and protecting the ozone layer,
- carry out legislative studies and other studies on harmonization with the European Union acquis in matters falling within its field of duty,
- prepare or have the national reports that our country is obliged to prepare within the scope of international organizations and contracts,
- ensure the coordination of the Climate Change Coordination Board,
- provide national coordination of efforts to combat climate change at the local level, to organize capacity building activities and develop legislation for the preparation and implementation of climate change action plans on a local scale,
- monitor and evaluate the national and international developments regarding the control, recovery and disposal of substances that cause the depletion of the ozone layer and the alternatives of these substances, and to carry out and make studies for determining and implementing policies and strategies on the subject,
- follow up, control and report greenhouse gas emissions causing climate change on a national scale,
- carry out studies on market-based mechanisms and economic instruments, especially the emission trading system, within the framework of climate change policies,
- ensure the coordination of the works for monitoring and evaluating climate change adaptation policies,
- work towards informing and raising awareness of the public,
- prepare and implement national and international projects on the subjects falling within the field of duty

[147] https://cygm.csb.gov.tr/birimler/iklim-degisikligi-ve-uyum-dairesi-baskanligi/207

Department carries out all these duties with 6 branches;

- Climate Negotiations and International Policies
- Climate Change Policies
- Local Climate Change Policies
- Climate Change R&D and Application
- Greenhouse Gas Emissions Monitoring
- Ozone Layer Protection

3.3.1.3. Turkish Statistical institute (TURKSTAT)[148]

The recent form of the Institute was given by the Law No: 5429, dated 10/11/2005, Published in OJ dated 18/11/2005 No: 25997. Institute is officially assigned and authorised to declare, submit and publish all kinds of statistics in Turkey.

Duties and authorities of the Institute are as follows:

- to prepare the Official Statistics Programme,
- to organise the statistical activities specified in the Programme and ensure their realisation,
- to determine the statistical methods, definitions, classifications and standards to be used in the production of official statistics in line with national and international norms,
- to compile, evaluate, analyse and publish statistics in the fields of economy, social issues, demography, culture, environment, science and technology, and in the other required areas,
- to provide scientific and technical explanations to the results of official statistics,
- to follow up the developments in scientific research techniques, and methods and information technologies in the field of statistics and to take relevant measures for the adoption of these developments,
- to determine the areas where statistical data are needed as well as data compilation methods in cooperation with the relevant institutions and organisations, by taking into account the national and international priorities,
- to follow the performance of tasks assigned by the Programme to the institutions and organisations in relation to official statistics, to examine statistics produced by these institutions and organisations in compliance on their international standards, to perform quality control and to provide technical support and ensure coordination in these issues, to coordinate the establishment of a national and international information network and information flow system to ensure the storing of statistical information, its submission to users and development of systems pertaining to these areas,
- to identify the standards for the establishment of the national register systems, implement these standards, and to ensure their observance through inter-agency coordination,
- to follow, evaluate and publish, when needed, the indicators related to other countries or country groups in order to make international comparisons,
- to draft, develop and implement research and technical assistance projects in cooperation with the national and international organisations and institutions for the production of data in the required areas and for the enhancement of existing technical capacity,
- to cooperate with other countries and international organisations, and to organise international meetings in the field of statistics,
- to perform other duties assigned by the Law

[148] http://www.turkstat.gov.tr/UstMenu/yonetmelikler/StatisticsLawOfTurkey.pdf

The Presidency may establish national and international training and research centres regarding its working areas in cooperation with universities and other training institutions where the duties of the higher education institutions are reserved.

Under these general outlines, TURKSTAT collects all fisheries data by collaborating with the MAF, GDFA and disseminate to the public.

Within the context of International relations, activities are carried out on three main topics:

- Within the context of EU coordination studies; cooperation studies with EU, international organizations and national statistical institutes, following up activities on EU statistical standards and conducting studies in order to comply with these standards, and organizing all types of studies on "Statistics" are carried out according to the country policy,
- Within the scope of implementation of international statistical projects in order to harmonize with European Union Statistical Acquis, EU financed programmes and the financial management, coordination, monitoring and reporting activities are being carried out. Some basic activities within the framework of the programmes can be exemplified as managing the tender processes; coordination of consultancy and data collection activities and organisation of local and international training activities.In addition to EU Programmes, TurkStat participates in the third country projects funded by international organizations as an expertise provider.
- In the context of the international cooperation studies; bilateral and multilateral statistical cooperation projects, technical assistance projects/ programs and cooperation protocols directed to the several countries and country groups are being prepared in accordance with the policy of the country, these projects, programs and protocols are being implemented in line with the international agreements, cooperation studies in the field of statistics with international organizations, national statistical offices and regional organizations are being carried out, compliance studies with the international standarts are being coordinated and followed.

3.3.2. Private Organizations

Not only public but also various other private institutions plays an important role in the governance of aquaculture business as to support investors by acting/corporating together to implement constructive decisions taken by the government.

3.3.2.1. Central Association of Aquaculture Producers Union (SUYMERBİR)[149]

Aquaculture Producers Central Union is a producer organization established in 2009 with the approval of the Ministry of Agriculture and Forestry according to the provisions of the Law on Agricultural Producers Associations No, 5200. Main aim is to cooperate with member associations, contributing to the development of the sector, helping members to comply with the rules regarding production planning and marketing at the national level, by informing and directing the members,

Duties of SUYMERBIR are to;

- protect the rights and interests of members,
- represent member associations at home and abroad,
- send representatives to the councils and similar organizations established to create agricultural policies,
- contribute to the works to be carried out in the process of harmonization with EU,
- prepare projects and take initiatives to get technical and financial support from national and foreign sources,

[149] http://suymerbir.org.tr/

- carry out meetings and workshops that will ensure the unity and solidarity of the members,
- disseminate information via publications such as books, brochures and magazines

SUYMERBIR has 3 members associations in the Black Sea region; Rize, Trabzon and Samsun-Sinop Aquaculture Producers Associations.

3.3.2.2. Trabzon Chamber of Commerce and Industry[150]

All cities have such institutions to promote business activities and investments in the provinces. With its current structure, "Trabzon Chamber of Commerce and Industry", founded in 1874, is one of the oldest chambers of Turkey. With its 6785 members, 13 units and 37 employees Trabzon Chamber of Commerce and Industry aims to contribute to the trade and economy of the region.

Second half of 19th century is a historically special period for Trabzon. Developments in naval trade, rapid advances in world trade provided many opportunities to Trabzon. Especially, regarding the trade between Europe and Iran, India, Caucasians and Middle East, many struggles are interfered for Trabzon.

After the foundation of Turkish Republic, according the rules and regulations dated 1926 elections are made (March 25, 1926) and the chamber continued its activities till today without giving a break.

Their Mission was declared as:
- to have an organizational structure that continuously improves, learns and develops by realizing the strategic plan and quality targets of the Chamber,
- to produce efficient and quality services to meet the needs and expectations in order to solve the structural problems of the members,
- to fulfill the socio-economic development of the region with the awareness of social responsibility,
- to fulfill the duties assigned by the legislation in a complete manner, within the framework of member satisfaction principles.

Vision of the Chamber is:
- to improve strong institutional capacity to provide the highest quality service to its members,
- to adopt contemporary approaches in management processes and using the most advanced information technologies,
- to identify the problems correctly and producing effective solutions,
- to play efficient role in the socio-economic development of the region,
- the importance of decision-makers' knowledge,
- to be value creator and leading organization

Chamber has 31 different business committees. Aquaculture is included under the Agriculture, Forestry and Animal Husbandry, Development Cooperatives, Flowers, Plant, Seed, Fertilizers, Pets and Feeds Committee. Due to high importance of fish farming in the Province regarding the volume of investment, employment, export, importance in nutrition, high input to the local economy, Chamber gives special importance to improve aquaculture business in the region. Major activities are to transfer problems to the Government, to produce solutions together with the Provincial Directorate of Agriculture and Forestry, to support SMEs to take part in exhibitions on aquaculture, to organize visits to other countries to increase export and promote big trout in potential countries and prepare sectorial reports in the field of aquaculture. Chamber organized 2 business visits to Russian Federation and Japan, and supported participation of members to the exhibitions in Dainmark and Russia by opening stands and tasting events in 2019.

Trabzon Chamber of Commerce and Industry is one of the important stakeholders of the DACIAT Project.

[150] https://www.ttso.org.tr/en/index.php

3.3.2.3. Eastern Black Sea Union of Exporters (DKIB)[151]

The most important pillar of foreign trade is exports due to its great share in the development of the countries. Any increase in the exports increases the wealth created in the country and causes an increase in production efficiency.

The General Secretariat of the Eastern Black Sea Exporters Association was established in Trabzon in 1998 to serve Trabzon exporters, and Rize, Artvin and Gümüşhane provinces were included in the jurisdiction of the Union, which was later converted into a regional structure by considering the needs of the Region. In this context, association has a status of Regional Union, with Liaison Offices (Branch) in Rize and Artvin-Hopa District as service units.

Duties and functions of DKIB are to:

- protect professional ethics and solidarity,
- try to develop exports in accordance with the country's interests,
- act jointly at the point of adjusting the export of related goods according to foreign demand,
- organize courses and seminars to inform exporters,
- establish foundations, schools, laboratories, build social facilities and companies to serve to increase exports and exporters,
- carry out studies on foreign trade issues and protective and progressive works towards the interests of members in the eyes of public, non-governmental and private sector organizations, and national and international organizations/institutions.
- participate international fairs with members, producers and export companies and provide technical/financial support in international fairs,
- announce the requests from the Commercial Counselors to the relevant sections and members,
- work in cooperation with the Ministries and Trade Counselors in order to solve the problems,
- fulfill the duties assigned by the Ministry of Commerce on export supports,
- perform the approval function of registered export goods,
- announce current export figures to the public,
- protect the commercial rights and interests of its members in the national and international arena,
- establish relationships with members and international organizations in line with Turkey's interests,
- organize and participate local exhibitions to carry out promotional activities,
- support Turkey Exporters Assembly and the Ministry of Commerce in the development of foreign trade policy.

Under this framework of functions, DKIB supports aquaculture production in Trabzon in order to increase exports from Trabzon. On the other hand if the export quantity increase, Rize, Gumushane, Giresun and Ordu provinces may also be benefited due to work jointly in different stages of the production, i.e. hatcheries and juvenile production, growth in lakes and inland ponds, fattening in the sea cages, feed industry, cage and net manufacturers and other service providers. Aquaculture is one of the targeted sectors of DKIB to increase export possibilities of the investors in Trabzon Province.

3.3.3. Supporter Organizations (Promotions/Supports/Incentives)

Aquaculture sector is governmentally supported to be spread across country by numbers and capacities, diversification of the number of species farmed, increase the production for more supply to domestic markets and export. All of the actors took place in the designated authority, central and local governing bodies,

[151]http://www.dkib.org.tr/tr/default.html

research institutions, business supporting organizations, service suppliers and funding partners are working in harmony to reach the same target.

3.3.3.1. Agricultural Bank (Aquaculture and Fisheries Loans)

Agriculture Bank is a state-owned bank in Turkey founded in 1863. It is the second biggest Turkish bank since 2012 according to the Bankscope database measured by total assets in USD. Besides agricultural support loans, Ziraat Bank serves citizens in all financial transactions.

3.3.3.1.1. Commerial Credits:

Real persons and companies of which have invested on fisheries and aquaculture activities may apply for fishery credits (aquaculture in sea, lakes, ponds; fishing in the sea and inland waters) for investment and operation. Fisheries loans are the credits allocated to the producers farming fish in cages in the sea and in soil and concrete ponds in inland waters (trout, sea bream, sea bass, etc.), and fishing industry in the seas for financing their investment and operational activities.

Fisheries credits for fish farming and fishing cover to supply juvenile fish, feed, medicine, fuel, labor, boat repair, all kinds of fishing and aquaculture tools and equipment, cold air storage, motor boat, fishing vessel fishing nets, etc.

In the determination of investment loans that can be used for investment expenditures, the size of the investment of the project is evaluated by taking into consideration the amount of equity of income and expense balance and customer credibility. In operational loans, an evaluation is made according to the capital requirement related to the enterprise that continues its production and fishing activities. Loans are allocated according to the evaluation reports applied by the banks, the credit rating of the customer requesting the loan, the loan term, the credit term and the collateral conditions.

Basic Requirements for real persons are:

- National identity card copy,
- Farmer Certificate / From Farmer Registration system
- Documents proving its agricultural property (land registration, rental contract, etc,)
- Documents related to collaterals to be shown against the loan
- Balance sheet and income statement for the last three years from companies operating on a balance sheet basis

For Legal Persons:

- Farmer Certificate / from Company Registry System
- Trade Registry Gazette where the legal entity articles of association (if any) are published
- Chamber registration document
- Tax certificate
- Decisions on the authority of representation of persons authorized to represent the legal entity and notarized circular of signature
- Balance sheet and income statement for the newly established legal entities belonging to the establishment and / or last year, and in others for at least the last three years
- Documents proving its agricultural holdings (land registry, rental contract, etc,)
- Documents related to collaterals to be shown against the loan,

3.3.3.1.2. Subsidized Loan Applications

In order to support investments on selected sectors, it has been decided by the attached decision signed by the President, Ziraat Bank and Agricultural Credit Cooperatives are assigned to implement the Decision on the

Use of Low Interest Investment and Business Loans for Agricultural Production pursuant to Articles 3 of Law No, 4603 and Articles 1 of Law No, 5570.

The upper limit of the loan provided by Agriculture Bank in aquaculture business was doubled in 2020 compared to the previous year, reaching 10 million TL, Interest rates are applied in two ways as "INVESTMENT" and "OPERATION" period. According to the decision, encouraging subsidized credits for the fisheries sector could be applied as it was shown in the Table 15 given.

After the interest rate discounts given in Table 14, Ziraat's current 10% interest rate decreases annually by 5% for both periods. On a monthly basis, this rate corresponds to 5/12 = 0,41%, Of course, if you are a young farmer under the age of 40, or woman, in addition to the information above, for women investing in aquaculture, this rate decreases to by 0,16% per month and 2 % per year.

Requirements:

- Fish farmer or fishing license/certificate,
- Identity card and any property or ownership of boat to be deposited,
- Your credit rating should be over 1700 points and above,
- 2 guarantees together with their spouses,
- No debt document from the tax office.

Table 3.1. Discount credits of Agricultural Bank to aquaculture business

Topic	Reduction Rate (%)		Upper Limit of the Credit (Million TL)
	Investment	Maintenance	
Fisheries Sector	50	50	10
Aquaculture	10	10	
Young farmer/entrepreneur(≤40 yrs)	10	10	
Woman farmer/enterpreneur	10	10	
Highest reduction rate applicable	80	80	

3.3.3.2. KOSGEB[152] Grant Incentives

KOSGEB was established in 1990 with the Law No: 3624, to provide services and supports only for the production industry SMEs until 2009, However, due to the increase in the added value production and employment creation potentials of other sectors in Turkey and due to the high requests received from SMEs in such sectors, the target of the KOSGEB had been enlarged to cover all SMEs.

KOSGEB Establishment Law was amended by the Law 5891 to provide essential legal grounds for KOSGEB to support SMEs other than the ones in the production industry sectors. The Cabinet Decree No 15431 on the "Determination of Sector and Regional Priorities of Small and Medium Enterprises that will Benefit from the Services and Supports to be Provided by KOSGEB" was published in the Official Journal dated September 18, 2009 (No 27353), and with this Decree, the sector and regional priorities related with the enterprises that will benefit from the services and supports to be provided by KOSGEB were determined.

Entrepreneurs can take advantage of KOSGEB grant incentives, regardless of what kind of fishing activity they conduct; importing seafood or exporting domestic fish from the nature or farms, KOSGEB supports everyone who sets up or will start a business as a production partner, by providing the conditions. Some of the sectors and fields are given below as it is indicated by the following NACE codes (Table 16):

[152] Small and Medium Enterprises Development Organization of Turkey, Ministry of Science, Technology and Industry; https://www.kosgeb.gov.tr/

Table 3.2. Sectors to be supported by KOSGEB funds

Nace Code	Sectors
10.2	Processing and storage of fish, shellfish and mollusks
46.38	Wholesale trade of foods including fish, shellfish and mollusks
47.23	Retail trade of fish, crustaceans and mollusks in stores dedicated to a particular property

The "Entrepreneurship Support Program" created by KOSGEB for entrepreneurs who want to get support to open a new business has been redesigned from the beginning of 2020, as “Entrepreneurship Development Support Program”, which is now its new main name, includes grant support between 60000 TL and 370000 TL. According to the business model will be established, all entrepreneurs who will start a new business can benefit from these supports.

KOSGEB Entrepreneurship Development Support Program covers 2 kinds of support:

1. Traditional Entrepreneur Support
2. Advanced Entrepreneur Support

The only form that does not change is the “Applied Entrepreneurship Training”, which is the first condition of the application to both programs. However, radical changes were made in these trainings. The most striking one is the training given over the Internet with "Distance Education" technology. Whether it is “Formal” or “Distance Education”, it has become much easier to get an entrepreneurship certificate. However, while taking these trainings, "Distance Education" period was kept a little longer for those who will receive "Advanced Entrepreneurship Support".

KOSGEB Traditional Entrepreneurship Support Program:

It is dedicated to applicants who will start a new business. The program takes place under 2 forms. These are;

- Businesses Established by Real Persons
- Enterprises Established in the Capital Company Status

The business ideas of those who will establish businesses within these two sectors must include the business ideas within the KOSGEB supported Sectors and NACE codes. Applicants must apply the KOSGEB support program if the business idea is not included in the "MANUFACTURING" sector. But if the business idea is within the "MANUFACTURE" sector in the NACE codes of KOSGEB, then the program needed to be applied is the "Advanced Entrepreneur Support" program.

While the program provides support for the expenses that previously received for work, machinery and rentals, it now provides support according to the insured premium that applicants employ with the majority,

Businesses Established by Real Persons: (within 1 to 12 months)

As a first establishment support of the workplace, applicant will be given a grant of 5000 TL without question,

According to the SSI[153] premium payments, the workers of the applicant have worked for between 1 and 12 months are given a grant of up to 20000 TL after 12 months. The number of these premium days can be easily calculated. Since there are 365 days in a year but on average 249 days are the working days. If the farm employs 1 person in 1 year, farmer will receive 5000 TL more at the end of the year,

If farm is operated within periods, applicant will receive 10000 TL. If 4 people employed in periods, applicant will receive 20000 TL grant at the end of that year.

[153] Social Security Institute (Service)

If applicant is younger than 30 years old, or disabled, or female, veteran and martyred, applicant will receive a grant of + 5000 TL after 1 to 12 months.

Thus, if applicant catch the highest premium day at the end of 1 to 12 months after the 5000 TL for the workplace establishment, then he will receive a grant of 20000 TL and a total of 30000 TL in the first year by receiving a grant of + 5000 TL if he is younger than the age of 30 or disabled, veteran or female relative (If you are a company, you will receive a grant of 35000 TL and + 5000 TL establishment support, which was given in the first year).

Businesses Established by Real Persons: (within 12 to 24 months)

If the applicant is disabled person, a relative of a martyr, an entrepreneur under the age of 30, a woman or a veteran, you will receive a grant of + 5000 TL after 12 to 24 months.

According to the number of day premiums for the staff employed, applicant will receive a maximum of 20000 TL at the end of 12 to 24 months.

Accordingly, if the applicant is a private company, after 24 months a grant of 55000 TL in 2 years, with a maximum of 25000 TL will be received. However, if the investment belongs to Capital Company, applicant will receive a maximum of 25000 TL grant at the end of 12 to 24 months, and a grant of 60000 TL with 35000 TL in the first year (Table. 3.3).

Table 3.3. KOSGEB support program

Support	Real Persons	Capital Company
Establishment support	5000 TL	10000TL
	1st Performance period Total premium days	2nd Performance period Total premium days
Performance support	for 180-539 days 5000 TL	For 360-1079 days 5000TL
	For 540-1079 days 10000TL	1080-1439 days 15000 TL
	1080 and over 20000TL	over 20000TL

KOSGEB Advanced Entrepreneur Support Program:

In order to be able to benefit from this program, applicant's business idea should be among some of the business ideas included in the KOSGEB Supported sectors and the "MANUFACTURING" sector located in NACE codes. In addition, new entrepreneurs who have received "Advanced Entrepreneurship Training" shall benefit from "Distance Education" and "Applied Entrepreneurship Training" program. If applicant is active among these sectors and receives training, the grant amount of the business that will be given to the applicant within 1 to 24 months is the same as in the table given above. On the other hand two additional supports can be provided (Table 3.4):

Table 3.4. KOSGEB supports in advanced program

Type of the support	Support amount TL	Support rate %
Machinery*, equipment, software		
Low, low- medium technology level	100000	75
Medium-high technology level	200000	
High technology level	300000	
Mentoring, consulting, business coaching		
Support for consultant and business coaching	10000	75

*if the machinery is made in Turkey, support has increased additional 15%

As it is seen in the table, the machinery needed to buy for the business must be in the first place for the production. In accordance with this requirement and if the applicant's business is in the "MANUFACTURING SECTOR TABLE" grants will be given under the criteria:

- If the technology level is "low", a grant of 75000 TL allocated for the machine cost 100000 TL,
- If the company at the intermediate level, a grant of 150000 TL is received for the expense of 200000 TL,
- Although it is at a high level, 225000 TL grant is given for the cost of machinery for 300000 TL,
- In addition, a 7500 TL grant will be paid within the 10000 TL consultancy support.

Apart from the relevant conditions for the support programs, additional requirements from the new entrepreneur are:

- never received any grant from KOSGEB before,
- presentation of the business idea after "Entrepreneurship Training",
- Then, it is necessary to create and apply KOSGEB registration.

3.3.3.3. Other Support Organizations

Non-refundable credits; grants in brief, farmers in aquaculture business benefit from the grant opportunities up to 80% for their farms established in the selected cities within the scope of IPARD-2, until 2020, Until now, 3 trillion TL and 11000 project owners have been given their livestock investments completely free of charge, IPARD[154]-3 phase is expected to be approved by the European Commission.

Turkish Government provides interest and grants to farmers who are involved in agricultural activities in many areas. These opportunities are sometimes taken into consideration by certain time intervals and sometimes within the budget allocated to farmers. Some of other supporting institutions are:

3.3.3.3.1. Agriculture and Rural Development Support Institution (TKDK) Development Agencies[155]

Agriculture and Rural Development Support Institution (TKDK) provides 80% grant on project basis, with the support of 75% European Union funds and 25% of Turkish Government and 80% of grant opportunities are provided to farmers in 2019 with many precaution titles. The institution provides its support within only 42 provinces (Trabzon, Rize, Samsun Ordu, Giresun and Kastamonu in the Black Sea Region).

Support Premium by Ministry of Agriculture and Forestry

Providing the necessary conditions by the Ministry of Agriculture and Forestry, support payments are made to those who officially continue their aquaculture activities upon their application, In this sense, the Aquaculture Support Communiqué has been issued by the MAF and supports are given to the species included the legislation, Various measures are taken for state aquaculture production, especially in issues such as fish species protection and fishing bans, Producers farming fish species determined in the communiqué are supported at the determined unit prices,

In order to benefit from aquaculture supports, it is necessary to produce the one in the listed species; such as trout, mussel, Black Sea trout, red spotted trout, fangri, synagrit, gilthead, yellowtail, yellow mouth, tilapia, eel, leech, shrimp, crayfish species, etc,, "Fish identification cards" supports are provided for fish species produced within the scope of intensive fish farming, In addition, within the scope of aquaculture, there are government grants for good agricultural practices (GAP).

[154] EC Instrument for Pre-accession Assistance for Rural Development
[155] announcements can be followed at https://bit,ly/2U0t23V,

The fish species supported within the scope of good agricultural practices are trout, sea bream and clam by 0,25 TL per kg, Production support is provided for those who are engaged in good agricultural practices, those who are registered in the system, those who make their applications within the application period, who submit their documents completely, those who do not produce juvenile fish and those who do not lose their right to benefit from the supports provided, and the productions made within the scope of agricultural practices are 0,25 TL per kilogram, ,

In addition, 0,25 TL are granted for those producing fish in intensive closed systems, There is no kilogram limitation in the closed system,

In order to take advantage of the support given for aquaculture, it is necessary to meet the following conditions;

- Being farmer or member of a farmer family,
- Operating in rural areas
- Being a real and legal person
- Farming the fish species and mussel
- To have an aquaculture certificate approved by the Ministry (Fig, 5),
- To have received Good Agricultural Practices Certificate from organizations authorized by the Ministry (MAF),
- To produce up to 500 thousand kilograms (There is no production limit for closed system)
- Obligation to register in the Agricultural Information System

Figure 5. Aquaculture certificate

Fish Recognition Card Support

It is also known as label support, Applications will be made to the Provincial / District Agriculture and Forestry Directorates located in the region to be labeled, When the application is made, it is mandatory to issue a Fish Recognition Card Identification minute, However, if the farming is carried out in different provinces, two are issued and one of the documents is delivered to the provincial irectorate in the region where the facility is located, The number of fish in the farm to be supported should be equal with the documents necessary for the label support. The following issues are taken into account in the calculation of labels to be supported;

- 3 pieces per kilogram in sea bream and sea bass production,
- 4 pieces per kilogram in trout, Black Sea trout and spotted trout farming
- 2 pieces per kilogram of new species

- One card is issued for over-kilogram fish farming.

Requirements for Application:

- Fisheries support application statement,
- Fish recognition card invoice,
- Fish catch report/sales certificate,
- Document showing that the harvested product is sold,
- Record report showing that trout harvest is made over kg,
- Fish label fixing report,
- Union or cooperative membership certificate,
- Copy of aquaculture certificate,
- Feed invoice,
- If juveniles are obtained from research institutions, a document proving this is required,

Variety of supports was allocated to fish farmers to promote aquaculture production and to spread fish farming business across country (Table 3.5).

Requests must be done to Provicial/Town Agriculture and Forestry Directorates together with the documents given below:

- Trout support application petition,
- Minutes or sales document showing that the harvested fish is sold,
- Sales document indicating that the product has been purchased or juvenile fish detection document,
- If there is membership to a cooperative on fisheries, partnership certificate
- Feed invoice,

Table 3.5. Incentives for production in Turkey

Type	TL per kg	TL per fish	Remarks
Trout	0.75		≤ 350 tons
New species	1.50		
Closed (intensive) fish farm			
Big trout (>1.25 kg)			
Mediterranean mussel	0.10		
Carp	0.50		
Diseases free trout hatchery brood stok support		60.00	≤ 10000 fish
Aquaculture in soil ponds	1.00		≥ 30 tons

Two percent of support is cut as service costs and the rest of the payment is transferred to the farmers over the accounts of producers through Ziraat Bank, The responsibility for the documents submitted to benefit from the payment belongs to the applicant, In the event that it is determined that an unfair payment is made, as a result of the Law on the Collection Procedure of Public Receivables 6183, these amounts are collected from the person who is paid, together with the delay hikes.

3.3.3.3.2. Insurance for Agricultural Investments (TARSIM)[156]

In addition to the crucial role in regard to the world population, the agricultural sector is extremely sensitive field of activity with its inherent structure, featuring exclusive in economic, social, political, technological and personal risks. To this end, the effective performance in the agricultural activities in the nutrition of the human being is closely related with the management of risks threatening the agricultural production. It is therefore,

[156] https://web.tarsim.gov.tr/havuz/homePageEng

the developed countries effectively implement the risk sharing and risk transfer operations under various protective policies under the general titles of; Risk Management Programs; that also accommodates; Agricultural Insurance Practices as an important part integral to such programs. In order to provide coverage for the risks threatening the agricultural industry in the country, the implementation of an insurance mechanism has been considered and for this purpose, Agricultural Insurance Code No. 5363; was enforced as of 14/06/2005. The code provides:

- the establishment of Insurance Pool in regard to introducing standard provisions in insurance contracts to be executed to provide the coverage to the risks as referred under the Code, establishing the conditions for transferring risk under reasonable provisions, ensuring centralized payment of the indemnification upon occurrence of the risk, improving and spreading of the agricultural insurances,
- all tasks of this Pool are carried out by Agricultural Insurance Pool Management Company which, was established with equal share of the insurance companies participating in the Pool.
- insurance companies issue insurance policies with their own name however the risk and 100% of the premium must be transferred to Agriculture Insurance Pool. These insurance companies can optionally take share from the Pool through retrocession.
- the Government provides premium subsidy exclusively to insurance contracts executed under the Code, in terms of the premium on behalf of the farmers. The amount of premium subsidy is determined by Council of Ministers on annual basis, with respect to the crops, risk, region and premises scale.

Agricultural Insurance Pool Board of Directors is assigned by The Code, as an administrative apparatus responsible for determining the principles and procedures of the Agricultural Insurance Pool, the loss assessment methods, executing the contract between the insurance companies wishing to take part in agricultural insurance and Agricultural Insurance Pool Management Company, observing due diligence in determining the risks the subsidy to be covered, observing the practical drawbacks and problems and proposing pertinent solutions. The Board consists of total of 7 members, two members from Ministry of Food, Agriculture and Livestock and Undersecretary of Treasury each, and one member from Association of the Insurance and Reinsurance Companies of Turkey, Union of the Agricultural Chambers of Turkey and Agricultural Insurance Pool Management Company each. The Board's first members are assigned by Ministerial approval dated 16.1.2006 for three-year posts.

Main duties and responsibilities are:

- To provide the insurance coverage for such catastrophe risks like drought, frost, etc., that cannot be covered by a single insurance company,
- To expand the capacity and coverage of reinsurance by encouraging the participation to reinsurances,
- To effectively make use of the information, human and financial resources of the insurance companies jointly,
- To effectively make use of the Government subsidies and excess of loss Protection,
- To prevent unfair competition in the prices,
- To encourage the participation in Insurance.

The Mission of TARSIM is is to promote, spread of Agricultural Insurance and to conduct the necessary applications fast and accurate, in order to protect the farmers against the natural disasters and other risks.

Their Vision is defined as to turn out to be an exemplary organization entrusted by the farmer, capable of providing wide range of agricultural insurance covers as possible to all kind of agricultural crops grown in all agricultural regions of the country.

Species produced in the sea and land based farms; cage and nets that are recorded in the Aquaculture Registration System (ARS) are accepted for insurance following risk analysis and assessment within the scope

determined by decision of the President pursuant to Article 12 of the Agricultural Insurances Law Ref. Nr. 5363. The present insurance is effective within the framework of the following Tariff and Instructions.

More information about the coverage, indemnities, tariffs and premiums are given in Annex 3.

3.4. Ukraine

3.4.1. Public and private institutions

Aquaculture activity in Ukraine involves institutional interaction of the following parties:

- public authorities that regulate and manage such activities;
- local self-government bodies;
- aquaculture entities - legal or natural persons carrying out fisheries activities in aquaculture.

Key competences of state regulators of aquaculture activities that create a system of relationships and form management competencies and functions throughout the vertical of the sectoral management system (Table. 1.10). The most important, effective were the consequences of reforming and updating the procedure for the provision of fisheries for use on lease for aquaculture purposes. In fact, the basic law changed the procedures and principles for the provision of water bodies in resource use, reinforcing the involvement of local authorities in this process. It is known that the availability of fisheries to water resources is considered a necessary condition for the revitalization of aquaculture business and, as a consequence, a key task of reforming the industry by creating favorable institutional conditions for fisheries. The mechanism laid down in the basic law provides for new organizational relationships in the aquaculture sector, whose implementation is taking place today at the regional level. The main administrative and legal innovations are as follows:

Fisheries water bodies are provided for aquaculture purposes for rental use;

- the object of use under the terms of lease is the land under water within which aquaculture is carried out and the water (water space) provided for use in the complex;
- the rent consists, respectively, of the payment for the land and for the water space;
- leasing of water bodies for use on the lease is carried out in the presence of a water body passport;
- the authority to lease water bodies for use on lease terms within settlements belongs to village, settlement and city councils, and outside settlements to regional state administrations; leasing of the waters of inland sea waters, territorial sea, exclusive (marine) economic zone of Ukraine for the purposes of aquaculture (mariculture) is carried out by the Cabinet of Ministers of Ukraine;
- the tenant is obliged to adhere to the established standards of aquaculture fish production standards;
- in due course to report to the State Fisheries Agency on production volumes of aquaculture products.

The main link of the state fisheries management department is the State Department of Fisheries (State Fisheries) within the Ministry of Agrarian Policy of Ukraine (Table 3.6).

Table 3.6. Distribution of powers of the main state regulators of aquaculture in Ukraine

The governing body	The complex of tasks	Regulatory documents[2]
Cabinet of Ministers	Ensuring public policy in the field of aquaculture. Provision of inland waters (inland waters) for inland sea waters, territorial sea, exclusive (marine) economic zone of Ukraine for aquaculture purposes. Organization of international cooperation in the field of aquaculture.	CMU Resolution of May 29, 2013 No. 420 "On Approval of the Model Lease Agreement for Water Bodies". CMU Resolution "On Approval of the Procedure for the Provision of Hydrotechnical Structures for Aquaculture Purposes and the Typical Form of the Contract for their Use" (Draft).

Ministry for Development of Economy, Trade and Agriculture of Ukraine Ministry of Energy and Environment Protection	Approval of regulations, methodological documents and programs of scientific and technological development on aquaculture.	**Order** of MinAAP № 45 of 30.01.2013 "On Approval of Aquaculture (Fisheries) and Fish Productivity Zones by Regions of Ukraine". MinAAP **Order** No. 414 of 7 July 2012 "On approval of the Procedure of artificial breeding (reproduction), cultivation of aquatic bioresources and their use." **Order** of the Ministry of Ecology № 236 of May 28, 2013 "On Approval of the Methodology for Determining the Fee for Leased Water Facilities."
		Order of the MinAAP No. 742 of December 16, 2013 "On Approval of the Procedure for Development of the Passport of the Fishery Technological Reservoir". Order of the Ministry of Agriculture and Forestry "On Approval of the Procedure for the Implementation of Fisheries Reclamation" (Draft) "On approval of special forms of primary documentation for fisheries entities in the field of aquaculture."
State Fisheries Agency	Development of regulations and programs of scientific and technical development of aquaculture; control of activity and reporting of aquaculture subjects; personnel management; cooperation with international organizations on aquaculture, prevention of environmental pollution.	State Targeted Economic Program for Fisheries Development for 2012-2016
Local state administrations	Leasing of a part of a fishery water body, a fishery technological reservoir for aquaculture purposes for use. Participation in the development and implementation of national and regional aquaculture development programs.	
Local governments	Leasing a part of a fishery water body, a fishery technological reservoir for aquaculture purposes in accordance with the land management authority established by the Land Code of Ukraine.	

The State Fisheries Agency of Ukraine is subject to 4 state fish breeding complexes. The main task of which is the fishing of reservoirs of national importance for different species of fish in the territory of our country, namely:

- State Institution "Kherson Production and Experimental Plant for Breeding Young Fish". The specified fish breeding complex annually releases to the lower reaches of the Dnieper River more than two million specimens of two-year and this year carp, herbivorous species, as well as native species of fish (pikeperch, pike).

- State Institution «Novokakhovsky Fish Farm of partial fish». The fish breeding complex annually releases more than two million specimens of this year and two years of carp and herbivorous fish, more than three hundred thousand specimens of native fish (pikeperch, pike, European sheatfish) to the lower reaches of the Dnieper River and the Kakhovka Reservoir.
- State Institution “Production-Experimental Dnepr sturgeon Fish-Breeding Plant named after Academician S.T. Artyushchika. The only state-owned enterprise in Ukraine which task is to reproduce sturgeon fish species included in the Red Data Book (Beluga, Russian Sturgeon, Stellate Sturgeon, Sterlet) that have spawning sites in the Dnieper River, raising nomadic young and stocking the lower reaches of the Dnieper River and the Black Basin sea. Fish-breeding complex releases more than one million three hundred thousand pieces of sturgeon species each year.
- State Institution “Lopushno Trout Fish Farm. The specified fish breeding complex annually releases to the small rivers of the Carpathian region more than one hundred and twenty thousand salmon fishes (trout stream, rainbow trout).

Control of catch of aquatic living resources in inland fisheries of Odessa region (Kagul lake, Kartal lake, Kugurly lake, Yalpug lake, Sasyk lake, Stentsovsko-Zhebriansky floodplains, Tuzlov group of estuaries, Shabolatsky, Hadzhibeisky, Tiligulsky, Small Adzhalyk estuaries, and Kuchurgan reservoir), the Danube River and the Dniester River with lake-floodplain systems, as well as the exclusive (maritime) economic zone of Ukraine are carried out by the Odessa Basin Directorate for the Protection, Reproduction of Water Living Resources and Fisheries Regulation. The fisheries in the Black Sea and the associated estuaries are also controlled by the State Inspectorate for the Protection of the Black Sea. The cumbersome system for regional fisheries management needed modification and was slightly reformed in 2005.

Licensing conditions for carrying out commercial activities related to industrial fishing in industrial areas of fisheries, in addition to inland reservoirs (ponds) of farms, were approved by a joint Order of the State Committee for Regulatory Policy and Entrepreneurship and the State Department of Fisheries and Agriculture. A necessary condition for the implementation of an effective regional policy in the fisheries complex should be the full implementation of the powers of local authorities and self-government bodies.

Scientific support is provided by the State Enterprise "Odessa Center of the Southern Research Institute of Marine Fisheries and Oceanography" (Odessa), the State Enterprise "Regional Experimental and Experimental Complex" (Bilyaivskyi district, Paliyovo village), the State Enterprise" Experimental mullet fish breeding farm (Belgorod-Dnestrovsky district, Bilenke village), State enterprise "Dnestrovsky fish breeding farm" (Belgorod-Dnestrovsky district, Odessa-Reni highway, 43 km, Sturgeon section).

The establishment of the **Odessa Regional Association of Fisheries Enterprises** has been declared as a programmatic event in the approved sectoral regional fisheries program in Odesa Region 2014-2017, but special consideration of the interests of the aquaculture sub-sector is required when formulating such documents.

4. RESEARCH AND DEVELOPMENT ACTIVITIES CARRIED OUT IN PARTNER COUNTRIES

4.1. Greece

4.1.1. Educational and research institutions

Educational and research institutions active in Greece in the field of aquaculture support education research and innovation, with applied research, system and product development as well as infrastructure development and support, and technology transfer and entrepreneurship. The following are the main aquaculture educational and research institutions in Greece:

Hellenic Centre for Marine Research[157]

The Hellenic Center for Marine Research has recently been formed by merging the National Center for Marine Research and the Institute of Marine Biology of Crete. The result is a large body with various research centers throughout the country and with an important infrastructure of research vessels and laboratories. The Hellenic Center for Marine Research is a state-owned research organization operating under the auspices of the General Secretariat for Research and Technology (GSRT) of the Ministry of Education, Research and Religions. One of the areas of the Center is the Aquaculture Institute, where research on the issues of the sector is carried out. Areas of research include, among others, new species biology, aquaculture engineering, nutrition and pathology. Main activities of the Hellenic Center for Higher Education is the field, laboratory and experimental interdisciplinary, basic and applied research in various scientific fields related to physics, chemistry, geology, biology, aquaculture and aquatic ecosystems, the interface between the atmosphere and the atmosphere, the atmosphere zone, water column and seabed, maintaining public aquariums and disseminating information and knowledge on significant achievements through a variety of events, undertaking specific pilot studies and the development of management plans for specific issues, and the exploitation of products produced from biological and abiotic resources or from either through contacts with third parties, and the provision of various maritime services. ELKETHE he also acts as a government adviser on oil pollution from marine activities and accidents, issues that shape fisheries policy, water resources management and the implementation of the maritime strategy.

Its main objectives are to conduct interdisciplinary and basic research in the following areas:

- Structure and operation of inland, coastal and marine ecosystems, including ecosystem modeling
- Aquatic biodiversity (at all levels)
- Integrated Observation and Forecasting Systems of the Greek Seas
- The role of climate change in the evolution of aquatic ecosystems (marine and terrestrial)
- Impact of natural and anthropogenic pressures and hazards on the marine environment (eg oil spill, pollution, tsunami, floods, water invasions, harmful phytoplankton outbreaks (HABs), landslides)
- Fish life cycle, catch potential, catch ecology, modeling and management
- Aquaculture
- Population Genetics and Marine Genomics
- Biotechnology applications
- Integrated river basin and coastal zone management

Institute for Fisheries Research[158]

The Institute for Fisheries Research (INALE) belongs to the Greek Agricultural Organization DIMITRA (ELGO - DIMITRA), which is supervised by the Ministry of Rural Development and Food. The Institute is based in Nea Peramos Kavala and has been operating since 1995 with main research areas in fisheries, the aquatic environment (coastal, transitional and inland waters), fishery exploitation and aquaculture. The Institute's specialized research and technical staff participates and implements a number of research projects and studies, acts as a consultant in the country's fisheries and environmental policy, provides services to public services and private entities, while contributing significantly to graduate and postgraduate education fisheries and aquaculture professionals. It is a Scientific Foundation that conducts research into the ecosystems of the marine environment and inland and transitional waters. In particular, through its three Departments operating (Department of Marine Fisheries, Department of Inland Waterways and Lagoons and Department of

[157] https://www.hcmr.gr/el/
[158] https://inale.gr/

Aquaculture), it implements national and international research projects aimed at marine fisheries and its fisheries / environmental management, fisheries, fishery phytobenthos, invertebrates and fish, in the study and recording of biodiversity, in the protection and enhancement of inland and transitional water ecosystems, in the study of the quality of water the creation of new technologies to support the aquatic environment and finally the sustainable management of water systems and the resources derived from them. The main activities of the Fisheries Research Institute are research, service provision and education of primary and secondary students and pupils. INALE's research activity is funded by research projects and studies commissioned by national and European organizations, other public bodies and private entities.

Department of Agricultural Fisheries and Aquatic Environment, School of Agricultural Sciences, University of Thessaly[159]

The Department was established as part of an innovative initiative to meet the ever-increasing needs in education and research for staffing primary production in the country in the field of aquatic science, in the broad sense of the term. The overarching goal of the Curriculum is the training of scientists capable of developing, implementing and transmitting know-how and technological innovations in the production, processing and disposal of fishery / aquaculture products and the sustainable management of the aquatic ecosystem. The Department's curriculum aims to provide its graduates with both the required specialization and the ability to adapt continuously, so that they are able to meet the ever-increasing needs of the labor market.

Department of Biology of Aristotle University of Thessaloniki[160]

The Department of Biology of the Aristotle University of Thessaloniki comprises the Department of Zoology which covers the field of Morphology, Physiology and Biology of Animal Cells and Organisms and Systematic Animal Distribution. There are such laboratories:

- Laboratory of marine and terrestrial animal diversity
- Fisheries Laboratory (http://fishlab.bio.auth.gr/)
- Laboratory of Animal Physiology
- Zoological Museum

Department of Biology of University of Crete[161]

The Department of Biology of the University of Crete was founded in 1981, and today it is an internationally recognized center for modern university education and research in the field of Biology. It provides state-of-the-art university education and training, in an environment of high standards, with excellent scientists providing education that contributes to the knowledge of a biologist, nurtures scientific thinking and provides Greek and International experts in the field of science. The main activities of the Department are research and teaching.

Department of Oceanography and Marine Life Sciences of the University of the Aegean[162]

The Department of Oceanography and Marine Life Sciences is the only Higher Education Institution in the country offering undergraduate degrees, educational and research project in collaboration with leading research institutes and universities. Enshrined in the professional pathways of the Fisheries and Environmentalist, the Department offers a strong degree in both the public and private sectors.

[159] http://diae.uth.gr/
[160] https://www.bio.auth.gr/
[161] https://www.biology.uoc.gr/el
[162] https://www.mar.aegean.gr/

The Department focuses on the theoretical and practical training of scientists, offering:

- International perspectives
- High level of education
- Practical research experience
- Specialized facilities
- Multidisciplinary studies with an economic impact

Department of Animal Production and Aquaculture Science, Agricultural University of Athens[163]

The Faculty of Animal Production and Aquaculture Science belong to the School of Agricultural Production of Infrastructure and the Environment of the Agricultural University of Athens (AUA). The University was founded in 1920 under the name of the Higher Agricultural School of Athens (AGSA) and is the first Higher Education Institution in the field of Agriculture and the third in antiquity after the National and Kapodistrian University and Technical University.

Department of Animal Production of Fisheries and Aquaculture, University of Patras[164]

The Department of Animal Production, Fisheries and Aquaculture was established with the recent incorporation of the University of Patras, Department of Fisheries and Aquaculture Technology, Technical University of Western Greece since 1981 associated with the development and support of the industry in the country. The Department focuses on education and research in the areas of animal production and exploitation of fishery and aquaculture resources, which support a strategic pillar of the primary sector of the Greek economy. Located in Mesolongi, it has infrastructure and scientific equipment distributed in laboratories.
Comparative advantages of the Department are the proximity to Greece's largest aquaculture park (Echinades Islands), the important Mediterranean natural laboratory, which is the Messologi - Aitolikos Lagoon, one of the largest inland waterways of the Greek Seaboard) as well as significant activity and tradition in the primary sector.

4.1.2. Research and development activities in the aquaculture sector

In order for the industry to meet the above requirements and to achieve the strategic objectives through the actions outlined above, the contribution of development research is crucial, as it has also contributed to its development to date. In line with the new legislative framework, the research guidelines will result from the National Aquaculture Development Program following the opinion of the National Aquaculture Council. The national program will set medium-term and long-term goals to enhance the competitiveness of the existing activity and lay the foundations for the sustainable development of the industry and the achievement of national strategic objectives (Vision 2030). To this goal, the actions outlined above and summarized below should include[165]:

- Improvement of existing farming methods and production processes
- Development of new farming methods and farming technologies in new fields (eg open sea)
- Breeding new species
- Sustainable fish production
- Promoting the production of biotechnology products

[163] http://zp.aua.gr/
[164] http://www.upatras.gr/el/node/8439
[165] Multiannual National Strategic Plan for the Development of Aquaculture in Greece, 2014-2020.

- Protecting the environment and reducing impacts

In 2012, the ΣΕΘ (Federation of Greek Mariculture) cooperated with the European Aquaculture Research and Innovation Platform (EATiP) the sector's vision of 2030 horizon development. For Mediterranean aquaculture and Greek aquaculture, in particular, it was proposed to double the volume of production, in order to satisfy the increasing demand in fish. However, in the period 2012-2016, due to the ongoing restructuring process of the largest companies in the sector, as well as the general financial crisis in the country, the industry implemented a strategy of stabilization and improved profitability, not an increase in production. The result of this strategy was to reduce production so as to maintain sales value at a profitable level. According to the latest update, it is estimated that the average annual growth rate by 2030 will be 4% and production will range to 150,000 tonnes (Federation of Greek Mariculture, Annual Report 2018).

4.1.3. Proposed actions to enhance competitiveness

In order to enhance the competitiveness of aquaculture enterprises in Greece and the sustainable development of the sector, the inhibitory factors mentioned in the preceding paragraph should be addressed with targeted actions and actions. More specifically, actions in this direction will aim to:

- Increase in production
- Reduce production costs
- Quality assurance of aquaculture products
- Strengthen diversification
- Strengthen promotion
- Ensuring environmental protection
- Development research
- Consultancy
- Production of new biotech products
- Enhancing the competitiveness of SMEs, NATURA 2000 network
- Brackish ecosystems
- Other actions

Increase of production

The strategy for the period 2014–2020, set for 2030, should be based on the creation of new units and the modernization of existing ones in order to increase and improve farm production, identify new development zones and implement research priorities, which will enhance the competitiveness of the industry and introduce innovative processes for managing the natural environment and the well-being of fish populations.

At the same time, as has already been documented by the Market Tracking Mechanism, the gradual increase in domestic production, notably sea bream and sea bass, is imminent as demand is growing at a pace higher than supply worldwide. Also, due to the financial crisis, which has led to a decline in production, a significant market share has been lost. For this reason, the strategic target for annual growth of Greek production by 7%, significantly exceeds the average annual growth rate of 4% set by the EU.

In particular, actions to increase production require:

- Enhance entrepreneurship with the aim of establishing new units and the necessary facilities for the rearing of Mediterranean Sea fish, shellfish, freshwater fish, algae cultivation etc.
- Modernization of existing units and their supporting infrastructures
- Further exploitation and modernization of fish farms operating in lagoons, lakes and rivers.
- Enhancing research & development towards increasing productivity through new farming methods, improved management, etc.

Reduction of production costs

Reducing production costs requires actions and actions that will reduce all the individual costs that burden the production of the finished product. More specifically, the following are mentioned:

- Strengthen the operation of organized aquaculture zones (POWs), with the aim of sharing operational costs through the utilization and exploitation of shared resources and infrastructure, with particular emphasis on remote areas
- Synergies between fish farmers and feed producers to improve the utilization of fish feeds and to develop recommendations for optimal farming results
- Reduce the cost of farming / cultivation / exploitation by modernizing production facilities, focusing on production processes, improving feed conversion ratio and improving productive properties (growth rate, reduction in mortality, etc.) of animal feed
- Actions focused on reducing energy costs & staff costs, and on the safety of staff, facilities and livestock
- Enhance research to reduce farming costs

Quality assurance of aquaculture products

Ensuring and continuously improving the quality of aquaculture products is undoubtedly an important parameter for increasing competitiveness and as such has been greatly promoted by aquaculture companies in our country. In order to achieve the objective of improving quality, as well as protecting suppliers and buyers and under the pressure of large customers, marine fisheries companies are seeking, on a voluntary basis, to maintain their high export status, their certification. Certification is achieved through food quality assurance or management systems (HACCP, ISO) regarding installation, development, production, maintenance and environmental management.

The International Organization for Standardization (ISO) defines 'quality' as 'a set of features and characteristics of a product (or service)', which contribute to its ability to meet expressed or implied needs (ISO 8402: 1986). In the case of fish and their products, quality relates to safety, gastronomic enjoyment and the correct recording of indications as to the weight, species, origin, value and "perfection" of the products. In international fish trade (FAO), two of the prominent aspects considered are "safety" and "sensory" quality.

"Safety" is achieved when there are no different risks. The "sensory" quality is determined on the basis of organoleptic criteria, size and presentation of the fish. Adherence to the existing institutional framework governing the sector (provisions on safety and hygiene, traceability, product labeling and consumer information) is already contributing towards the 'quality' of quality assurance. The utilization of quality assurance or management standards and systems (HACCP, ISO) has an important role, as well. Furthermore, to improve quality, advanced methods of production and processing (e.g. organic aquaculture, organic products, n-3 enriched products) may be implemented.

Strengthen the diversification of finished products

Enhancing competitiveness through diversification requires actions and actions aimed at developing know-how for breeding new species and at the same time expanding the variety and appearance of finished

products. The choice of new species to qualify for farming or cultivation should aim at expanding demand in existing markets and penetrating new ones, but without causing competition with existing products.

Candidate species should cover the full range of products produced, whether intended for human consumption or as a raw material for biotechnological production or for any other purpose. Specifically, species such as: amberjack, oyster, scallops, sea cucumbers, sturgeon, crustaceans, cephalopods, sea urchins, and algae could be added to farmed aquatic organisms. In addition to new species, diversification of products can also be achieved through certified farming such as organic and / or ecological cultivation. Furthermore, in order to enhance diversification, actions aimed at producing traditional products of registered origin should be encouraged.

Finally, processing and final presentation of the product plays an important role in differentiation. For this reason, special emphasis is placed on the certification of packaging and disposal processes, as well as on the final form offered to the consumer (fresh, frozen, smoked, fillet, pre-cooked, etc.), according to the nutritional habits and consumer demands, market trends and applied research to develop appropriate know-how.

Enhancement of promotion

Aquaculture products cover a small proportion of the demand, both at European and global level, which leaves huge room for market penetration. Promoting aquaculture products and with the ultimate aim of enhancing their competitiveness requires both business and collective action by promoting the establishment of producer organizations. Such coordinated efforts can increase the per capita consumption of aquaculture products in existing markets, while introducing these products into new markets. Also, to promote products, there is a need to step up actions to inform consumers, participate in trade fairs, conduct targeted advertising campaigns etc., while at the same time researching market trends is needed internationally, meaning in traditional markets and potential (new) markets, as well.

Ensuring environmental protection

Aquaculture as an activity of the primary sector requires excellent environmental conditions. In particular, in Greece, where the majority of farms are active in marine areas (shellfish and floating marine cages), environmental quality assurance is inextricably linked to their viability. To this end, the strict EU and national legislative framework is in place.

In this context and in order to reduce the negative impacts or enhance the positive impacts on the environment and increase the efficiency of water resources, proposed actions are:

- The promotion of new forms of aquaculture that minimize the impact on the environment as well as the introduction of eco-management & control systems and organic aquaculture methods
- Designation of new areas suitable for aquaculture development
- The use of renewable energy sources
- Restoration of existing aquatic ecosystems, lagoons, lakes, etc
- Modernization of production infrastructures and systems aimed at reducing the environmental footprint
- Improvement of techniques and methods for monitoring and recording environmental parameters in aquaculture sites
- Immediate response to emergencies (eg accidents, shipwrecks, etc.)
- Specific attention is paid to the protection of biodiversity and generally sensitive and protected areas, such as Natura 2000 sites, as well as the monitoring and management of these areas

Research for development

In order for the industry to meet the above requirements and to achieve the strategic objectives through the actions outlined above, the contribution of research to the development is crucial, as it has contributed to the development of the aquaculture sector in the past. According to the new legislative framework for research, the research guidelines will result from the National Aquaculture Development Program following the opinion of the National Aquaculture Council.

The national program will set medium- term and long-term goals to enhance the competitiveness of existing activity and lay the foundations for the sustainable development of the industry and the achievement of national strategic objectives (vision 2030). To this end, the actions outlined above and summarized below should include:

- Improvement of existing farming methods and production processes
- Development of new farming methods and technologies in new fields (eg offshore)
- Breeding new species
- Sustainable fish production
- Promoting the production of biotechnology products
- Protecting the environment and reducing impacts

Consultancy

In the context of achieving the national objectives for the sustainable development of the sector and in order to enhance productivity and competitiveness of aquaculture products, it is important to actively support the players in the sector. This support also includes consulting services to meet the requirements relating to:

- modern management needs at productive, scientific, administrative, financial level,
- compliance with national and EU legislation
- environmental protection and environmental impact assessment
- the implementation of maritime spatial planning
- management needs related to ensuring the health and welfare of aquatic animals and public health
- developing specialized marketing, promotional and business strategies

Production of new biotech products

In the context of innovation and promotion of new species production, emphasis should be placed on aquatic biomass production systems (cyanobacteria, algae, etc.) through actions:

- Collaborative research in order to identify and develop their production methods with neutral footprint in the environment, but also to expand their biotechnological utilization (biofuels, medicine, cosmetic pigments, etc.). Of particular interest is the scientific research activity in the field examining their potential use in biologically superior forms of fish feed.
- Promote actions that choose to produce aquatic biomass production systems in recirculation systems, with the aim of minimizing water use and avoiding biodiversity problems (e.g. genetic pollution from fish escaping).

Enhancing the competitiveness of SMEs, NATURA 2000 network

Implementation of the Natura 2000 management objectives in the areas covered, by actions related to recreation, tourism and marketing of local products and actions aiming at providing solutions to the environmental problems of the areas (e.g. cost-effective solutions for water purification) and the sustainable

exploitation of raw materials, in line with the regional conservation objectives, create opportunities for small and medium-sized enterprises (SMEs).

In the context of the development of inland aquaculture in areas of the Natura 2000 network, it is also suggested that:

- Actions that boost production in recirculation systems with the aim of minimizing water use and avoiding biodiversity problems
- Actions aimed at cooperation of producer organizations, in order to contribute to aquaculture environmental management and to ensure the biodiversity requirements of Natura 2000

Brackish Ecosystems

Ensuring the development of brackish ecosystems is proposed through actions aimed at modernizing and productively improving their traditional exploitation methods, always ensuring that their use is environmentally sustainable, in line with their respective protection schemes and in particular with the objectives of the Natura 2000 network, (if the region is integrated):

- Modernizing - improvement actions aimed at the wellbeing and health of organisms (which may include the provision of safe predator protection systems, e.g. protection of fish from birds by surface nets)
- Actions related to specific problems of lagoons, or cultivation in earthen tanks, such as e.g. managing, through appropriate investments, accumulation of deposits, etc.
- Actions aimed at diversifying income into activities in brackish systems (and generally in inland waters), through complementary activities not related to aquaculture and fish farming (eg development of agro - tourism, educational tourism aiming at the environment etc)
- Actions for obtaining technical, scientific, legal, environmental and financial advisory services. In the Natura 2000 network areas the above actions serve to avoid creating an environmental footprint, identifying and mapping specific areas of inland water ecosystem (lake, lagoon etc.) that must be excluded from the Natura 2000 aquaculture activity
- Actions aimed at improving, protecting and managing natural fish farms (and those that are part of the Natura 2000 network), in cases of mass production losses
- Actions related to aquaculture methods compatible with the specific environmental management needs (resulting from the design of the Natura 2000 network or other protection regimes)
- Actions to enhance fish farming or aquaculture activities that include environmental and biodiversity conservation and improvement of traditional aquaculture features
- Finally, actions involving cooperation aiming at the development and successful aquaculture of new species capable of growing with minimal use of fish meal.

Other actions

In addition to the above actions, actions aiming at enhancing the capabilities of human resources involved in aquaculture are also necessary. Actions to be supported:

- lifelong learning - employee training
- disseminating know-how, innovation and best practices
- improving working conditions and worker safety
- insurance of stocks against natural disasters, adverse weather events, sudden changes in the water quality
- covering losses from diseases, damage or destruction of production facilities

4.2. Romania

4.2.1. Educational and research institutions

Research and education institutions	*Brief description*
University "Dunărea de Jos" Galați Faculty for Food Science and Engineering Aquaculture, Environment and Land Survey Department[166]	Established over five decades ago, the faculty in Galați, as the only training center for specialists in the fisheries sector, has responded to social and scientific needs, accumulating a real treasure trove of tradition, expertise and achievements both in the teaching and scientific research sector, this tradition being also continued nowadays. As of 2005, within the Faculty for Food Science and Engineering, the education process is organized in the three Bologna type cycles, relevant for the fisheries sector being: • Bachelor's level, engineers, day time study for 4 years – Fisheries and Fish Industrialization area; • Master's level, for 2 years study – Science and Engineering of Aquatic Bioresources. All study programmes organized within the Faculty for Food Science and Engineering are certified by ARACIS (Romanian Agency for Quality Assurance in Higher Education). As a result of implementing a project funded from European funds within the Operational Sectorial Programme „Increase of economic competitivity" 2007-2013, in 2014, the Romanian Centre for modelling recirculating systems in aquaculture – MoRAS was established within the faculty.[167] The infrastructure of MoRAS Centre consists of a Recirculating System for aquaculture Pilot Station, that performs applicative researches, being served by 14 laboratories equipped with high performance equipment for research: Extrusion station, Chromatography and microscopy, Cells culture, Histology, Nutrition, Water quality control, Numerical modeling in aquaculture and molecular biology, Bio-economical modeling in aquaculture, Physiology, Mechanical and tribological testing, Polymer materials researches, Gastronomy, Master study researches. Full members and associate members of MoRAS centre are teachers, researchers and auxiliary personnel within the University "Dunărea de Jos" Galați. The main mission of MoRAS Centre is promoting a fundamental and applicable research in aquaculture in recirculating systems, by stimulating cooperation, exchange of ideas and the expertise gained in this area by the academic community within the University „Dunărea de Jos" in Galați. MoRAS declares itself open to scientific cooperation between all

[166] http://www.sia.ugal.ro/
[167] https://www.unicer.ugal.ro/index.php/ro/prezentare-moras

	profile units in the country and abroad on the basis of two-sided agreements or within national and/or international programmes. MoRAS intends, depending on opportunities, to support, through technological transfer, the implementation of aquaculture recirculating systems and intensive aquaculture technologies developed within the centre, at economic and industrial units level. MoRAS Centre offers a wide diversified range of consultancy, expertise and technological transfer for the social-economic environment: 1.Laboratory services: Water quality tests, biochemical tests (meat, feed), Micro-biological tests (water, fish), Evaluation of fish health condition by analyzing blood metabolic profile, Control of fish physiological health condition; 2. Professional training services in aquaculture; 3. Consultancy services in aquaculture; 4. Research, development and innovation services; 5. Services for drawing up studies/documentation in the aquaculture sector; 6. Experimental development and research services in the aquaculture sector.

The Academy of Agricultural and Forestry Sciences "Gheorghe Ionescu Sisești"
Research – Development Institute of Aquatic Ecology, Fisheries and Aquaculture (ICDEAPA)[168]
	The Research – Development Institute of Aquatic Ecology, Fisheries and Aquaculture GALAŢI was established in 1981 and its mission is to perform fundamental, applicative, technological development and technology transfer activities, to a high quality standard, in its competency areas, both at national and international level.
	
	Specific activities performed within the institute are:
	• Fundamental and applicative research in:
	  ○ Artificial reproduction of various species of fish (sturgeons, esocidae, siluridae, cyprinidae);
	  ○ Culture of biologic material in various technological systems
	  ○ Physiology, nutrition;
	  ○ Amelioration, selection and genetics; Ichtiology;
	  ○ Ichtiopatology;
	  ○ Hydrobiology;
	  ○ Hydrochemistry;
	  ○ Fishing;
	  ○ Mechanization and automation of technological processes in aquaculture and fisheries;
	  ○ Arrangements, buildings and facilities in aquaculture;
	• Evaluation, preservation of aquatic living resources;
	• Environmental impact and balance studies;
	• Development of partnerships with similar national research units in order to integrate them in the European technological system;
	• Development of partnerships with economic agents in the area in order to put new technologies into practice and to extend the research results at a faster pace;
	• "Training" activities;

[168] http://www.icdeapa.ro/

	• Production of brood selected from species: carp, Asian cyprinidae, sturgeon, catfish, pike, lobsters etc. Main directions for research – development: AQUACULTURE • Development and improvement of technical systems in aquaculture, fishing tools and mechanized systems; • Development of methods for diagnosis, prophylaxis and treatment of fish diseases; • Development and improvement of technologies in aquaculture; complex production, diversification and capitalization of the food specific for aquatic living creatures; • Acclimatization, development of breeds of culture and hybrids for fish and other aquatic creatures with high productive and quality potential. EVALUATION, PRESERVATION OF LIVING AQUATIC RESOURCES • Knowing the biology of fish species in aquatic ecosystems in order to establish the strategy for their preservation and restoration; • Identification of critical habitats and specific habitat needs for various development stages of endangered, vulnerable, rare fish species, in order to improve and protect them; • Development of methodologies and techniques for the evaluation of the condition of living aquatic resources; • Evaluation of the impact produced by fisheries and aquaculture activities on aquatic ecosystems; • Development of methodologies and techniques for the quality control of the aquatic environment. FISHING IN INLAND WATERS, MECHANIZATION AND AUTOMATION OF TECHNOLOGICAL PROCESSES • Improvement of fishing methods and tools for inland waters; • Development of fishing tools with high selectivity in order to capture fish species with high economic value; • Mechanization and automation of technological flows in aquaculture. INFORMATIONAL SYSTEMS IN AQUACULTURE Development of data basis regarding the management of aquaculture resources. An important asset of the institute is represented by the testing and application of research results within laboratories (Aquatic ecology laboratory, Systems and engineering laboratory in aquaculture and fisheries, Fisheries engineering, arrangements and construction laboratory) and its own farms Brateş and Cotul Chiului.
The Danube Delta National Institute for Research and Development (DDNI) [169]	The Danube Delta National Institute for Research and Development

[169] http://ddni.ro/wps/ro/acasa/

	(DDNI) was established in 1970, and its main objective is to perform fundamental and applied research in ecology and environment protection, aiming management substantiation in the Danube Delta Biosphere Reserve and other wet areas of national and international interest for the preservation of biodiversity and for sustainable development. As a result of the offered expertise and contribution to the local, regional and national research and development programmes, DDNI was nominated as: • Centre of Excellence for Deltas and Wetlands; • National Reference Centre for Land Cover and Fisheries; • Scientific Advisor of the Ministry of Environment and Sustainable Development for the implementation of Natura 2000 Network in Romania; • Centre of Technological Information for the Danube Delta of the National Authority for Scientific Research. The research activity of The Danube Delta National Institute for Research and Development is oriented towards achieving the management objectives of the largest protected area in Romania and Europe: • assessment of the ecological status of natural heritage and elaboration of needed actions to preserve biodiversity; monitoring of flora and fauna and environmental factors; • assessment of natural resources and the exploitation level, in accordance with the regenerating potential and the carrying capacity of the ecosystems; • elaboration of hydrological scenarios to assist ecological restoration actions for the improvement of the water circulation within the existing channels network; • measures for the recovery of endangered species populations – fish, birds, reptiles, mammals; • elaboration of technical solutions for the restoration of abandoned agricultural polders and fish ponds in order to extend the area of natural habitats for fish and bird species; • modeling of basic processes in the functioning of aquatic ecosystems; • supporting studies for the harmonization of socio-economic interests with the concept of preservation of the natural capital and for increasing the quality of life and the standard of civilization; • developing the Geographic Information System for the Danube Delta
The National Institute for Marine Research-Development “Grigore Antipa” (INCDM “Grigore Antipa”)[170]	The National Institute for Marine Research-Development “Grigore Antipa” Constanţa performs research-development activities in fields like marine physical oceanography, marine biology and microbiology, marine chemistry and biochemistry, marine ecology

[170] http://www.rmri.ro/

	and protection, engineering and technology. Relevant responsibilities: • National Oceanographic and Environmental Data Center; • National Operator of the integrated physical, chemical and biological monitoring system of the marine environment; • Regional activity center for environmental aspects of fisheries and other marine fishing resources management; • National scientific responsibilities for fisheries data collection and living marine resources stock assessment; • Coordinator of the environmental professions and fisheries training centres.

4.2.2. Research and development activities in aquaculture sector

Research and development activities performed in aquaculture – research, studies, inventions, projects, etc.	***Brief description***
The University "Dunărea de Jos" Galați/The Faculty of Food Science and Engineering in partnership with economic agents or other universities	
FITOBIOACVA – Optimization of sturgeon intensive rearing technology by using feed additive with plant bioactive compounds[171]	Within the National Plan for Research-Development and Innovation for the 2015-2020 period: *Programme 2 – Increasing the competitivity of Romanian economy through research, development and innovation*, the University "Dunărea de Jos" Galați, as project coordinator, and SC Danube Research Consulting SRL, as partner, implemented the project FITOBIOACVA. The project's aim was the transfer/implementation of a technological solution for the improvement of rearing performance and health physiological condition of culture sturgeons through feed enrichment with bioactive compounds extracted from thyme and sea buckthorn. The project approached a complex, multidisciplinary topic that was materialized in the transfer of an innovative technological solution by using phytobiotics as a source of food additives, aiming to improve the efficient use of food, productive performances, but also the immune response in order to ensure disease resistance for some sturgeon species in the aquaculture system of the economic agent SC Danube Research Consulting SRL. The method by which the sturgeon rearing technology was optimized consisted in using the feed enriched with bioactive compounds extracted from thyme and sea buckthorn, the result materializing in the improvement of biotechnological indicators (food conversion factor, survival percentage). Also, the obtained results indicate that the diet enriched with vegetal extracts from thyme and sea buckthorn had beneficial effects upon metabolic health of sturgeons, highlighting the immunity stimulation which had the following consequences: disease prevention, reducing

[171] http://www.fitobioacva.ugal.ro/index.php

	losses and obtaining a top quality and healthy final product. The research results have innovative character due to the modern technology.
Selection and genetic amelioration technology aiming to increase sturgeon aquaculture profitability[172]	This project was implemented within the National Plan for Research-Development and Innovation for the 2015-2020 period: *Programmme 2 – Increasing the competitivity of Romanian economy through research, development and innovation*, by SC Danube Research Consulting SRL, Bucharest University, the University "Dunărea de Jos" Galați and Silver Sturio SRL. Within this project, various models for sturgeon hybrids rearing were tested aiming to monitor the performances related to the productive parameters and the quality of the final products. Therefore, various production systems were experimented (open and recirculating systems) for the intensive increase of hybrid lines obtained by artificial reproduction using aquaculture broodstock selected from the lots belonging to industrial partners. The biologic material obtained was monitored during 18 months period of rearing in industrial system, part of it being used as experimental lots for a series of studies that have the goal to review the technological performance of the new obtained hybrid, BestBeluga (BB), and set up optimum conditions for its rearing in intensive systems. Following the development of the project, a selection, rearing and amelioration technology was elaborated for the sturgeon hybrid BestBeluga, resulting from Bester female and beluga male interbreeding, in order to increase competitivity and profitability of aquaculture activities. As a result of implementing the new technology, the trading companies involved as partners within the project estimate an increase of the competitivity and profitability compared to previous achievements. The selected broodstock and their descendants, obtained as a result of controlled reproduction under artificial conditions, have been genetically, biochemically, physiologically and technologically characterized. Therefore, optimum biotechnological and biomolecular parameters needed to increase adaptability and to improve survival and rearing rates for this hybrid line under aquaculture conditions could be identified. The research results are innovative due to the new technology.
Development of a multitrophic integrated system for the production of microalgae and shellfish intended for feeding the sturgeons in aquaculture - SISTRAL[173]	The project funded within the National Plan for Research, Development and Innovation 2015-2020, *Programmme 2 – Increasing the competitivity of Romanian economy through research, development and innovation*, *Sub-programme 2.1. Competitivity through research, development and innovation*, was implemented by SC Silver Sturio SRL, service provider being the University "Dunărea de Jos" in Galaţi.

[172] http://inovtehnostur.com/
[173] http://www.biosys.ugal.ro/sistral.html

	The main goal was to implement a modular facility, accessible pricewise, for the production of living food (i.e. shellfish) used for to feed the sturgeon brood. This multitrophic system consists of two sub-systems, one photobioreactor for the rearing of microalgae and one reactor for shellfish rearing. The field elements (solenoid valves, PH transducer, peristaltic pump and level indicator) are supplied from a 24 V supply source and connected to a control panel ensuring the correct operation of the facility. The control of this multitrophic system is provided by an Arduino development plate whereon the piloting programme was installed. The facility operates without computer to simplify the implementation within industrial environment. The 24V source, Arduino plate and light panel will be individually supplied from 220 V. To achieve the (software's) code, the programme ARDUINO IDE was used, which is an open source programme. The microalgae grown in the photobioreactor will be fed with nutrients resulted from the waste water of the sturgeon rearing system and, if needed, this waste water will be enriched with an inorganic substrate consisting of salts with reduced economic value. The photobioreactor will operate under continuous mode, and microalgae suspension will be transferred as food to the shellfish rearing reactor. Evacuation from the photobioreactor will be designed with a bypass in case of fisheries farms that, apart from sturgeon, are rearing other fish species consuming mostly living microalgae. The reactor for shellfish will be designed to operate under semi-continuous mode. In this reactor, shellfish technologically recommended to be used for sturgeon brood rearing will be grown. The reactor for shellfish will be continuously fed with microalgae suspension until reaching a maximum volume. When the airing stops, shellfish sedimenting and their cropping will be allowed, keeping a minimum volume to restart the process. This way, the shellfish reactor will have a sequential operation mode. For optimum shellfish rearing it is necessary to correctly design the reactor dimension in relation to the addition of living microalgae. The microalgae and shellfish species were chosen for freshwater fish, but the facility is expected to be versatile, so it could also be used for salt water shellfish species without being modified. The research results belong to the partners SC Silver Sturio SRL, the University "Dunărea de Jos" in Galaţi and the contracting authority of the programme and it is innovative due to state-of-the-art technology implemented.
Information system for the traceability of fisheries products based on cloud computing technology -TRASIPESC [174]	Within the National Plan for Research-Development and Innovation for 2007-2013 period, Programme 4 – Partnerships in priority areas, Softeh Plus SRL, The National Institute for Marine Research-Development „Grigore Antipa" Constanţa and the University of Agricultural Sciences and Veterinary Medicine in Bucharest, under

[174] https://trasipesc.softeh.ro/trasipesc/

	the coordination of the University „Dunărea de Jos“ in Galaţi, implemented the project TRASIPESC. TRASIPESC is an information system available in cloud. Access to information related to traceability can be obtained by reading a 2D bar code label. This label is generated when introducing the data in the system by the participants involved in the distribution chain, before product marketing. This system is available on various platforms. The condition to operate is for such platforms to have a WEB browser type application installed. To read the bar code labels, they should have installed an application for reading 2D bar code labels and a bar code reader (in case of a smartphone, the phone camera can be used). A bar code printer is needed for the distribution chain participants to print the 2D bar code labels. TRASIPESC is an online platform that allows facile registration of information about fish and fisheries products within the entire production – supply – sale chain and fast identification of their route by authorities and consumers. The platform provides all facilities for registration and identification of fish and fisheries products for all those involved in this process: first sale centres, aquaculture operators, importers, processers, distributors and consumers. Using the TRASIPESC platform brings extra transparency in fish and fisheries products trading, having a major impact on increasing consumers trust and fast identification of compromised lots. The registered data on TRASIPESC platform is made available to related authorities, with the purpose to facilitate dynamic monitoring of fish and fisheries product lots on the market, as well as for any type of needed statistics. The research results are innovative due to implementing a new product and they belong to the partners: Softeh Plus SRL, the National Institute for Marine Research-Development „Grigore Antipa“ in Constanţa, the University for Agricultural Sciences and Veterinary Medicine in Bucharest, and the University „Dunărea de Jos“ in Galaţi.

4.3. Turkey

4.3.1. Educational and research institutions

There are 25 faculties providing aquaculture training in Turkey; 15 Faculties of Fisheries, 1 Faculty of Water Science, 2 Faculties of Marine Sciences, 2 Faculties of Marine Sciences and Technology, and 5 Fisheries Departments within the Faculties of Agriculture. However, in recent years, a large number of these faculties have not been able to obtain or fill the student quota allocated from the Higher Education Council (YÖK).

Apart from MAF affiliated institutions, scientific and technical research is carried out in 4 institutes affiliated to universities and postgraduate education is provided. These are “Erdemli Marine Sciences Institute” in Mersin (Middle East Technical University); two “Marine Sciences and Technology Institute” in İzmir (Nine September University) and Trabzon (Karadeniz Technical University), and “Institute of Marine Sciences and Management” in Istanbul (Istanbul University).

Regarding the Black Sea region there are 4 faculties of fisheries and one institute in the universities founded in Trabzon, Rize, Ordu and Samsun Provinces. Besides education on primary, secondary and tertiary level, research studies were also carried out on fisheries and aquaculture, different aspects of fish farming and interaction with environment (Table 4.1).

Trabzon Central Fisheries Research Institute established in 1987 by the name of "Trabzon Fisheries Research Institute", sustains applied research activities since 1988. In 1998, the institute got "Central Institute" status by the Ministry and its regional base duties advanced to national level and its name changed as "Central Fisheries Research Institute - Trabzon". Institute aims to carry out research surveys on fisheries and aquaculture especially in the Black sea and inland waters in Turkey and to ensure the adoption of research results into practice. Aquaculture Department has the facilities of intensive fish culture, closed circuit fresh water and marine fish hatchery, marine aquaculture, inland aquaculture, fish farming technology, fish feeding, and adaptation. Main studies focus on Black Sea trout, Black Sea turbot, flounder, sturgeon and red snapper.

Marine Fish Hatchery has a closed area of 700 m^2 for the production of flat fish, mainly turbot but will be used for the production other potential marine fish species. The mechanical systems, research and production units are available in the hatchery. Mechanical systems consist of water intake, filtration, sterilization and disinfection, heating and cooling, air conditioning units. Research and production unit has feed, brood, larval production, nursery department and laboratory facilities. Sea water to the production units are taken by three different points (from 18 m, 40 m and 55 m depths).

Recirculation unit has volume of 10 m^3 of water use, capable of operation both in fresh water and sea water. Water exchange rate is 10% daily in the system. The water re-used in the system after cleaned with various physical and biological filters. Oxygen level in water is kept continuously at 7-9 mg/l and monitored as the temperature level supporting by heating and cooling units. So far, egg incubation, pre-feeding and growth studies on sea trout, Rainbow trout, Siberian sturgeon (*Acipenser baerii* Brandt, 1869) were carried out in the unit for 5 years. The new unit of 640 m^2 is still under construction.

Table 4.1. Education, research and development and training institutions in the Black Sea

Education & Research					
Province	**University**	**Institution**	**Degree**	**Experimental Aquaculture Unit**	**Objectives**
Trabzon	Karadeniz Technical University (KTU)	Surmene Faculty of Marine Sciences/ Department of Fisheries Technology Engineering[175]	Bachelor, MSc, PhD	Trout culture	Inland & marine aquaculture, fish diseases, fish processing, marketing, education & research, consultancy
		Institute of Marine Science and Technology[176]	MSc		Fisheries, aquaculture, oceanography
		Technology Transfer Application Research Center[177]			University-industry cooperation services, Intellectual and industrial property rights, Entrepreneurship and corporate services
Rize	Recep Tayyip Erdoğan University	Fisheries Faculty[178]	Bachelor, MSc, PhD	Trout culture	Inland & marine aquaculture, fish diseases, fish processing, education & research

[175] http://www.ktu.edu.tr/baltekmuh
[176] http://www.ktu.edu.tr/imst
[177] http://www.ktu.edu.tr/ttoen
[178] http://suf.erdogan.edu.tr/tr/page/su-urunleri-yetistiriciligi-bolumu/1159

	(RTU)				
Ordu	Ordu University (ODU)	Fatsa Faculty of Marine Science, Department of Fisheries Technology Engineering [179]	Bachelor, MSc		planning of fish farms, culture and feeding techniques, fish disease, diagnosis and treatments
Sinop	Sinop University (SU)	Faculty of Fisheries[180]	Bachelor, MSc, PhD	Inland and marine species	Farming alternative species in both marine and freshwater, mussel culture, fish diseases, diagnosis and treatment, research, training and consultancy,
Research & Training					
Province	**Ministry**	**Institute**	**Facility**	**Objectives**	
Trabzon	Agriculture and Forestry	Central Fisheries Research Institute[181]	Turbot, sturgeon, trout culture hatchery, recirculated closed system	Research, training, ınduced spawning, fry production, extension services to investors, delivery of juveniles, enhancement of sea and inland waters	

Institute has also marine cages in Yomra Fishing Port area for the studies on Black Sea trout, rainbow trout, a few species of sturgeon, sea bass and sea bream culture. Research and development

4.3.2. Research Programs

Under the supervision and coordination of TAGEM, four aquaculture research institutes and one aquaculture department were established and funded. These are Central Fisheries Research Institute (SUMAE) in Trabzon, Mediterranean Fisheries Research, Production and Training Institute (AKSAM)[182] in Antalya, Fisheries Research Centre in Elazığ (ELSAM)[183] and Isparta-Eğirdir Fisheries Research Center (SAREM) Institute.[184]

Since the start of TAGEM's Fisheries Research Project, 202 research projects were carried out. Together with 8 R&D projects launched in 2019, 46 research projects are still in progress. Other projects are funded by Scientific and Technological Research Council of Turkey (TUBITAK) (6 projects), from other public bodies (7 projects), international bodies (4 projects from JICA[185], 2 from FAO). During 6th and 7th Framework Programs of the European Union, TAGEM had participated in the consortia of 3 projects (Anon, 2019a).

Fish breeding and aquaculture research studies are of great importance in terms of rational use of resources, increased production, meeting the increasing demand for seafood, supporting natural stocks, creating new employment opportunities and developing exports. In order to increase sustainable production of seafood in Development Plans; providing rational use of natural resources, development of aquaculture and offshore fishing are foreseen. Training and awareness raising activities should be carried out to improve environmental interaction with aquaculture activities. Continuity is important in the training of staff working in aquaculture research. Sources should be obtained from the private sector, national and international organizations for research. Strategies that prioritize quality in addition to increase in production should be supported.

Aquaculture projects were carried out under the name of "Aquaculture Breeding and Husbandry" with the support of Ministry of Agriculture and Forestry in the last decade. It was aimed to farm and create new forms of existing species and culture new species which have high commercial value. There are 23 fish species and Mediterranean mussel used in the aquaculture business in Turkey. Since 5 years the researchers were able to

[179] http://www.fdbf.odu.edu.tr/
[180] https://sufak.sinop.edu.tr/
[181] https://arastirma.tarimorman.gov.tr/sumae/Sayfalar/EN/AnaSayfa.aspx
[182] https://arastirma.tarimorman.gov.tr/akdenizsuurunleri/Sayfalar/EN/AnaSayfa.aspx
[183] https://arastirma.tarimorman.gov.tr/elazigsuurunleri/Videolar/Promotional.mp4
[184] https://arastirma.tarimorman.gov.tr/sarem
[185] Japanese International Corporation Agency

add 8 new marine species to the fish farming industry. The juveniles of these new species are at the distribution level to the farms who demand. At present the production amount of new fish species has reached 6,200 tons in 2018. Studies on the development of culture techniques, feeding trials and enhancement of the resources with these species continue.

The results obtained in the projects carried out with the Black Sea trout have been put into practice and the private sector production has been started farming. It has been widely produced especially in net cages in the Eastern Black Sea Region. Trials are carried out to produce a specific commercial feed to cover all biological needs of fish in order to reduce mortality rate in the early stages and to increase growth rate. Another project aims to determine its nutritional needs as well as establishing the infrastructure for the improvement of the genetics by observing the third (F3) and fourth (F4) generations of brood stock in private farms using molecular genetic methods.

Turbot (*Psetta maxima*) is a potential species for aquaculture and enhancement studies. Turbot farming studies were started in 1997 and 5 different projects have been carried out so far. Private companies have been supported by the distribution of eggs and juveniles free of charge, training of staff has been provided, the results of project studies shared, survival rate increased to the level in European countries with more detailed studies on brood stock management, increasing the success of larvae and juvenile production. Studies are carried out on the photoperiod application in reproduction of turbot.

In 2000, in the early sturgeon aquaculture studies in have been started with the collaboration of MAF (TAGEM, SUMAE), and universities (Sinop Faculty of Fisheries, Istanbul Faculty of Fisheries) in Turkey. Fertilized Russian sturgeon (*A. gueldenstaedtii*) eggs were imported from Russia and kept to be released after 2.5-3 months to the Sakarya River.

Another project was carried out between 2006-2009 under the title “Determination of the Current Status of Mersin Fish Populations and Investigation of Farming Opportunities- (TAGEM / HAYSUD / 2006/09/02/01)” to start sturgeon farming and sturgeon releasing program to support threatened sturgeon stocks in the Black Sea.

For the first time in 2013 and 2015, domestic sturgeon species have been hatched by the Ministry of Agriculture and Forestry. Since commercial production is made with eggs brought from abroad, R&D studies for the development of breeding techniques for this species are continuing (Memiş, 2007).

Within the scope of "Development of Sturgeon Culture and Conservation Strategy" project supported by FAO, two different projects have been carried out in Turkey in order to start farming of sturgeon, to carry out egg production and juvenile growth, improve farming techniques, and develop an effective conservation strategy and a management plan specific to sturgeon. Some of the young sturgeons were marked for stock reinforcement and released to their natural habitats, and some were given to private farms in order to encourage farming.

Within the scope of fish nutrition and feed trials, a number of studies have been carried out to determine the feeding characteristics of new species and improve specific feed for specific species which are going to be commercially produced. Feeding trials have been carried out by using different types of raw material, various probiotics or enrichers, live food (Artemia, daphnia and chironomid) together with tout feed have been tried to increase the survival rate of crayfish juveniles. The effects of Zeolite-added feeds in trout feeding and Mannan-oligosaccharide (MOS) in sea bream feeding on growth and meat quality were investigated.

Monitoring studies have been carried out at different periods regarding the determination of environmental impact and carrying capacities in regions where intensive fish farming is carried out. In these projects, it was aimed to contribute to the reduction of environmental impacts of aquaculture. Some experiments have been carried out on reducing waste production and purification of solid wastes. It has been reported that the use of

fringed rooted plants is effective by creating a surface-flow artificial wetland in the water exit of the fish farms, and that the use of zeolite in the last resting part may have a chemical improvement in water quality. In another study, the efficiency of the drum filters used in the waste water filter in dense production areas was measured. While these filters reduce the amount of waste from feed, they do not affect the other pollution load.

A pilot study for the implementation of new technology to evaluate utilization of the opportunities for the establishment of databank about fish farms and real-time monitoring of water quality in dams by geographical information system (GIS) and spatial analysis was completed, recently. GIS based digital maps in Artvin, Rize, Trabzon ve Gümüşhane provinces were prepared. Two more studies were concluded for real-time monitoring of environmental parameters by installing real-time data monitoring systems in the marine and dam environment.

4.3.3. Fund provider institutions for aquaculture research

There are several funding institutions for research and development projects in Turkey.

Scientific and Technical Research Council of Turkey (TUBİTAK) has the largest project support programs for the universities, research institutes and companies (Table 4.2) either individual or joint application basis on aquaculture.

Table 4.2. Grants provided by TUBITAK on project basis

National Funds	
Code	Program
1001	Scientific and Technological Research Projects Funding Program
1002	Short Term R&D Funding Program
1003	Primary Subjects R&D Funding Program
1005	National New Ideas and Products R&D Funding Program
1007	Public Institutions Research Funding Program
1503	R&D Project Brokerage Events Grant Programme
1505	University – Industry Collaboration Support Program
1507	SME RDI Grant Programme
1512	Entrepreneurship Multi-phase Programme
1515	Frontier R&D Laboratory Support Programme
1602	TÜBİTAK Patent Support Programme
3001	Starting R&D Projects Funding Program
3501	Career Development Program (CAREER)
International Support Programs	
	ERA-NET
	COST Actions
International Researchers Felowship Programs	
2221	Fellowships for Visiting Scientists and Scientists on Sabbatical Leave
2216	Research Fellowship Programme for International Researchers
1509	TÜBİTAK International Industrial R&D Projects Grant Programme

4.3.4. Business development

To measure the success of aquaculture business in Turkey, several indices are used for the evaluation; self-sufficiency rate (SSR), import dependency indices (IDI), and exportability index (EI). The first two of these indices are used to measure at what extent which the total supply in a country is met through domestic production or imports. Additionally, the exportability index (IEE) can be used to show how much of the production is exported. Using these indices together to make an overall assessment, despite several shortcomings with respect to the aquaculture industry in Turkey; Turkey in general seems to be in good condition (Table 4.3).

Table 4.3. Self sufficiency indexes for 2018

Parameters	Equations	Values
Production	Production=Fishing+Aquaculture	628631 tons
Imports		98297 tons
Exports		177074 tons
Consumption	Consumption=Production + imports-exports	549584 tons
Self Sufficiency Rate (SSR)	SSR= Production / Consumption	114.3%
Import Dependency Index (IDI)	IDI= Imports / Consumption	17.9%
Exportability Index (EI)	EI= Exports / Consumption	32.2%

In the post-2000 period, the value of SSR did not change much, varied between 95-114%, and it was calculated as 114.3% in 2018. IDI value reached 10% in 2008 and was found to be 17.9% in 2018. The EI value reached 10% in 2011, and in the following period, exports increased faster and became 32.2% in 2018.

According to the existing state of aquaculture, such a business system can be applied to solve existence problems and increase production and exports from the Black sea (Figure 4.1).

In order to provide more progress in the field of aquaculture, weaknesses and threats should be converted strengths and opportunities by rational methods. Level of success will be closely related to positive motivation of all stakeholders to reach short, mid and long term targets determined by the common understanding.

According to the reports on the Black Sea region, climate change will have an impact as the floods. Therefore essential measures should be taken in short and midterm periods to get rid of threat of flood (by fostering the farm borders, changing locations, renewal of water intake and discharge systems).

Efficient lobbying activities needed to reduce pollution risks in river basin and impact of hydroelectric power plants on fish farms.

In order to solve such problems Union of Aquaculture Producers in provinces and top organization Association of Aquaculture Producer Unions (AAPU) need to be more active to communicate with the Ministry of Agriculture and Forestry (MAF) and other public stakeholders. On the other hand AAPU must change organizational structure from bottom up instead of vice versa. If there is need any legal support, a binding regulation should be drafted and proposed to the MAF.

Main problem in the sector is smooth marketing with good price and high costs of feed and fry supply. At present majority of the investors are hardly find fry from the hatcheries across country. If AAPU is able to organize such common action, hatcheries may have chance to produce sufficient amount of fry to cover the need of the industry. Brokerage system could be established on digital platform to bring producers and buyers together for an active service benefit of the all parties. Same type of role can be acted for the feed, material and equipment supply necessary for production with sufficient quantity, in time with lower costs. On the other

hand veterinary services, consultancies and training needs may also be provided under this collective system. Actually it will be a typical platform which can act like a producer organization for the benefits of members. Recently, big trout producers have formed a media group to discuss the future of big trout production in the Black Sea Region with the participation of academia, producers, administrative staff, exporters, etc. Their main target is sustainable big trout production, creation of a brand name; increase the attraction towards in the international markets, organization of awareness campaigns to increase domestic consumption.

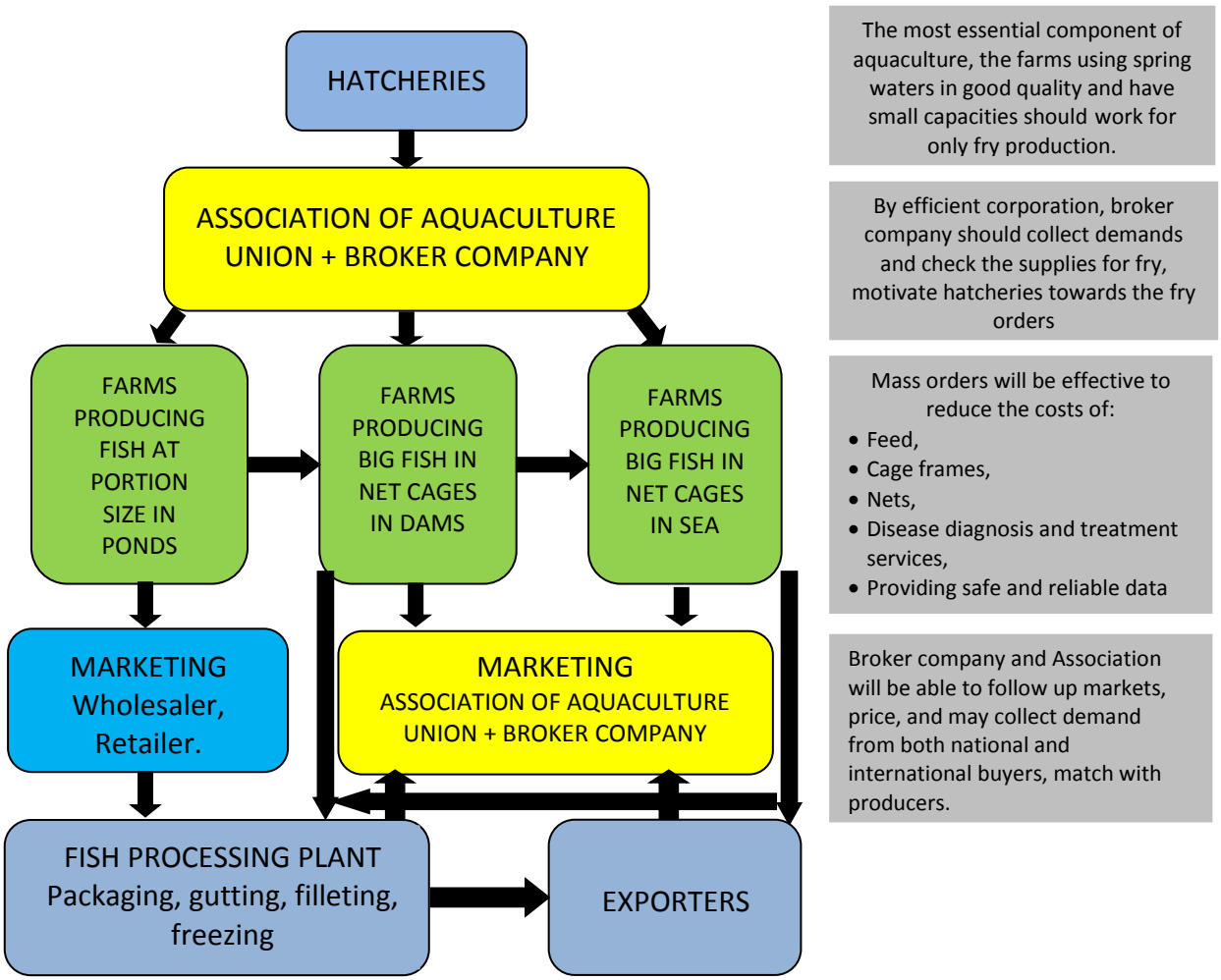

Figure 4.1. An aquaculture business model for the Black Sea of Turkey

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4.3.5. Proposed actions to enhance competitiveness

Increasing production and productivity in aquaculture

- Field work to determine new aquaculture areas in inland and marine ,
- Taking appropriate opinions of the relevant institutions for the new production sites,
- Processing of these areas determined for cultivation in seas, inland waters and terrestrial areas into 1 / 5000-1 / 10000 scaled environmental development plans,
- Implementation of the essential measures for the sustainable aquaculture production
- Within the framework of sustainability, the maximum project capacities should be determined and granted to the producers accordingly,
- Expanding the use of closed circuit production systems,
- Establishment of Agriculture Based Specialized Organized Industrial Zones (ABSOIZ) in regions suitable for aquaculture.

Development of alternative and new species breeding

- Identification of foreign species that may be suitable for breeding,
- Determination of the conditions for bringing and use of the economic new foreign species suitable for breedingaquaculture into the country,
- Investigation of the adaptation and breeding conditions of these species,
- Encouraging omnivorous and herbivorous species farming,
- Providing support schemes for poly-culture,
- Transforming the species suitable for the conditions of our country into investment by making evaluations according to the obtained results,
- Research on farming of new species (cat fish, some local freshwater fish, etc.)
- Building capacities for new species,
- Providing investment incentives,
- Research on the culture of alternative fish species (shrimp, leech, frog, turtle, snail, crayfish, crab etc.),
- Creation of the culture criteria of alternative species that have started to be commercially grown and specified in the legislation,
- Development of marketing strategies of alternative species,
- Determination of economic algae and macrophyte species and production criteria in the waters of our country,
- Determining and mapping the biological and ecological characteristics of macro and micro algae species,
- Providing investment incentives.

Fish diseases, risk analysis and development of management plan

- Identification of existing disease types detected in aquaculture species cultivated in all regions of the country,
- Investigation of diseases that are likely to develop along with existing diseases,

- Creation of national risk maps,
- Creating a risk map of the diseases that can be transmitted from other countries with international trade,
- To determine the costs of drugs used in disease treatments,
- Developing protective methods against drugs and determining their costs,
- Making legal arrangements that give authorization to Fisheries Engineers and Fisheries Technology Engineers on fish health, based on World Animal Health legislation,
- Preparation of the national fisheries health management plan,
- Establishment of a national fish diseases vaccine production laboratory,

Development of feed industry for aquaculture

- Determining the feed requirement of country depending on the growth of the aquaculture industry and planning the feed production,
- To solve feed raw material problems and provide cheaper ingredients,
- Conducting researches on feed development according to aquaculture types,
- Research and implementation of alternative feed raw materials for fish meal,
- Providing support to investors to produce aquaculture feed,
- Production of fish feed in public feed factories, as in other animal feeds, in order to control feed quality and price stability in the market,
- Establishment of a national feed research center.

Development of national and international markets and marketing

- Making an updated marketing project and preparing a strategic plan for marketing inline with the sector growth,
- Establishing promotion offices in foreign countries for promotion and marketing,
- Organising visits to potential markets (EU, Russian Federation, Turkic Republics, Middle East countries etc.,) to carry out product promotion activities to find new ones,
- Increasing participation in national and international fairs,
- Developing logistics infrastructure,
- Developing special brands that appeal to the taste of fish products,
- Giving lectures of branding and marketing for graduate students specific to fisheries and aquaculture under MSc and PhD programs in the Faculties/Departments of Fisheries,
- To train engineers for better background with fluent language, branding and marketing knowledge to carry out marketing activities in targeted countries.

Development of water resources management plans and models

- Determination and monitoring of the present and future usage rates of ground and surface waters by all user groups,
- Investigation, determination and monitoring of the present and future pollution loads has to be created by all parties for water resources,
- Carrying out studies for efficient use of surface water resources

Increasing seafood consumption

- Development of a national plan with the participation all stakeholders to increase continuous supply and consumption,

- Determination of consumption behaviors of all segments of the society (school age children, teenagers, groups having different educational and income levels, citizens living in different geographical regions, etc.) by surveys.
- Organizing promotion and tasting days for the regions where the fish consumption rate is low (Anon, 2019 b).

4.4. Ukraine

4.4.1. Educational and research institutions

Institute of Hydrobiology of the National Academy of Sciences of Ukraine (Kiev)[186]

The Institute of Hydrobiology of the National Academy of Sciences of Ukraine is the leading scientific centre in Ukraine with a great experience of complex hydroecological, hydrobiological, ichthyological, biotechnological, radiobiological researches of freshwater ecosystems of different types.

The Institute's researchers organised in a team of highly skilled specialists who carry out scientific investigations on solving urgent problems related to the discovering of regularities of the freshwater ecosystems functioning in the conditions of increasing anthropogenic impact, assessing the quality of the water environment and factors that determine it, preserving the biodiversity of Ukrainian reservoirs, biotechnological approaches to cultivating of economically valuable species of hydrobionts.

Main scientific directions of the Institute's research:

- Investigation of the biodiversity and functioning of freshwater ecosystems as the basis for the development of technologies for biological indication, monitoring and management of ecological state of the water bodies;
- Investigation of physical and chemical bases of a migration, transformation and biological effects on hydrobionts of radionuclide and chemical contaminations and ways of their regulation;
- Assessment and forecasting of fish fauna state in the water bodies of different types for the environmental management and conservation of fishes diversity;
- Molecular, cellular and physiological researches of aquatic organisms as a basis for the development of highly efficient technologies of aquaculture.

Some of research surveys conducted by the institute is given in Table 4.4.

Table 4.4. Research Projects of the Institute of Hydrobiology of the National Academy of Sciences of Ukraine

Title	Customer/Program	Leader
The research, assessment and development of measures to preserve the biotic and landscape diversity of mountain rivers on the basis of the European Union approaches to the preparation of a river basin management plans (2015-2019)	The complex multidisciplinary scientific research program of the National Academy of Sciences of Ukraine on the development of scientific principles for the rational usage of a natural resource potential and sustainable development (2015-2019).	Afanasiev S.O.
The prognosis and prevention of negative effects of climate change on the ecological status, potential and biodiversity of hydroecosystems of Ukraine (2016-2021)	The complex multidisciplinary scientific research program of the Department of a General Biology of the National Academy of Sciences of Ukraine	Romanenko V.D.

[186] http://www.hydrobio.kiev.ua/en/pro-instytut/napriamky-naukovykh-doslidzhen

	"Fundamental principles of forecasting and prevention of the negative impact of changes in climatic conditions on the Biotic Systems of Ukraine"	
The structure, biology and phylogeny of amoeba isolated from bentonite clay of Mesozoic sediments (2014-2015)	NASU – RFFR Contest	Yuryshynets V.I.
The development of principles of complex hydrobiological monitoring of techno-ecosystems of power plants	NNEGC "ENERGOATOM"	Protasov O.O.
The hydrobiological observations. The development of recommendations for the correction of sanitary and ecological criteria to be monitored in the further removal of the cooling pond from exploitation (2015-…).	SSE «Chernobyl NPP»	Gudkov D.I.
The determination of histological, haematological and genetic effects of chronic ionizing radiation on fish and invertebrates in the water bodies of the Chornobyl Exclusion Zone (2014-2015).	University of Portsmouth Higher Education Corporation	Gudkov D.I.

Institute of Fisheries of the National Academy of Agrarian Sciences [187]

The Institute of Fisheriesof the National Academy of Agrarian Sciences is the main scientific institution that defines and develops the promising trends in the field of fisheries research, coordinates and performs methodical management of scientific works in the field of aquaculture and fishery in inland water bodies of Ukraine.

The structure of the scientific units of the Institute of Fisheries has been formed according to assigned tasks and with the goal of a comprehensive solution of scientific and research works. The units of the institute are presented on the interactive page Institute Structure.

- The main subjects of the scientific activities of the institute are:
- rational exploitation of aquatic living resources in inland water bodies;
- coordination of the work of breeding farms of Ukraine;
- conservation of the genetic fund and restoration of the populations of rare and endangered fish species;
- selective breeding works;
- biotechnologies in aquaculture;
- studies of the dynamics of genetic structure formation in multiple-breed groups of fish;
- ecology of the hydrosystems of inland water bodies;
- prevention and early diagnostics and treatment of fish diseases;
- development and improvement of fish feeding technologies, creation and selections of fish feed formulas;
- consulting of farm aquaculture;
- development of normative documents regulating fisheries activities in inland water bodies;
- training of the skilled personnel of the highest category;
- analysis of the economic efficiency of business activities of aquaculture enterprises;
- building contacts and partnership for international scientific cooperation.

The Institute network has 4 organizations:

1. SE “Research farm “Nyvka” (Kyiv),

[187] http://www.if.org.ua/index.php/en/

2. SE “Research farm of Lviv research station of the Institute of Fisheries” (Lviv region),
3. Lviv research station (Lviv region),
4. Zakarpattya scientific-research station of salmonid culture and conservation of endangered fishes (Zakarpattia region).

Southern Research Institute of Marine Fishery and Oceanography (PivdenNIRO), Odesa branch

The first research fishery agency of the Black Sea was established in Kerch (the Crimea) in 1922. It was the ichthyological laboratory, later transformed into the Azov and Black Seas Research Institute of Marine Fishery and Oceanography — AzcherNIRO with its branch in Odesa. In 1988 the institute was given the new name of Southern Research Institute of Marine Fishery and Oceanography (PivdenNIRO). In 1996 two earlier independent research agencies — in Berdyansk and Sevastopol — were joined to PivdenNIRO[188].
PivdenNIRO is under the authority of the State Committee for Fishery of Ukraine and is a member of the National Academy of Science of Ukraine. PivdenNIRO is the unique in Ukraine institute carrying out versatile scientific, designing and consulting-expertising studies in the sphere of marine fishery and commercial oceanography. PivdenNIRO carries out studies in the Black and Azov Seas, in the vast areas of the Indian, Pacific and Atlantic Oceans, in the Antarctic waters. The main objective of PivdenNIRO staff is to provide scientific substantiation for present activities and development of marine fishery in Ukraine by means of designing and realizing complex measures for long-term conservation and sustainable utilization of marine living resources.

Odessa State Environmental University, Department of Water Bioresources and Aquaculture

Odessa State Environmental University (OSENU), a multi-campus public university, provides innovative undergraduate and graduate education that contributes to development of the society and the individual through harmonization of mankind-nature relations to facilitate learning through discovery, synthesis, preservation and dissemination of knowledge on the Environment. OSENU is the seat of Environmental Subcommission of the Standing Commission of the Ministry of Education and Science of Ukraine in Biology, Natural Sciences and Mathematics.

Over a long period the main aim of OSENU (founded in 1932) was to train personnel in the fields of environmental quality monitoring and environmental control. In the field of Hydrometeorology OSENU has been training specialists for the World Meteorological Organization for more than 50 years. The curricula for training specialists meet all international standards and are acknowledged by hydrometeorological services all over the world. Since 1957 the University has provided training for some 1600 specialists form more than 70 countries, including circa 150 Candidates and Doctors of Science. Two of OSENU graduates, members of Intergovernmental Panel on Climate Change, Alioune Ndiaye and Oleg Sirotenko were among the awarded the Nobel Peace Prize (2007). For the time being, foreign citizens of 27 countries have been provided education at the University[189].

In 2008 the Department of Water Bioresources and Aquaculture was established at Odessa State Environmental University. Oleksandr P. Mykhailiuk, Doctor of Science (Veterinary), Professor, became the Head of the Department. Since 2012 and for now this department is headed by Pavlo V. Shekk, Doctor of Science (Agriculture), Professor. Young and promising scientists who are interested in the development of the department and science make up the friendly collective of the department.

The Department of Water Bioresources and Aquaculture provides training of bachelors and masters with the speciality 207 Water Bioresources and Aquaculture (Branch of knowledge – 09.02 – Fisheries), as per the

[188] http://rada.com.ua/eng/catalog/9951/
[189] http://odeku.edu.ua/language/en/home/

training programme 090201 Water Bioresources and Aquaculture with the speciality Water Bioresources – specialization: mariculture, aquaculture, decorative (aquarium) fish farming; with the speciality Protection, Management and Sustainable Utilization of Hydrobioresources, specialization: Fishery Protection[190].

Odessa I.I.Mechnikov National University, Department of Hydrobiology and General Ecology191

Odessa I.I.Mechnikov National University is one of the oldest in Ukraine. Here you can get acquainted with a reach history of the university and current multifaceted educational, scientific and social works of numerous team of teachers, research fellows and students.

The department was created in 1933. Its first head was Professor N. A. Zagorovsky – an expert on estuaries, one of the initiators of conducting biocenological research in the Odessa Gulf. After his death in 1934 the department was headed by assistant professor A. K. Makarov. Under his leadership researches of fishes and benthos in the northwestern part of the Black Sea, researches of estuaries were carried out.

Fundamental and applied hydroecology, marine and freshwater biology, ichthyology, ecology, protection and sustainable use of biological resources of natural ecosystems are the main topics of the education program. Main directions of scientific activity:

- Complex hydrobiological research of northwestern part of the Black Sea and adjacent waters (study of benthic ichthyofauna, macrozoobenthos, zoo- and phytoplankton, phytobenthos);
- Research in population ecology and population dynamics of wild animals;
- Improvement of methods of differentiation of intraspecific communities of wild animals;
- Research of productivity and biotic balance of coastal ecosystems;
- Development of mathematical models to assess the abundance and biomass of individual species of plants and animals in aquatic ecosystems;
- Research in the conservation of biological diversity of natural ecosystems;
- Development of technological bases of breeding, keeping and guarding of rare species;
- Aquaculture and behavior of fish.

Graduates of the Department gain knowledge of basic and applied hydrobiology, ichthyology, ecology, conservation and sustainable use of biological resources of natural ecosystems. Students study marine and freshwater biology; biology and ecology of various groups of aquatic pelagic and benthic organisms, methods of populational genetics of aquatic organisms, basis of aquaculture and aquariumistics, aquatic toxicology, phycology, etc. Students get acquainted with the methods of quantitative assessment of biological diversity; obtain theoretical knowledge and practical skills for using mathematical algorithms of calculation of biological resources of natural ecosystems; study basic methods of classic hydrobiology research and approaches to conservation of biodiversity of the Black Sea.

4.4.2. Research and Development activities carried out in the field of aquaculture

Institute of Hydrobiology of the National Academy of Sciences of Ukraine (Kiev)[192]

For the first time in world practice, methodological bases have been developed to determine the reference biological components and, accordingly, of a complex system of diagnostics, control and forecasting of the ecological status and biodiversity of aquatic ecosystems, which can be formed as a new scientific and technological area - "Bioindication hydroecology". This work is based on the factual material of many years of basic research of hydro-ecosystems of different types, first of all, in the Dnipro and Danube basins.

[190] http://odeku.edu.ua/language/en/odeku/institutes-faculties/department-of-water-bioresources-and-aquaculture/
[191] http://onu.edu.ua/en/structure/faculty/bio/hydrobio
[192] http://www.hydrobio.kiev.ua/en/pro-instytut/fundamentalni-doslidzhennia

Based on a multilevel systematic approach, it was first demonstrated that biological indicators for monitoring the effects of global climate change could be both individual indicator species sensitive to changes in the aquatic environment and structural and functional characteristics of major biotic communities of different types of ecosystems. The different in scale and duration climatic changes lead to an increase in the species richness of invasive species of hydrobionts and their role in hydroecosystems. The significant inhibition of production processes in primary producers under abnormally high temperatures was revealed.

The features of ecological and physiological adaptation of invasive and native species of fish and invertebrates to the influence of abiotic factors of the aquatic environment have been established. The differentiation of adaptation mechanisms in different hydrobionts - representatives of the Ponto-Caspian faunal complex is revealed. It has been shown that pre-adaptation of hydrobionts (bivalves and crustaceans) increases their resistance to the stress effects of temperature, salinity and toxicants. Invasive fish species with high adaptive capacity have significant phenotypic variability in physiological and biochemical characteristics and morphometric parameters, depending on their conditions of existence.

For the first time, a new conceptual model for the functioning of rivers of different types has been proposed and the main flows of matter and energy have been quantified including plankton flow, drift and ascending migrations of invertebrates and fish. For small plain and mountain rivers, a balance has been calculated and schemes of biotic flows of matter and energy of ecosystem elements have been constructed taking into account the groups of different trophic levels. The diet and dynamics of nutrition of mass fish species and the role of these processes in the overall energy balance were investigated. The positive role of floodplains as refugiums for the conservation of biodiversity in river systems for plankton and phytophilous fauna communities has been investigated.

Institute of Fisheries of the National Academy of Agrarian Sciences

The research activities, which are carried out and can be proposed for You by our units: ichthyological, physiological-biochemical, hydrochemical, toxicological, hydrobiological, ichthyopathological, microbiological, virological, molecular-genetic, cytogenetic, histological, patent and marketing[193].
Scientific activities of the Institute are carried out according to scientific and technical programs of the National Academy of Agrarian Science of Ukraine. In addition, a significant amount of scientific works is conducted every year in response to orders of the State Agency of Fisheries of Ukraine, Ministry of Agrarian Policy of Ukraine, other ministries and governmental bodies, fisheries related organizations and enterprises as well as according to international agreements and programs.

Southern Research Institute of Marine Fishery and Oceanography (PivdenNIRO), Odesa Branch

The main trends in PivdenNIRO scientific activities: Complex studies in biology of commercial, associated and dependent species in the Azov and Black Seas and in the World Ocean; Scientific justification for long-term conservation and sustainable utilization of bio-resources and monitoring of oceanic, marine and estuarine ecosystems, development of forecasts and recommendations to manage resources and fisheries; Information statistical control over fisheries activities of vessels flying under the Ukrainian flag in the World Ocean, over fisheries in the territorial waters and exclusive zone of Ukraine, collection, processing and storage and provision with fishing statistical data; Nature protective studies in the Black and Azov Seas including environmental control over the state of marine ecosystem, development of scientific justification for water bodies protection from pollution and assessment of anthropogenic impact on the water body and water organisms; Development and improvement of methods in order to increase commercial productivity of waters by development of mariculture (fish farming, acclimatization, water organism production — mussels, oysters,

[193] http://www.if.org.ua/index.php/en/

algae); Development of technologies in order to produce foodstuffs and feeds, medicinal and prophylactic preparations and biologically active matters extracted from water organisms, environmental technology; Development of normative documents (standards, technical conditions) of food, fodder and technical production, medicinal-prophylactic preparations and package; Design of effective and ecologically acceptable gears and methods of commercial fisheries; Development and improvement of software and mathematics provision for monitoring and information-prognostic system; Development, compilation and publication of fishing guidelines, atlases and scientific information reviews; International scientific and technical cooperation[194].

PivdenNIRO takes an active part in the activity of international fisheries organizations and commissions, cooperating with FAO, CCAMLR, NAFO, EUROFISH, INFISH, TACIS, UNEP, BSEP, PHARE and others. PivdenNIRO scientists and staff have carried out and are carrying out collaborating studies with scientists from many countries: Australia, Albania, Egypt, Yemen, Pakistan, Iraq, Kuwait, Cuba, 'Vietnam, France, Mozambique, Republic of Seychelles, Mauritius, Bulgaria, Romania, Turkey, Russia, Georgia, USA, Canada etc.

Department of Water Bioresources and Aquaculture of Odessa State Environmental University

In order to involve junior students in the Department's research work its leading specialists arrange student scientific seminars and circles. Activities of student scientific circle Water Bioresources include the study of key issues related to various fields of hydrobionts use and results in a high level of interest among junior students. Particular attention is paid to a practical side of scientific activities. Typical problems studied by the student scientific circle include: the importance of invertebrates for fish vital activity, fish body shape and its importance in hydrodynamics, adaptation of hydrobionts as an evolutionary process, features of structure and functions sensory organs of herbivorous and predatory fish, the importance of spawning factors for anadromous and semi-anadromous fish, the importance of acclimatization for reproduction of fish resources and fish species, new methods of fish and fish products processing, biology and peculiarities of sturgeon breeding etc. Activities of the circle are led by the Department's teachers.

Each and every student of the department has an opportunity of participating in student competition Water Bioresources the first stage thereof takes place in the university and at the Department of Water Bioresources and Aquaculture. Traditional areas include hydrobiology, ichthyology and fish breeding.

Students of Master's education and qualification level take part in All-Ukrainian competition of student research papers as per the training programme "Biology" and almost all of the department's students, under the guidance of its leading specialists, participate in the competition. Every year students of the department take winning places and their papers participate in the 2nd round of the competition.

In addition, the Department arranges a traditional annual Student Scientific Conference of the Odessa State Environmental University involving students of almost all years of study. All participants have an opportunity of publishing the results of their research papers in the form of abstracts included in a separate collection and the best works are recommended to be published as the articles included in a relevant collection of articles following the student scientific conference of the OSENU.

Department of Hydrobiology and General Ecology of Odessa I.I.Mechnikov National University195

Now on the department the population genetics of fish is covered by associate professor D. B. Radionov. Biology and ecology of gobiid fish studies associate professor, PhD, I. L. Ryzhko and senior lecturer Yu. V.

[194] http://yugniro.in.ua
[195] http://onu.edu.ua/en/structure/faculty/bio/hydrobio

Karavansky. In addition, Yu. V. Karavansky is highly skilled in of decorative fish breeding. With his active participation the courses on aquarium fish are opened on the department.

In 1997–2005 the researchers of the department fulfilled three fundamental budget projects. Their main goal was to forecast the changes in physiological and biochemistry processes of unicellular algae in stress conditions. It was revealed that different factors affect the beginning stages of adaptive reactions that are aimed to eliminate influence of negative stressors. The intracellular mechanisms of primary adaptations of organisms to negative factors of environment were distinguished.

In 2007–2011 on the department a study on determining the distribution patterns of gobiid fish and macrozoobenthos under the meteo-, hydrological and hydro-chemical factors in coastal part of Odessa Gulf was conducted. 49 species of fish were noted after five years of research in the Odessa Gulf. New data on the dynamics and size distribution of five species of gobies, rapa whelk, six species of crabs were obtained. It was concluded that the number of rapa whelk on stone ridges in the Gulf remains rather high. A new species of anemones for the Black Sea was found and tubenose goby and stone crab was first recorded in the Odessa Gulf. The results of the studies indicate that coastal marine ecosystem is in good condition. However, they are still under the influence of the aggradation of sand that occurred in 2007 and the bottom biocenoses in shallow area in Odessa Gulf have not recovered yet.

Now V. V. Zamorov studies biology and ecology of Gobiidae fish from the northwestern part of the Black Sea and coastal reservoirs, he works at the thesis for doctor's degree. He has published more than 80 works (Zamorov V., Leonchyk Y., Zamorova M., Dzhurtubaev M. Evaluation of the potential abundance and biomass of commercial benthic fish in the Yalpug and Kugurluy lakes (Ukraine) // Scientific Annals of the Danube Delta Institute. – 2014. – Vol. 20. – P. 101 – 108[196]). Since 2006 he has held a post of the dean of Biological faculty.

In the end of 1990-s and in early 2000-s the department was involved in studies connected with the identification of reasons of mass death of fish-invaders in the Danube Lakes.

5. CONCLUSION

Aquaculture is a very important sector for both the economy and the environment, as it can counterbalance overfishing problems and meet the increased demand in fisheries products. Given the large scale of environmental problems that have arisen, this is very important, which is why aquaculture research is increasingly oriented towards environmentally friendly culture methods.

With the know-how available today and the technology available to measure parameters related to water quality in the farm, as well as parameters and quality characteristics of the cultured species, it is now possible to optimize aquaculture performance and produce better quality products.

The vision of the marine aquaculture industry is to continue its growth and to establish as a key development pillar at regional, national and international level, as well. With a strategic goal of enhancing competitiveness, with respect for the environment and the consumer, the industry is showing the way to sustainable management of natural resources, sustainable development and maintaining social cohesion in remote areas and areas with reduced development alternatives and supporting the regional and national economy.

It is obvous that all partner countries is very keen to increase aquaculture production according to the specific conditions they have. As EU member countries Greece and Romania are subjected to EU legislations for the implementation, maintanence and encourage farmers with similar way but in different directions. Romania

[196] http://onu.edu.ua/en/structure/faculty/bio/hydrobio/scientific-works

has to focus more on to improve inland fisheries while the Greece tries to develop mariculture by adding new marine species to the aquaculture portfolio. Both of the countries aim to improve physical capacitiesof existing farms to improve them and add new ones with the funds allocated by EU.

In case of Turkey and Ukraine; associate countries to EU, more efforts spent to harmonize national legislation with EU acquis for the management of fisheries and aquaculture sector; administration, implementation, maintanence, marketing and transportation since 2 decades. As Romania, Ukraine has good habitats for inland fish farming from extensive to intensive production methods. Legislations reguired for the management of fish farming activities seem to be better adapted to EU standards, only improvements on infrastructures are expected.

Aquaculture is very well developed in Turkey. In order to reach high volumes of production both in inland and marine aquaculture, main motivation can be attributed to rich water resources and support incentives from the Government. On the other hand entrepneurs successful intentions to turn threats, as the increase in capture fisheries, to the opportunities in the field of aquaculture. At present Turkey aims not only to increase exports but also wants to export know-how in turn key construction of fish farms, remote monitoring systems, automated feeders and smart production systems, hatcheries and live feed production in case of marine ones, processing plants,aquaculture, etc.

Partners believe that improvements in aquaculture business may grant the production of valuable food for the nutrition of the people while increasing jobs within the sector direct and indirect ways. On the other hand corporation in aquaculture may also serve to increase existing competences and add new ones for the benefit of investors and national economies.

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ANNEX 1
AQUACULTURE REGULATION

Official Journal Dated: 29.06.2004

Official Journal No: 25507

CHAPTER 1- *Purpose, Scope, Legal Basis and Definitions*

Purpose:

Article 1 - The purpose of this Regulation is to use potential of water resources of Turkey with the most productive way ensuring sustainability in aquaculture, by protecting the environment and providing aquaculture investments in a planned way for quality / safe food supply, and effective inspection and monitoring during production processes,

Scope:

Article 2 - This Regulation covers the wide range of aquaculture investments to be established in seas, inland waters and adjacent localities, site selection, implementation method and evaluation process of demands, preliminary permit, project approval (final permission), project cancellation, project changes, trial production, mandatory site changes, establishment of integrated facilities, project transfers to third parties, Bluefin tuna fattening farms, organic seafood culture, certification process for aquaculture farms, import of egg, juveniles and brood fish, employment of technical staff, health and sanitation issues, environmental impacts, and protection and control issues.

Legal Basis:

Article 3 - This Regulation has been prepared on the basis of Article 13 of the Fisheries Law No, 1380,

Definitions

Article 4 - In this Regulation;

Ministry: Ministry of Agriculture and Forestry,

Ministry Central Organization: (TÜGEM) General Directorate of Agricultural Production and Development,

Provincial Directorate: The Ministry Provincial Directorates of Agriculture and Forestry,

Fish farming: Cultivation of aquatic plants and animals in sea and inland waters and their eggs (except for the animals covered by the Terrestrial Hunting Law No, 4915),

Aquaculture: the activity of producing and / or growing) aquatic living organisms, in intensive, semi-intensive or extensive conditions in aquaculture farms,

Farming facility: Places where aquaculture process is carried out,

Inland waters: Places of production and cultivation in natural and artificial lakes, lagoons, dam lakes, embankments, regulators, canals, arcs, streams, rivers, etc,

Hatchery: Facilities established to obtain eggs and juveniles from brood stocks,

Production ponds: Soil, concrete and net ponds, and other similar units made from plastic or similar material for aquaculture purposes,

Net Pond (Net Cage): Units with mesh covers made of frames wood, iron or plastic materials for aquaculture in seas and inland waters,

Intensive fish farming: Intensive cultivation based entirely on external feeding,

Semi-Intensive fish farming: Fertilization and breeding based on complementary feeding,

Extensive fish farming: Low production, based on the natural efficiency of water, with inventory control

Project: The set of documents containing all essential information about the species to be farmed, location of the site, nature, financial aspects, architectural drawings and constructional plan and calculations for aquaculture facilities, cost for investment in detail, farming methods and production plan, supporting documents provided from public institutions and organizations, and all kinds of documents and information related to the business as whole.

Entrepreneur: The real and legal persons who want to establish and operate fish farms,

Offshore aquaculture: Fish farms outside of the closed bays and gulfs in the seas, established at water depth over 40 m to produce fish in net cages using suitable technologies,

Filtration System: Units to keep wastes in water used in production process by different types of filters,

Fish Farming Certificate: The document issued by the Central Organization of the Ministry for the farmers engaged in aquaculture production activities,

Common fish farming area (Annex: OJ-18/06 / 2007-26556): Area designated for more than one marine and inland aquaculture farms in aquaculture business,

Commission (modified by Annex: OJ-30/5 / 2009-27243): Establishment of the Commission which working principles and procedures are determined by the Ministry Central Organization,

Juvenile fish farms (modified by Annex: OJ-30/5 / 2009-27243): Farms produce fish up to 30-50 g after hatching to transfer the facilities in the sea, inland waters and offshore cages,

Juvenile fish on-growing site (modified by Annex: OJ-30/5 / 2009-27243): Aquaculture sites allocated for on-growing of juveniles in the sea, inland waters and on land,

CHAPTER TWO - E*stablishment of Fish Farms and Requirements*

Article 5 - General issues related to the sites to establish fish farms are given below:

a) (Amended: OJ-30/5 / 2009-27243), In order to permit an establishment of a new farm which will use the same water resource together with one or more farms an land, sufficiency of the quality and quantity of water and occurrence of any adverse effect due to new farm to the other farms should be approved and reported by the expert institutions i,e Fishery Faculties and Research Institutes, If the issued report is found appropriate, the request is forwarded to the Ministry's Central Organization together with the opinion of the provincial directorate and it is decided whether to establish a new facility on the water supply, However, if deemed necessary, a decision is made by the Commission, based on the report prepared by providing a re-examination of the issue,

b) Farm facilities to be established on land, in cases where there is no negative effect of the plants by means of hygiene and sanitation (providing the water from a separate source or receiving it through a separate channel from the same water source), the minimum distance condition between the facilities is not required,

c) (Amended: OJ-15/10 / 2005-25967): For the efficient use of inland water resources, in the facilities to be installed on water bodies with a flow rate of 100 lt / sec and less, a farm must have a production capacity that

can use the entire production, No farms with a capacity of less than 25 tons / year can be established on water resources with a flow rate greater than 100 lt / sec, However, in regions where it is not possible to find sufficient space for the farm to be established, this condition is not sought if the provincial directorate gives opinion in this direction,

e) The distance between aquaculture investments in net cages in dams is determined by the Ministry's Central Organization, taking into account the opinion of the Provincial Directorate created based on the criteria such as the area to be allocated to farming, project capacity, water depth, and flow rate, provided that the distance between the farms is not less than two hundred meters,

f) (Amended: OJ-30/5 / 2009-27243): The size of the area to be allocated for production in net cages is determined by taking into consideration the project capacity, the type and technique of cultivation to be applied, provided that it is not less than twice the area to be occupied by the cages in the seas and inland waters,

g) In order to ensure all kinds of life and property safety in the sea and inland waters, the area where the net cages and water intake and discharge systems of the hatcheries should be marked with buoys and lightning buoys, It is indicated by IALA (International Association of Lightning Authorities) standards in terms of navigational safety at sea by day and night obstacle signs, The place of buoys and lightning buoys cannot extend beyond of the leased area,

h) In the seas, as a result of the environmental planning works, the distance between the aquaculture areas allocated for aquaculture is determined by the Central Organization of the Ministry, taking into account the opinion of the Provincial Directorate on project capacity, water depth, flow rate and aquaculture techniques, In areas where environmental planning is not carried out, the distance between two tuna fattening farms and net cage farms and tuna fattening farms in the seas is should not be less than two kilometers; in case of the two finfish farms the distances should not be less than one kilometer based on the opinion of the Provincial Directorate regarding the criteria on project capacity, water depth, flow rate, which is approved by the Central Organization of the Ministry,

i) (Amended: OJ-30/5 / 2009-27243): The distance between hatcheries or between hatcheries and other aquaculture farms is determined by the Ministry's Central Organization taking into consideration the report prepared by the fisheries faculties and research institutes together with the opinion of Provincial Directorates about capacities, water intake and discharge systems, and production methods, However, if it is necessary, a re-examination of all process may be asked by the Commission,

j) In order to ensure the efficient use of the aquaculture areas, the minimum capacities of the projects are determined by the Central Organization of the Ministry,

k) If there is threat of freezing for cold-water fish farms or high temperature risks over 20 ° C, a production management plan is needed to be prepared considering approximate start and end dates,

l) Off-shore aquaculture is permitted only in the seas, out of closed bays and gulfs, over minimum 40 m depths by using appropriate technologies, on the other hand, if the project capacity, depth of water, current speed and technology used in aquaculture process is suitable, the permit can be given to establish marine farms for fish production in cages at shallower depths with the decision of Central Organization of the Ministry,

m) The size of areas on land needed to support mariculture farms for lOJistics and management purposes is determined by the Central Organization of the Ministry and / or the Provincial Directorate,

n) (Annex: OJ-18/06/2007-26556): Determination of common aquaculture sites and their planning is done by the Provincial Directorate after the approval of the Central Organization of the Ministry, The procedures and

principles regarding aquaculture activities including mandatory location changes are regulated by the directive to be prepared by the Central Organization of the Ministry,

o) (Annex: OJ-18/06/2007-26556): The authority to permit aquaculture certificate for the application of new technolOJies other than existing ones is the Ministry Central Organization and its directive prepared on the procedures and principles regarding the implementation,

p) (Annex: OJ-18/06/2007-26556): The procedures and principles for crustaceans, arthropods and mollusks farming are determined by the directive to be prepared by the Central Organization of the Ministry,

q) (Annex: OJ-30/5/2009-27243): The procedures for the juvenile fish production facility is executed in accordance with the provisions, Other procedures and principles needed for juvenile fish growing areas and facilities are determined by circulars to be prepared by the Central Organization of the Ministry.

CHAPTER THREE-*Implementation of Farms, Permits, Approval and Project Process*

Application

Article 6. The procedures and principles for the evaluation of the applications are given below:

a) (Amended: OJ-18/06/2007-26556): Entrepreneurs who want to establish an aquaculture business must apply to the relevant Provincial Directorate and obtain permission from the Central Organization of the Ministry,

b) The entrepreneurs who want to establish fish farms, apply to the Provincial Directorate with a written statement (Attachment 1) by adding to a 1 / 25,000 scaled field map on which the place where the facility will be established is marked, Provincial Directorate conducts a local investigation within 15 days by a technical team to be formed, It is ensured that water samples are duly taken from the water source or production sites to be used in the aquaculture facility, and necessary analyzes are carried out by the investor in the certified laboratory designated by the Ministry, If the analyses are all positive and acceptable for water quality , water surface, land and other criteria (i,e, depth of water, distance between plants, appropriate aquaculture techniques and environmental effects) determined by the Central Organization of the Ministry, for all inland water and marine farming facilities need to prepare " Preliminary Study Report "(Attachment -2), and farms with hatcheries has to prepare "Hatchery Preliminary Study Report" (Attachment -3) together with Attachment -2, A sketch showing the location of the facility, water source, road and settlement status of other facilities and the distances related to them, is also prepared and added to the preliminary study report(s) by the Provincial Directorate.

Provincial Directorate demands preliminary permission for the applicant from Central Organisation of the Ministry by handling all documents; 1 / 25,000 scaled map of the facility will be established, with the application statement of the investor, water analysis result report, sketch and other documents to be provided by the investor(Attachment -4) together with the appropriate opinion of the Provincial Directorate (Additional last sentence: OJ-30/5/2009-27243) Procedures related to the preliminary permit requests are finalized within twenty one days by the Ministry.

c) (Amended:OJ-30/5/2009-27243): Eight months of period from the date of application is given to the investor to provide all of the documents for preliminary permit (Attachment -4) by the Provincial Directorate, If the essential documents could not be completed within this period, the application of the investor is removed from the transaction, However, if the reasoned request of the applicant is deemed appropriate, an additional period may be given by the Provincial Directorate in accordance with the reason.

d) If there are more than one application for farming in the same area both in marine and inland waters, other applications are kept for evaluation until the first application is concluded, If the first application does not take place, other applications are evaluated according to the order of application.

e) If it is the first application for fish production in net cages in dam lakes, the opinion of the General Directorate of State Hydraulic Works is taken by the Central Organization of the Ministry and the transactions are carried out accordingly.

Preliminary Permission

Article 7 - General provisions regarding the preliminary permission for the establishment of aquaculture plant are described below:

a) (Amended: OJ-18/06/2007-26556): In case of completing the procedures in Article 6, the entrepreneur is given a twelve-month pre-authorization by the Ministry's Central Organization and / or Provincial Directorate to prepare his project, During this period, the preliminary permission of the entrepreneur who does not prepare his project and deliver it to the Provincial Directorate is canceled by the Ministry's Central Organization upon the proposal of the Provincial Directorate, However, if the reasoned request of the entrepreneur who declares an excuse on this matter is notified to the central organization of the Ministry with the approval of the Provincial Directorate, an additional period may be given by the Ministry's Central Organization.

b) When the entrepreneurs who have received a preliminary permit or who are in the stage of obtaining a preliminary permit, wants to make changes in their previous applications, they apply to the Provincial Directorate with a petition (Attachment -5), Subsequent transactions are carried out in accordance with the principles laid down in Articles 6 and 7, Considering the nature of the requested change, documents that have been previously supplied by the operator and are still valid, new ones are not required from the operator, However, the first application date is taken as the application date.

c) Entrepreneurs who have applied for a preliminary permit and whose transactions are still in progress and those who have received a preliminary permit cannot transfer their rights to another entrepreneur.

Project Approval

Article 8 - General provisions regarding approval of fish farming projects are described below:

a) Entrepreneurs who want to establish a fish farm and get preliminary permission must have their projects approved by the Ministry's Central Organization and / or Provincial Directorate.

b) While preparing the project, the project preparation instruction and disposition determined by the central organization of the Ministry are taken as basis, Discovery-quantity charts of the application project prepared by real and legal persons authorized to prepare the project are calculated by considering the increase rate to be announced by the Ministry of Public Works and Settlement, if these prices are not disclosed, The project is delivered in five copies to the Provincial Directorate for approval, Entrepreneurs are obliged to add a notarized copy of the specification regarding the project subject, sent to the Provincial Directorates by the central organization of the Ministry in each project copy,

c) (Amended:OJ-30/5/2009-27243): In the approval of the projects of fish farms, the condition of conformity with the relevant provisions of the "Environmental Impact Assessment Regulation" is sought and the document confirming that this requirement is met is added to the project,

d) Approval authorities of aquaculture projects to be implemented in seas and inland waters are determined by circulars to be prepared by the central organization of the Ministry,

e) For the projects whose approval authority is the Provincial Directorate, a copy of the project remains at the Provincial Directorate, and another copy is sent to the Central Organization of the Ministry within fifteen days after the date of approval, If there is a lease for the projects approved by the provincial directorate, the lease offer is made to the relevant institution together with the project and the Ministry's central organization is informed as a result, The other two copies of the approved project are given to the investor,

g) Authorization to approve: After the projects approved by the Central Organization of the Ministry, one copy is kept in the Central Organization of the Ministry, If the lease for the approved project is in question, one copy of the project is sent to the Provincial Directorate in order to be used during the application to be made for the lease, two copies are given to the operator and one copy is kept in the archive of the Provincial Directorate,

Aquaculture Certificate

Article 9 - The procedures and principles to be applied in issuing aquaculture certificate to fish farms are explained below:

a) (Amended: OJ-30/5/2009-27243): After completing the water and / or area rental operations for the aquaculture plant and / or hatchery and starting production, an application is made to the provincial directorate within a month to obtain the Aquaculture Certificate and / or Aquaculture Hatchery Certificate, Within fifteen days after the application, an inspection report is issued by the Provincial Directorates, and the Aquaculture Certificate (Attachment – 6 / a) and / or Aquaculture Hatchery Certificate (Attachment – 6 / b) is sent to the Ministry's Central Organization tOJether with the audit report to be approved, , The procedures regarding the approval of the Aquaculture Certificate are finalized within twenty days,

b) "Aquaculture Certificate" is issued one for each facility. The approved original document is given to the operator; a certified copy of each is filed in the Central Organization of the Ministry and the Provincial Directorate,

c) The copy of the certificate is hanging on in a place where easily visible in the administrative building of the facility,

d) In case of project change, project transfer, name change and etc,, in order to issue the Aquaculture Certificate suitable for the new situation by canceling the old certificate, after the allocation procedures completed to the new investor, a new "Aquaculture Certificate" (Annex-6 / a and b) issued in accordance with the new situation are sent to the Central Organization of the Ministry tOJether with the "Audit Report",

e) Aquaculture Certificates of aquaculture plants, whose activities are terminated for any reason, are sent to the Central Organization of the Ministry by the Provincial Directorates for cancellation,

f) The entrepreneurs who will interrupt production for any reason shall apply to the Provincial Directorate by attaching the original of the certificate document to their statement explaining the reason and duration of the break, Originals of the breeding documents of these facilities are kept in the Provincial Directorates until the facility in question starts production again, Central Organization of the Ministry is informed by the Provincial Directorates about the situation in question,

g) Entrepreneurs apply to the Provincial Directorate within one year from the date of publication of this Regulation to replace the certificate documents previously issued by the Ministry's Central Organization and / or Provincial Directorate,

h) Entrepreneurs are required to apply to the Provincial Directorates to get visa for their aquaculture certificates in every three years,

ı) (Annex: OJ-30/5/2009-27243): Due to administrative and technical problems, if the documents regarding the renewal or visa issuance of the farms cannot be supplied and the reasoned request of the operator is relevant, the breeding certificate can be visa or renewed,

If the documents regarding the renewal or visa issuance of the fish farm cannot be supplied due to administrative and technical problems, and the reasoned request of the investor is relevant, the aquaculture certificate can be approved for visa or renewed,

Cancellation of the Project

Article 10 - General provisions requiring cancellation of aquaculture plant projects are as follows:

a) Regarding the establishment of the fish farm, completion of leasing procedures is essential to invest and start production within one year after the last completed lease transaction by accepting as the start date, the project is canceled. If the entrepreneur's reasoned request and this request is found appropriate by the Central Organization of the Ministry, this period is extended for one time only. If the period is exceeded, the cancellation of the projects is made by the Provincial Directorate if approval is done by the provincial directorate and notified to the Central Organization of the Ministry, Approval of the projects done by the Central Organization of the Ministry is done by this central organization upon the proposal of the Provincial Directorate,

b) Exceeding the period stated in item (a) due to any environmental, physical and chemical factors or natural disasters, which may have a negative effect on aquaculture, or which may be understood later, is not considered as a reason for project cancellation. In this case, the investor is given a six-month decision-making period, and the project is canceled after six months if a new proposal is not received from the entrepreneur with the solution to eliminate the restrictive situation or change the location, If an activity proposal is received to eliminate this restrictive situation and this proposed activity is deemed appropriate, an additional time sufficient for the proposed application is given. In the six-month decision-making period, if the entrepreneur proposes changes to the project, the provisions of Article 11 of this Regulation are applied. The decision authority regarding the projects covered by this article is the authority that approved the project,

c) In case the fishing grounds are rented with a project for fish farming procedures for the cancellation of project is carried out by the Central Organization of the Ministry, if the promised investments to be made for each year in the proposed and approved plan are not fulfilled without reason, even one year after of that year based with the report prepared by the Provincial Directorate,

d) If the lease contract is terminated due to the entrepreneur's failure to fulfill his obligations, project certificates are also canceled. Cancellation of the projects whose are approved by the Provincial Directorate are made by the Provincial Directorate and notified to the Central Organization of the Ministry. If approval is done by the Central Organization of the Ministry cancellation is also done by the same organization.

Changes in the Project

Article 11 - The procedures and principles to be applied in case of changes in aquaculture projects are as follows:

a) The entrepreneurs who want to make any changes in their projects such as the type, location, capacity and area increase/decrease, and setting up an additional unit and change of location should apply to the Provincial Directorate where the facilities are located (Attachment -7), Regarding these applications, transactions are made in accordance with the principles stated in the 6th, 7th and 8th articles,

b) Considering the nature of the requested change, the documents that have been previously supplied by the investor and if they are still valid are not requested from the applicant again,

c) New project is required for any change of species while revised project is requested to install additional units and capacity increase / decrease, No project is requested for space increase / decrease and relocation of the farm realized with the documents related to the navigation and rentals, In cases where capacity increase / decrease and space increase / decrease are involved, both revised project documents related to navigation and rentals are requested,

d) The entrepreneurs are subject to have permission about any changes that will not spoil the merits of their approved projects (shape, size and number of cages / ponds, biological characteristics of farmed species apart from the changes during the establishment of the fish farm or at post production stage, and have the site plan suitable for the new situation. The authorization and approval authority for these changes is the authority that approves the project,

e) (Annex: OJ-15/10/2005-25967): After the aquaculture projects are approved, the entrepreneurs are obliged to apply to the Provincial Directorates with a petition for their changes in their annual production planning, If the requests for changes are deemed appropriate by the provincial directorates, this will be notified to the Ministry within 15 (fifteen) days,

Mandatory Location Changes

Article 12. (Amended: OJ-18/06/2007-26556)

In case of notification from the Ministry's Central Organization and / or the Provincial Directorate due to legal, technical, security and similar compulsory reasons, entrepreneur should apply with a petition (Attachment -8) to the Provincial Directorate at the place where their facilities will be moved, at the latest one month, Documents related to transfer and new settlement plan are provided in case of compulsory place changes to be made without changing the size of surface area and / or capacity increase / decrease provided that they are within the same city borders, Other transactions are evaluated within the scope of the relocation of the projects and are carried out in accordance with the principles in Article 11, In case of the compulsory relocation requires moving to an area within the boundaries of other provinces, the transactions are carried out in accordance with the principles in Article 11,

Trial Production

Article 13 - The general provisions regarding the trial production to be applied in the aquaculture farms are as follows:

a) The entrepreneurs who want to make trial production in a part of their existing facilities apply with a petition containing a detailed report including the purpose, reason, material, method and duration related to the trial production, Such applications are forwarded to the Central Organization of the Ministry by the Provincial Directorate by specifying their opinion, The authority to allow trial production belongs to the Central Organization of the Ministry,

b) Entrepreneurs whose want to make trial production without having any facilities, apply to the Provincial Directorate where the trial facilities will be established with a petition (Annex-9), Regarding these applications, transactions are made in accordance to the principles stated in Articles 6, 7 and 8, However, while preparing the aquaculture project, the project disposition prepared by the Central Organization of the Ministry is taken as basis,

Transfer of the Projects

Article 14, The procedures and principles to be applied in the transfer processes of aquaculture plants and projects are as follows:

a) Entrepreneurs who want to transfer their aquaculture facilities to real or legal persons apply to the Provincial Directorate where their facilities are located, by submitting the documents to be determined by the Central Organization of the Ministry, with a petition (Annex-10),

b) (Amended: OJ-30/5/2009-27243), Proposals related to the transfer processes of the projects which have been approved by the Ministry Central Organization are notified by the provincial directorates to the Ministry Central Organization within seven days, After the approval of the transfer process by the Ministry Central Organization, the demand for the transfer is conveyed by the provincial directorate to the institution authorized for the leasing, and then the result is reported to the Central Directorate of the Ministry by the provincial directorate, The proposals regarding the transfer processes of the projects whose project has been approved by the provincial directorate are notified to the Ministry's Central Organization within seven days with the approval of the provincial directorate, These proposals are evaluated within fifteen days and sent to the relevant institution within seven days by the provincial directorate, if deemed appropriate by the Ministry's Central Organization, After the transfer, the Ministry Central Organization is informed about the issue,

c) Real or legal persons who take over the project submit a notarized copy of the specification to the Provincial Directorate, A copy of the specification is sent to the central organization of the Ministry by the Provincial Directorate,

d) (Annex: OJ-18/06/2007-26556), For the transfer of the enterprises to real or legal persons that will be engaged in aquaculture for the first time, the condition of obtaining an Aquaculture Certificate is required.

CHAPTER FOUR-Requirements for other aquaculture activities

Bluefin tuna fattening

Article 15. Procedures regarding the establishment and operation of bluefin tuna fattening farms will be carried out according to the this directive and the Communiqué on "Bluefin Tuna (*Thunnus thynnus*) Fishing and Fattening" published in the Official Gazette dated 23/03/2003. No: 25057.

Organic Aquaculture

Article 16. Transactions related to organic aquaculture projects are carried out in accordance with the relevant articles of this Regulation. Regarding production, the legislation in force regarding the principles and implementation of organic agriculture is complied with.

In regions where fisheries employed

Article 17. The procedures and principles regarding fisheries and aquaculture in natural lakes, ponds, dam lakes, rivers and branches are determined by the Ministry "(Amended: 15/10/2005 -25967 Article 5).

Establishment of Integrated Plants

Article 18. Only the part of the aquaculture industry, which includes the aquaculture plant and other related activities, is evaluated, and the relevant procedures are carried out in accordance with the principles stated in the Articles 6, 7 and 8.

CHAPTER FIVE- Import of eggs, fry and brood fish

Conditions to be sought in the import of egg, juvenile and breeding seafood

Article 19. The procedures and principles regarding the importation of the eggs, brood and breeding materials used to be grown in aquaculture facilities are determined by the Ministry (Amended: 15/10/2005 - 25967 Article 6).

CHAPTER SIX- Employment of technical staff

Technical Staff Employment in Fish Farms

Article 20. The provisions regarding the employment of technical personnel in aquaculture plants are as follows:

a) In fish farms, depending on their production capacity, at least 4 years of faculty graduates who have education on aquaculture or those who have worked in the public for at least 5 (five) years are employed as technical personnel provided that they document their status (Amended: 15/10/2005 - 25967 Article 7). The number of technical staff to be employed in the facilities is determined by the circulars to be prepared by the central organization of the Ministry, taking into account their production capacities. One of the technical staff employed is assigned as "Technical Responsible Manager".

b) In hatcheries, at least one technical staff is employed and regarded as "Technical Responsible Manager" regardless of capacity.

c) In the aquaculture plants or hatcheries, if the owner of the facility meets the conditions of the technical personnel whose characteristics are stated in item (a) of this article, this operator is considered as the technical personnel.

d) Fish farms and hatcheries, technical personnel employment and technical responsible manager appointments that are currently in operation, shall notify the Provincial Directorate within six months by filling the "Technical Responsible Manager Appointment and Technical Personnel Employment Form"(Attachment - 10),

e) Fisheries aquaculture facilities and hatcheries to be established will fulfill their obligations regarding the employment of technical personnel and appointment of a technical responsible manager during their application to the Aquaculture Certificate,

f) As the production capacity, which is accepted as the basis for the employment of technical personnel, issued before the issuance of a breeding certificate for enterprises that have just started production; For the enterprises currently in production, the production amount in the most recent audit report belonging to that enterprise is taken from the annual audit reports, In the following years, the production capacity, which is periodically prepared every year, is taken as the basis for production capacity, which is considered as the basis for the employment of technical personnel.

CHAPTER SEVEN - Fisheries Health and Welfare
Measures to be taken for the Protection of Fisheries Health and Welfare

Article 21. The measures to be taken for the protection of fisheries health and welfare in aquaculture are specified as follows (Change: 18/06/2007 -26556, Article 7):

a) The Ministry is authorized to take and take all kinds of measures to protect the aquaculture and aquaculture health in which aquaculture is carried out,

b) Dead fish in farms are collected and burned regularly or buried in lime pits,

c) In case of a suspicion or finding of a disease in the breeding facilities, the entrepreneurs must report this situation to the Provincial Directorate where the facility is located as soon as possible,

d) When the disease notice is received, the breeding facility is monitored by the Provincial Directorates, Entry and exit of live or dead seafood products and all kinds of tools, equipment, tools and equipment that may spread the disease are subject to the permission of the provincial directorate officials; Provincial Directorates

ensure that the necessary samples are taken from the facilities where the disease is received, sent to the relevant laboratory for examination and testing, and ensures that other enterprises that have the possibility of infection are taken necessary measures,

e) If the disease occurred in the aquaculture facilities on land, all pools are evacuated for cleaning and disinfection processes, All eggs, fish or other aquaculture products that show signs of clinical disease are destroyed under the supervision of the provincial directors of the Provincial Directorate and again with the method recommended by the authorities,

f) After removing or disposing of fish, eggs, gametes or other aquaculture, pools, equipment and all kinds of materials, tools and equipment that may infect the disease, eliminating any risks that may lead to the emergence, spread or survival of the Province, It is cleaned and disinfected in a manner recommended by the authorities of the Directorate,

g) The activity of the breeding facility is not allowed until the risk of the disease disappears and the necessary precautions are determined and notified by the Provincial Directorate,

h) Disease investigation, measures taken, applications and results are reported to the central organization of the Ministry in a report by the Provincial Directorate,

i) All kinds of medicines and similar chemicals used in hatcheries and aquaculture plants are used depending on the veterinarian prescription, If necessary, medication can also be used with a magistral prescription, One copy of the prescriptions of the drugs used in the facility is kept,

j) Procedures and principles regarding fisheries welfare are regulated by the circular to be prepared by the Central Organization of the Ministry (Change: 18/06/2007 -26556, Article 7).

CHAPTER EIGHT- Environmental Impact and Protection

Measures to be Taken for Environmental Impact and Protection

Article 22. The precautions to be taken regarding environmental impact and protection in aquaculture plants are as follows:

a) The requirement of conformity with the relevant provisions of the "Environmental Impact Assessment Regulation" is required in the projects of aquaculture plants,

b) Entrepreneurs must take measures to protect the environment during the establishment and operation phase of aquaculture plants, In this context, facility wastes are not released to the water environment in which they are located; All kinds of materials and materials that will impair the quality of water, harm the environment, human and aquaculture health are not used,

c) While the aquaculture activities are carried out, all kinds of precautions that will not cause visual pollution are taken, In this framework, in particular, bags and other wastes used in aquaculture are regularly removed from the facilities, In addition, the structures on the land are designed in harmony with the environment they are in and their exteriors are painted in accordance with their environment,

d) Necessary measures are taken to prevent the species produced in aquaculture facilities from escaping into nature,

e) The waters left to the receiving environment in the aquaculture plants and hatcheries on the land must comply with the values reported in the Fisheries Regulation, and purification systems that will meet these conditions are established in the facilities,

f) Enterprises that do not currently have a purification system have to make the necessary changes in the layout plans and submit them to the relevant Provincial Directorates to approve the new settlement plans in which these units are included and their technical specifications are specified, The approval authority regarding these changes is the authority that approved the project, These facilities have to fulfill this obligation within one year from the publication of this Regulation,

CHAPTER NINE- Audit

Supervision for fish farms

Article 23. The provisions regarding the inspection of aquaculture plants are as follows:

a) Provincial Directorate officials inspect aquaculture plants within the framework of this Regulation and related legislation,

b) Routine inspections in aquaculture facilities are carried out by the Provincial Directorates in April, May and June of each year, and in March for hatcheries, an inspection report is prepared, Audit reports are sent to the Ministry central organization for hatcheries at the latest in April and for breeding facilities until the end of July,

c) It is obligatory to give a copy of the inspection reports to the facility where the inspection and control is carried out,

d) The provisions of the Fisheries Law No, 1380 and the provisions of the relevant legislation are applied for the provisions of this Regulation and the aquaculture facilities that are contrary to the other legislation referred to by this Regulation and the products produced by them,

Article 24, (amended: 15/10/2005 - 25967 Article 8) " Attachment -6 / a" and " Attachment -6 / b" in the Attachments of the same Regulation have been amended as attached, Attachment – 4 attached to the same Regulation has been amended as attached, (amended: 30,05,2009-27243 Article 6)

Article 25, (amended: 15/10/2005 - 25967 Article 9) “Attachment -8” in the annex of the same Regulation has been repealed and other annexes have been registered accordingly,

CHAPTER TEN Effectiveness and Execution

Preparation of Communiqué, Circular

Article 26. The central organization of the Ministry is authorized to issue communiqués, circulars and instructions in order to ensure, facilitate, complete or explain the implementation of this Regulation, Matters not included in the Regulation

Article 27. In cases where there is no provision in this Regulation, the operation is made according to the general provisions,

Force

Article 28. This Regulation comes into force on the date of its publication.

Executive

Article 29. The provisions of this Regulation are executed by the Minister of Agriculture and Forestry.

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ATTACHMENTS FOR THE STATEMENT TEMPLETES INLINE WITH AQUACULTURE REGULATION

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ATTACHMENT-TEMPLETE 1

TO: MINISTRY OF AGRICULTURE AND FORESTRY
……. PROVINCIAL DIRECTORATE

I would like to establish an aquaculture plant in the province of …… .
Thanks for your attention.
Sincerely yours,

../../….
Name and Surname

Signature

ADDRESS :
-Full address, phone, fax and e-mail

Information on the planned fish farm:

Town	:
Village/locality	:
Type of farming	:
Name of water resource (River, lake, dam, sea etc,)	:
Planned capacity (tons/year , individual/year)	:
Species to be farmed	:

Attachments :
AT-1 1/25,000 scaled map :

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ATTACHMENT-TEMPLETE 2

PRELIMINARY EVALUATION REPORT
FARM ON LAND ( ), NET CAGE FARM ( )
Date of arrangement .. /.. / ….

1. Information About the Applicant :

Name and Surname :
Date of Application :

2. Information on the Application Site

Province/Town :
Village :
Location :
Coordinates :
Ownership :
a) Real person/Company b) Treasury c) Forest area d) Other

3. Information on farmed species

Species :
Quantity (tons/year) :
Fry (ind,/year) :

4. Information on water and water resource

Name of the spring :
Name of the dam reservuar (*) :
Distance of spring to the farm :
Estimated flow rate (lt/sec) (**) : Min …….Max…….
Water temperature ^{0}C :Min……. Max…….
Mean: …….
Mean depth (m) :
Water levels (*)
Minimum (Month) :
Maximum (Month) :
Iceing (for lakes and dams)
Period covered with ice (*) : from…….Till…….
Aquatic Organisms in water :
Usage Status of Water
(Irrigation, drinking, energy, etc,) (**) :
Contamination status (if there is)
(Identification of pollutants) :

(add more info if necesary)

5. <u>Information on the farming site</u>

Distance to the settlement area (km)	:
Risk of flood (**)	:
Road (asphalt-stabilized-soil)	:
State of transportation (#days the road is closed to transportation)	:
Area used for aquaculture (m2)	:
Purpose of use at present	:
Soil structure (clay-sandy-rocky) (**)	:
Topographic state (slope, etc,) (**)	:
How water reaches to ponds (attraction, pump, channel etc,) (**)	:

If the facility is installed on land, a scale sketch of the land; Reservoir map or scale map for the lattice enterprises, the status of other facilities in the vicinity, their distances to each other will be indicated by drawing on the sketch or map,

CONCLUSION AND OPINION:

Inspectors (***) :

Name and Surname	:	**Name and Surname**	:
Signature	:	**Signature**	:

(*) : Lake, dam, sea
(**) : Farms and hatcheries on land
(***) : Minimum two experts

NOTE : Water analyse report should be attached

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ATTACHMENT-TEMPLETE 3

PRELIMINARY HATCHERY REPORT

Preperation Date: ../../….

1.Information About the Applicant

Name and Surname :
Date of Application :

2, Information on the Application Site

Province/Town :
Village :
Location :
Coordinates :
Ownership :
a) Real person/Company b) Treasury c) Forest area d) Other

3, Information on farmed species

Species :
Fry/juvenile production (# per year) :

4. Information on water and resources

		Inland	**Marine**
Source of water	:	.....	.....
Distance of source to the farm site	:	.....	.....
Fequired flow rate (lt/sec)	:	.....	.....
Water Temperature Minimum °C	:	.....	.....
" Maxsimum °C	:	.....	.....
" Mean °C	:	.....	.....
- Possible pollutants	:	.....	.....

5.Information on farm site

Distance to the settlement area (km) :
Risk of flood (**) :
Road (asphalt-stabilized-soil) :
State of transportation
(#days the road is closed to transportation) :
Area will be used for aquaculture (m^2) :
Purpose of use at present :
If there is any annual income (tons, kg, etc) :
Soil structure (clay-sandy-rocky) (**) :
Topographic state (slope, etc,) (**) :
How water reaches to ponds
(attraction, pump, channel etc,) (**) :

NOTE : Water analyse report should be attached

Inspectors (***)

Name and Surname	**:**	**Name and Surname**	**:**
Signature	**:**	**Signature**	**:**

ATTACHMENT-TEMPLETE 4

OTHER DOCUMENTS REQUIRED FOR PRE-AUTHORIZATION

For the facilities to be established on land, documents explaining the ownership status of the facilities where the facilities will be established are listed below,

1- If it is a personal property, a written declaration stating that it is the property owner or possession (It is stated in the application petition,),

2- If it is to be rented out from the individual, a written statement stating that the project is a tenant for the economic life of the project (stated in the application petition).

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ATTACHMENT-TEMPLETE 5

TO: MINISTRY OF AGRICULTURE AND FORESTRY

…….PROVINCIAL DIRECTORATE

I applied to establish a fish farm with my statement dated …….and I am at the stage of getting preliminary permission / project preparation.

For your kind attention. Thanks in advance.

Sincerely yours

../../….

Name and Surname

Signature

Contact :

Address, phone, fax and e mail :

Information on the planned farm:

Town :
Village/Location :
Type of farming :
Name of water source (River, lake, dam, sea, etc :
Planned capacity(ton/yr, ind/yr :
Species to be farmed :

Annex

1/25,000 scaled map

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ATTACHMENT-TEMPLETE 6/a

TURKISH REPUBLIC
MINISTRY OF AGRICULTURE AND FORESTRY
General Directorate of Fisheries and Aquaculture
AQUACULTURE CERTIFICATE

Certificate No :
Tax Office and Tax No :
National Identity No :
Name of the Farm (Project) :
Name and Surname of the Owner :
Address of the farm :
Phone, Fax, e-mail, :
Farmed products and types :
Capacity of the farm (Project) (ton/yr) :
Place and the date of approval of the project :
Approval date(s) of the revised project :
Ownership statue (Treasury, forestry, private property :
Number and volume of the ponds/Cages (adet/m^3) :
Hatchery capacity (# juveniles/yr) :
Starting day and duration of renting (for land and water will be used) : Land:……
Water:……
Surface area to be rent (water/land area)(m^2) : Land:……,,,,,,,, Water:……
Water volume to be rent (lt/sn) :
Coordinates of rented water surface (degrees:minutes:second) :1-……N,……E 2-……N,……E
3-……N,……E 4-……N,……E
Coordinates of farms established on land :

Approved

Name and Surname

Signature

……,/…,/…,,…,

Date of visa: **……,/…,/…,,…,** **……,/…,/…,,…,** **……,/…,/…,,…,**

(This document is approved and stamped by the Ministry's Central Agency and must be visaed by the Provincial Directorate of the Ministry every 3 (three) years)

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ATTACHMENT-TEMPLETE 6/b

TURKISH REPUBLIC
MINISTRY OF AGRICULTURE AND FORESTRY
General Directorate of Fisheries and Aquaculture
HATCHERY CERTIFICATE

Certificate No :
Tax Office and Tax No :
National Identity No :
Name of the Farm (Project) :
Name and Surname of the Owner :
Address of the farm :
Phone, fax, e-mail :
Produced products and types :
Hatchery (Project) capacity (juvenile/yr) :
Place and the date of approval of the project :
Approval date(s) of the revised Project (if there is) :
Area of the hatchery (m^2) :
Total closed area (m^2) :
State of ownership :
Water volume to be rent (lt/sn)
Starting day and duration of renting
(for land and water will be used) : **Land:……, Water:……,**
Coordinates of rented area
(degrees:minutes:second) :

Approved

Name and Surname

Signature

……/…,/…,…,

Date of visa: **……,/…,/…,…,** **……,/…,/…,…,** **……,/…,/…,…,**

(This document is approved and stamped by the Ministry's Central Agency and must be visaed by the Provincial Directorate of the Ministry every 3 (three) years)

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ATTACHMENT-TEMPLETE 7

TO: MINISTRY OF AGRICULTURE AND FORESTRY

……..Provincial Directorate

I want to make changes to my project approved by the Ministry on …….

Sincerely yours

../../….

Name and Surname

Signature

Personal Information

Address(es) :
Phone, fax, e-mail, web site :
Aqauaculture certificate no :

Information about farm

Province and Town :
Village/Locality :
Area (m^2) :

Information on changes

Subject (*) :
Explainations :

(*) Changes could be more than one (Changes in species, capacity increase/decrease, area increase/decrease, establishing additional units, changing the site, trial production, etc,)

Project funded by EUROPEAN UNION

ATTACHMENT-TEMPLETE 8

TO: MINISTRY OF AGRICULTURE AND FORESTRY

…… Provincial Directorate

I would like to establish a trial farm in the province …….

For your kind attention,

../.../….

Name and Surname

Signature

Contact Information

Address, phone, fax and e-mail :

Information on planned farm

Town :
Village/location :
Type of aquaculture (Ongrowing in net cages, juvenile production :
Name of water source :
(River, lake, dam, sea, etc) :
Plannned capacity(ton/yr, #/yr) :
Trial subject :

ANNEX

Annex -1 1/25000 scaled map

ATTACHMENT-TEMPLETE 9

TO: MINISTRY OF AGRICULTURE AND FORESTRY
……. Provincial Directorate

We would like to carry out the transfer transactions related to the project registered on the name of ……. approved on …….
For your kind attention

New demander of the project	Person transferring the project
../…/….	../…/….
Name and Surname	Name and Surname
Signature	Signature

PERSONAL INFORMATION WHO TRANSFERS

Address(es)	:
Phone, fax, e-mail, web site	:
Certificate No	:

PERSONAL INFORMATION ABOUT NEW DEMANDER

Address (es)	:
Phone, fax, e-mail, web site	:

LOCATION INFORMATION OF FARM

Province and town	:
Village/locality	:

Project funded by EUROPEAN UNION

DACIAT

Black Sea CROSS BORDER COOPERATION

ATTACHMENT-TEMPLETE 10

TECHNICAL RESPONSIBLE MANAGER AND TECHNICAL STAFF EMPLOYMENT FORM

Name – Surname : ……
Place of birth/year : ……., ../../….
National Identity No : ……,
Tax Office and No : ……., No: ……,
Address : ……
……
Phone : ……
Fax : ……
Mobile phone : ……
e-mail : ……
University graduated : ……
Faculty and Department : ……
Graduate year and diploma no: ……

Fotoğraf

	University	Field
MSc	: ……	……
PhD	: ……	……
Foreign Language	: ……	Level: ……

Courses Participated : Tittle Location Duration

1- …… …… ……
2- …… …… ……
3- …… …… ……
4- …… …… ……
5- …… …… ……

Certificates owned : ….. class driver license ☐ Scuba diving license ☐ Skipper certificate☐
Others (Explain) ……

Publications
1- ……
2- ……
3- ……

Professional Background Institution/Farm/company Duration of Work
1- ……
2- ……
3- ……

…… which the identity has been clearly stated above works as Operations Manager / Technical Staff in our facility,

../../….
Name and Surname
Signature
Tittle

ANNEX 2

DIRECTIVE ON THE APPLICATION OF AQUACULTURE REGULATION
(Directive 2006/1)

Legal Basis: Amended Regulation on the Fish Farm Implementation Regulation dated 15.10.2005, No: OG 25967.
Some articles of the Directive have been reorganized and the procedures and principles regarding implementation are given below:

1- Implementation Principles of Article 5 (j) of Aquaculture Regulation:

In order to ensure the efficient use of the areas allocated for aquaculture investments, the capacities in net cages will not be less than 250 tons / year in sea and 25 tons / year in dams and natural lakes. However, the capacity condition is not required for the projects of marine fish culture farms in earthen ponds and in net cages in streams and small irrigation lakes. The procedures regarding fish culture in small irrigation lakes will be carried out within the framework of the instructions notified to the Provincial Directorates.

2- Implementation principles of Article 6 (b) of the Aquaculture Regulation.

The water criteria tables to be considered in the applications for aquaculture in inland waters and seas are specified in ANNEX-1-a, b, c.

3- Implementation Principles of Article 8 (b) of the Aquaculture Regulation:

Information and documents to be included in the fisheries project file:
a) Information and documents required for the Pre-Permission,
b) Letter of preliminary permit issued by the Ministry,
c) Regarding the area where the facility will be established;

i) A document from the local Health Organization (Provincial Health Directorate, Environmental Health Directorate, etc.) stating that it does not have any health problems.
ii) (Amended: 2006/1) Document obtained from the relevant institution (General Directorate of Highways or General Directorate of State Railways or the Provincial Organizations of these organizations) that there is no objection in terms of transportation,
iii) (Amended: 2006/1) Document received from the relevant institution (General Directorate of State Hydraulic Works (requested at the preliminary permit stage), General Directorate of National Real Estate or the Provincial Organizations of these organizations) that there is no problem in using the water to be used in the facility,

Documents to be obtained from other relevant organizations if deemed necessary:

i) Trade Registry Gazette for legal entities (Company, Cooperative, etc.),
ii) Project feasibility report
iii) A document indicating whether there is any objection according to the EIA regulation
iv) Compliance with project preparation disposition (Annex-2)
v) Draft Technical Specifications (ANNEX-3-a, b, c, d, e, f, g, h)

4- Implementation Principles of Article 8 (d) of Aquaculture Regulation.

Regardless of their capacities, production projects of trout, carp, sea bream and sea bass fish and inland water and marine hatchery projects (including 2,000,000 pieces / year) with production capacity up to 2,000,000 pieces / year are approved by the Provincial Directorates.

Regardless of the capacity, the production projects for the cultivation of the turbot, sturgeon, eel, frog, aquatic plants, crustaceans and molluscs, and other species, trial production and organic aquaculture together are approved by the Ministry's Central Organization.

(Amended 3rd Paragraph: 2006/1) Projects to be implemented in small natural or irrigation lakes will be approved by Provincial Directorates.

Projects to be implemented for aquaculture in fishing areas and / or restoration projects are approved by the Ministry's central organization.

A copy of the projects approved by the Provincial Directorates will be sent to the Ministry's Central Organization within 15 (fifteen) days in accordance with the clause (e) of Article 8 of the Regulation.

5- Principles of implementation regarding article 9 (a) of Aquaculture Regulation (Supplementary Article: 2006/1):

For the entrepreneurs who are engaged in aquaculture, the "Fish Farming Certificate" and the "Aquaculture Hatchery Certificate" will be arranged as appropriate.

The documents need to be changed will be sent to the Ministry together with the new "Fish Farm Audit Report" in ANNEX-4.

If an aquaculture certificate is issued for the first time, only the “Fish Farm Inspection Report” will be sent to the Ministry and the aquaculture documents will be filled in by the Ministry and sent to the Provincial Directorates after approval. The validity period of the aquaculture documents is limited to the rental period and the lease transactions of the entrepreneurs will be checked by the Provincial Directorates.

The old certificates are still in force and will be sent to the Ministry with the necessary documents by the Provincial Directorates to be replaced with the new document on the first visa date. During the visa of the documents, leases will be checked.

6- Principles of implementation of Article 11 (e) of the Aquaculture Regulation (Supplementary Article: 2006/1):

Entrepreneurs who want to make changes in the quantities of the species to be produced without changing the approved project, related to the species specified in the project, the project capacity remains the same due to economic reasons such as supply-demand, offspring and sales prices; they have to get permission from the Provincial Directorates with the petition they attach to their annual production planning before that production season. This situation will be reported to the Ministry within 15 (fifteen) days.

7-Implementing Principles of Article 14 (a) of Fisheries Breeding Regulation:

In addition to the Aquaculture Regulation ANNEX-9;

- Trade registry newspaper sample of legal entities who want to take over the project,
- Signature circular of the person or persons authorized by the person who wants to take over,
- Authorization certificate sample,
- Copy of the company's establishment document.

In order to transfer of the aquaculture certificate to the new applicant, transfer permission, the lease agreements (water, area, etc.), will be issued by the relevant institution on behalf of the new applicant.

8- Principles of implementation regarding Article 17 of the Aquaculture Regulation:

Issues to be considered in leasing transactions;
The order, which determined the Procedures and Principles Regarding the Areas to be Leased by the Special Provincial Administrations numbered SÜDB / 250 11 10 11–426–1379 dated 30.01.2004, has been canceled and the principles to be followed in projects and non-project leases are as follows:

1- Leasing of Fisheries Production Areas will be made according to the "Communiqué on Leasing of Fisheries Production Places" published in the Official Gazette No. 25348 dated January 16, 2004.

2- Whether the aquaculture production areas will be opened for use for the first time with or without a project is determined by the Ministry's Central Organization with the proposal of the Provincial Directorates.

3- After the notification of the rental value (ANNEX-5) determined according to the lease notification (ANNEX-5) to the tenant every year, the provincial directorate is sent to the Ministry's Central Organization within 15 days.

9- (Amended: 2006/1) In accordance with the circular that regulates commercial fishing, the information regarding the origin and fishing areas that should be arranged for the fishing areas in inland waters, as requested in the Fishing Area Information Form in ANNEX-6, will be written taking into account the stock amounts, and if no certificate of origin has been issued, it will be indicated on the form. In this context, the instructions regarding the submission of documents of origin dated 02.03.2005 and numbered SÜDB / 250 11 10 12–819–2835 and the instructions registered in their interests were canceled.

10- (**Supplementary Article: 2006/1**) It is applied to the Provincial Directorates with a petition attached to the map where the coordinates are specified by the entrepreneurs who want to establish net ponds in the seas. These documents will be sent to the Ministry's Central Organization to obtain the necessary permission in terms of voyage.

11- (Additional Article: 2006/1) The short-term operation of the lagoons and net ponds without a project will be made in accordance with the principles of the Communiqué No: 2003/46 on the Lease of Aquaculture Production Areas published in the Official Gazette No. 25348 dated January 16, 2004.

12- (Additional Article: 2006/1) Operation of the lagoons and net ponds as projects will be done as follows:

i) 6 months before the end of the lease term, in order to ensure the sustainable use of the lagoons, it is announced in accordance with the Communiqué No. 2003/46 on Leasing Fisheries Production Sites.
ii) The applications made are evaluated by the Provincial Directorates and those deemed appropriate are sent to the Ministry together with the project summaries.
iii) Preliminary permission is granted to those who are eligible for applications submitted to the Ministry.
iv) Projects to be prepared by the entrepreneurs within 3 months at the latest after the preliminary permit is submitted to the Provincial Directorates.
v) Projects; It is examined under the chairmanship of the Provincial Directorate, with the participation of the University and Research Institutions, if necessary, by the Commission established at its location.
vi) The projects or projects deemed appropriate by the Commission are sent to the Ministry for evaluation together with the Commission report.
vii) Projects or projects approved by the Ministry are sent to the Provincial Directorates to be offered to participate in the lease tender to be opened by the Special Provincial Administration in accordance with the Communiqué No. 2003/46 on the Lease of Fisheries Production Areas.

The project of the applicant, who won the lease tender to be opened by the Special Provincial Administration, will be implemented and other preliminary permits and projects will be deemed to have been automatically canceled.

13. Implementing Principles of Fisheries Production Regulation Article 19 (Amended: 2006/1):

Applications regarding the import of fingerlings, eggs and breeders will be made to the Provincial Directorate for Aquaculture. The Circular numbered SÜDB / 250 11 10 12 / 2619–5589 on this issue was annulled.
According to this;
a) Import application; Plants with Fish Farming Certificates (Hatcheries can only import eggs and breeder), enterprises that have trial production permission and Universities and Research Institutions that want to import for scientific purposes.
b) Import applications are made with a petition to the Provincial Directorate (Annex – 7) where the enterprise is located.
c) Documents to be sent to the Ministry's Central Organization for import permission:

- Petition (ANNEX – 7);

It must be signed by the authorized person or notary, authorized personnel from the notary and company stamped,

- Control Certificate:
  - While preparing the Control Certificate, it should be prepared in 3 (three) copies by the company in the format in accordance with the principles of the Standardization Communiqué published every year and the G.T.IP number should be left blank,
  - It must be signed by the company's stamp and official or authorized personnel,
  - If signed by the company representative, the company signature circular is notarized and 1 (one) copy, if the control certificate is signed by the authorized personnel, a notarized copy of the notary and 1 (one) approved by the company,
- Invoice or Proforma Invoice;
  - Original and 2 (two) copies and certified 3 (three) copies translated into Turkish by sworn translation agencies,
- Health Certificate;
  - Original copy and 2 (two) copies and 3 (three) copies of them translated into Turkish by certified translation agencies,
- Certificate of Origin;
  - Original copy and 2 (two) copies and 3 (three) copies of them translated into Turkish by certified translation agencies,
- Requirement Document (ANNEX-8);

The amount of fingerlings, eggs and broods to be imported is determined by calculating according to the type and capacity in the fish farming document or the regulation made in accordance with the clause (e) of article 11 of the Regulation.

- Calculation of the product to be imported; In the import of the fingerlings, 4 individuals for 1 kg of production amount of the species to be imported, 5 eggs for 1 kg production amount in trout import, and the brood fish specified in the approved project for the brood import are taken into consideration.
- The amount of fingerlings, eggs and broods that will be imported annually will not exceed the amount calculated according to the type and capacity included in the aquaculture certificate of the facility. But; In accordance with Article 11 (e) of the Regulation, in case of a change in production planning, the final situation will be taken into consideration.
  - Trade Registry Gazette;
    - 1 (one) copy of the related company's announcement in the trade registry newspaper,
  - Fish Farming Certificate;
    - 1 (one) copy of the farming document of the relevant company
  - Commitment (ANNEX-9);

- All documents are true and as it is original,
- Letter of undertaking to be prepared not to use the material written in the control document other than its intended purpose.

10-Implementing principles for Article 20 (a) of Aquaculture Regulation:

(Amended: 2006/1) Aquaculture facilities, according to their project capacities, will employ at least 4 years of Faculty graduates providing training on fisheries or technical staff who have worked in the public for at least 5 (five) years. According to this; At least 1 for 50-249 tons / year, at least 2 for 250-499 tons / year, at least 3 for 500-749 tons / year, at least 4 for 750-999 tons / year, and 1000 tons / year and more at least 5 technical staff will be employed in the above facilities. The facilities that are still in operation will also employ technical personnel in accordance with this requirement within 6 months from the date of implementation of the Fisheries Breeding Regulation Implementation principles.

(**Additional Article: 2006/1**) The official letter (s) received from the relevant institution (s) will be taken as basis in order to employ 5 years of public service in the facilities.

One copy of Fish Farming Regulation ANNEX:10 will be sent to the Ministry's Central Organization within 15 (fifteen) days after delivery to the Provincial Directorates.

ANNEX 3

TARSIM-INSURANCE SYSTEM FOR AQUACULTURE BUSINESS IN TURKEY

GENERAL CONDITIONS - 2019

A. SCOPE ON INSURANCE

A.1. Subject of Insurance

(1) With this insurance, by the decision of the President pursuant to Article 12 of the Agricultural Insurance Law no 5363, Agricultural Insurance Pool hereby provides coverage for such aquaculture species cultivated in facilities registered to Aquaculture Registration System, cages and nets which is directly caused by the risks mentioned in Article A.2 according to the principles and conditions mentioned below.

(2) The covered risks are stated on the policy.

(3) For the purposes of applying this general condition, Aquaculture Insurance Tariffs and Instructions are considered.

A.2. Commencement of Insurance Coverage and Scope of Coverage

A.2.1. Aquaculture:

(1) Sum insured is the highest monthly stock value declared by insurant/insured in aquaculture plan. The cover commences after aquaculture products achieve the unit weights set out in the Tariff and Instructions.

(2) With regard to the aquaculture products covered by this insurance, losses due to deaths and material damages arising from;

a) Any kind of disease except the diseases set out in paragraphs (a and b) of clause A.3,
b) Pollutions and poisonings beyond control of the fish farmer,
c) Storm, whirlwind, earthquake, flood,
d) Accidents,
e) Predators,
f) Algae bloom

are covered.

A.2.2. Cage and Nets:

(1) Sum insured is the value of cage and nets declared by insurant/insured optionally.

(2) With regard to the cage and nets covered by this insurance, losses arising from;

a) Storm, whirlwind, earthquake, flood,
b) Accidents,
c) Predators,

are covered.

A.2.3. Stock Growing Period in Scope of Coverage

(1) Aquaculture stocks in egg and larva periods are not covered. This coverage commences when trout, sea bream, sea bass, granyoz, porgy, red band seabream, umbra, blue spotted seabream, black spot seabream, litrini seabream, common seabream and sturgeon gets 5 gr or bigger. For other species, commencement of coverage may be determined by Agricultural Insurance Pool Board.

(2) This coverage is limited with the capacity given by Ministry of Agriculture and Forestry.

A.3. Exclusions

(1) Losses attributable to or arising from the following events are excluded from the insurance coverage:

- Diseases which already exists before commencement of the coverage,
- Diseases (parasite, bacterial, microbial, viral and fungus) which occurs during the waiting period which is 14 days following the commencement date,
- Egg and larva period of stocks and first 5 days of tiddler's arrival to the facility,
- Wrong and insufficient feeding,
- Poisonings due to wrong stocking of the feeds in the facility,
- Intentional acts and faults of the insurant/insured or person in charge of the facility,
- Indirect damages following the occurrence of covered risk,
- Use of drugs and chemical substances (with utilization permit) in defiance of user manual, h) Use of drugs and chemical substances (with no utilization permit),
- Insured's failure to comply the treatment program recommended by specialists,
- Wounds and scars to be caused by use of wrong net in the cages or incorrect classification (grading) of the fishes,
- Decrease in flow rate of water in land pools (below the level declared by the insured) due to the acts of the fish farmer,
- Corrosion, wear or disfunction in mechanical or electrical equipment, facilities or installations (whether this installation or equipment is insured or not),
- Losses which occurs during transportation for any reason,
- Failure or gross negligence of management in arranging due maintenance for mechanical or electrical equipment, facilities or installations (whether this installation or equipment is insured or not),
- Instant changes of water temperature or salt level due to the acts of the management, n) Stocking beyond the declared storage volume,
- Cannibalism,
- Theft,
- Losses due to defective labor/material or use of incomplete material/labor in cages nets, t) Death and killing arising from the actions taken by the public authority over any insured aquaculture product,
- All losses caused by strikes, lockouts, civil commotions and uprising and willful misconducts and the military and disciplinary actions necessitated by them,
- Losses attributable to terrorism acts defined in Anti-Terrorism Law no 3713, including losses attributable to biological and/ or chemical contamination, pollution or intoxication, and sabotages attributable to these actions or actions and responses by competent authorities to prevent such events and to mitigate their effects,
- All losses attributable to war, state of war, invasions, foreign enmities, skirmishes (regardless of whether state is declared war or not), civil war, revolution, uprising, insurrection, revolt and the military and disciplinary actions necessitated by them, u) Losses and damages attributable to radiation or radioactivity contamination arising from a nuclear fuel or from nuclear wastes as a result of the combustion of nuclear fuel or any reasons attributable to them or to any military or disciplinary actions required for them (the term "combustion" as used in this subparagraph also covers any self-sustaining nuclear fission).
- Cage nets older than 12 years.

A.4. Calculation of Insurance Premium

(1) Deposit/provisional - premium is calculated by multiplying monthly average stock value declared in the aquaculture plan and premium rate. At expiry of the policy; necessary premium adjustment is made according to the premium calculation made based on monthly average stock values realized during cultivation period. Attached Tariff and Instructions are taken into consideration for determination and payment of deposit and final premium.

(2) Final premium amount is calculated by applying premium rate and the average sum insured to be calculated on realized monthly product stock lists. Agricultural Insurance Pool or insurant/insured have a right to refund of the difference between final premium to be calculated at the expiry of the insurance coverage and deposit premium collected in advance. If monthly product stock lists have not been sent for an insurance contract in force, the insurer makes premium calculation based on the highest sum insured declared in the aquaculture plan.

A.5. Deductible and Coinsurance

(1) It may agree not to compensate the part of the occurred loss, corresponding to a certain percentage or amount of the sum insured.

(2) In addition to the deductible set out in the first paragraph, it may agree upon participation of the insurant in the loss by a certain co-insurance percentage.

(3) Established deductible and co-insurance percentage is indicated on the Tariff and Instructions and on front side of the policy.

A.6. Acceptance of Insurance Application

(1) Agricultural Insurance Pool confirms the preliminary information form which is filled up by insurant/insured by Aquaculture Information System and according to the risk inspection result; policy shall be accepted and be issued.

(2) After the risk inspection, risks found unwarrantable by Agricultural Insurance Pool shall not be assured.

(3) In case there is discrepancy between the declaration of insurant/insured and the information in Aquaculture Information System, the policy can be issued upon update of the information in Aquaculture Information System.

A.6.1 Aquaculture Plan

Insurant/insured shall present Aquaculture Plan (annex:1) to insurer during application.

A.6.2 Hygiene & Care

Aquaculture product to be insured must be physically perfect and healthy and not injured at the commencement date of insurance period. It is essential for the insured to show due care to aquaculture all the time.

A.6.3. Suitability of Aquaculture Facility

(1) In order to insure the aquaculture products; pool, tank or cages in the aquaculture facility must have built or mounted in accordance with the project and their suitability must have been approved and certified by authorities.

(2) In aquaculture production following conditions are compulsory;

- Water quality should suit for species reared in the facility, providing spare pump and generator (functional all the time) in facilities which water is supplied by stream and pumps, -use of filter etc. equipment to remove rough materials involved in water in such aquaculture facilities where water is supplied by streams and cleaning them at least once a day.
- Draining channel should be built in such facilities that live on by streams, providing warning lights and luminous water-gauges for sea traffic, taking necessary measures against predators; cage connections should be consistent with recommendations of the manufacturing firm.
- In ground ponds;
  - The amount of oxygen should be at least 6-8 mg / lt,
  - Changes in the water percentage in 24 hours should be at least 50%,
  - top edges of the side walls of the pool to be inclined by 45%,
  - The ponds should not be fed by the basement water,
  - Floor drainage pipes to be sufficient length (according to length of the pools 3-6 meters),
  - Channels should be opened in sufficient size and width,
  - Level of floor drain pipes and water level of drain channels should not be the same,
  - Drain pipes of the pool should be higher level than the discharge pipe of the Public Waterworks Administration, etc.,
  - The water in the discharge channels due to winter rains should not mix with the water of the pool,
  - Keeping sufficient number of pool aerator according to the size of the fishes against oxygen level decrease,
  - Taking necessary precautions in the basement or the side walls of the pool against oxygen decrease at night for the moss,

- Providing spare drilling wells against reduction of water amount entering to the pool,

- Vibrogen

2 vaccination to the sea bass,

- The color of the water to be followed regularly against algae blooms and oxygen values.
- Providing generator and to take effect automatically against power failure,
- To provide warning alarm and ring assembly against power failure.

A.7. Commencement and Expiry of the Insurance Coverage

Insurance coverage shall become effective at such hour when the policy is executed and shall expire at the same hour on such dates that are stated on the policy as the commencement date and expiry date unless otherwise is agreed.

A.8. Excess Insurance

If the sum insured exceeds the value of the insured benefit, part of the insurance over this value becomes invalid. Agricultural Insurance Pool who becomes aware of the situation during insurance period, notifies the insured and reduces part of the sum insured and premium corresponding to this excess amount and returns the surplus to the insured.

A.9. Under Insurance

If the sum insured set out on the policy is below the value of the insured benefit as of time of damage, unless there is a contrary contract, Agricultural Insurance Pool is responsible for the loss in proportion of the sum insured to the insurance value.

B. LOSS and INDEMNITY

B.1. Obligations of Insurant/Insured in Case of Risk Occurrence

(1) In case of risk occurrence the insurant / insured is obliged to complete the following points; claim notification by informing the following information to insurer/agency, Agricultural Insurance Pool or the addresses stated in the policy within 24 hours after became aware of the risk occurrence;

- Name, surname and address,
- Turkish Citizenship Number or insurance policy number,
- Day and time of risk occurrence,
- Reason of loss, Information about damaged aquaculture product,
- Full address of the area where the risk occurred.

(2) Upon request of the Pool, insurant/insured is obliged to submit Agricultural Insurance Pool or loss adjuster such information and documents useful for detailing reasons of risk occurrence and finding loss amount and evidence as well as sample to be taken from dead fish (kept in an ice bucket) without delay.

(3) The loss adjustment is done by loss adjusters appointed by Agricultural Insurance Pool. (4) Agricultural Insurance Pool may change the location where claim notification shall be given by notifying the insured.

(5) For the purpose to be able to make the payment in fire loss, insured is obliged to provide prosecution final decision and to present it to Agricultural Insurance Pool.

B.2. Protection Measures and Recovery

(1) The insurant/insured shall be obliged to take the necessary precautions in order to prevent, mitigate or to reduce the loss in case of risk occurrence. Within this scope insurant/insured is obliged;

a) to take necessary measures through a veterinary surgeon, agricultural and aquaculture engineer specialized in the field of aquaculture in case of disease or accident suffered by insured aquaculture products,

b) to give permission to Agricultural Insurance Pool or the loss adjuster to investigate/research the insured aquaculture products and related documents for determining the indemnity,

c) to give, all information and documents, which is necessary for determining the reason of risk occurrence in detail and useful for determining loss amount and evidences, to Agricultural Insurance Pool or the loss adjuster upon the request of Agricultural Insurance Pool without any delay.

(2) In case of an infectious disease is seen, the insured is obliged;

a) To separate the sick and healthy animals,

b) To inform sickness to Agricultural Insurance Pool and Ministry of Agriculture and Forestry province/district offices,

c) To take the necessary precautions determined by the Veterinary Services, Crop Health, Food and Fodder Law, Law Nr. 5996

d) to provide necessary care, feeding and protection conditions for insured aquaculture products,

e) To take the precautions that Agricultural Insurance Pool has advised after controls.

B.3. Rights of Agricultural Insurance Pool in Case of Risk Occurrence

(1) Agricultural Insurance Pool has the right to control the medical condition, qualification, rearing/feeding conditions of the insured aquaculture products by employees of Agricultural Insurance Pool or loss adjusters in a reasonable time if necessary.

(2) In addition; Agricultural Insurance Pool may terminate the contract within 8 days from the date of determination in case the following faults of insurant/insured are determined:

a) Lack of maintenance of the pool, cage and tanks,

b) Failure to provide water quality criteria required for the species grown in the facility,

c) Failure to provide hygiene and bio-safety measures, d) Failure of maintain and feed, e) Failure to provide measures required by The Law No. 5996 Veterinary Services, Crop Health, Food and Fodder Law.

B.4. Loss Adjustment

The reason, quality and amount of the loss is determined according to the determination of Agricultural Insurance Pool or loss adjusters, thereby agreement between parties.

B.5. Indemnity Calculation

(1) In calculation of indemnity, unit prices stated on the policy is taken as basis without prejudice over insurance and under insurance applications. In case the policy is with deductible, loss not exceeding the deductible is not paid

(2) In the calculation of indemnity, the portion of the loss amount that exceeds the deductible indicated in the policy is taken as basis.

(3) Calculation of indemnity is made according to the Tariffs & Instructions. After reducing the deductible calculated over the sum insured (at the time of loss), co-insurance is calculated over the remaining loss amount and deducted from the indemnity. Salvage value is deducted from the indemnity amount, cases mentioned in the Tariff and Instructions, if any.

(4) The amount of indemnity due and payable is paid upon the deduction of fault rate, if any, as indicated in the Agricultural Insurance Pool Loss Adjusters report or as assessed with reference to the content of report.

(5) The amount of indemnity due and payable is paid upon the deduction of fault rate, if any, as indicated in the Agricultural Insurance Pool Loss Adjusters report or as assessed with reference to the content of report.

B.6. Indemnity Payment

(1) After completion of the loss file, finalized indemnity amount is paid to the insured no later than 30 days.

(2) On the payment date, overdue premiums that are due and payable in connection with all policies of the insured/ insurant may be set off against the indemnity in line with the declaration of the related insurer.

(3) Indemnity payments shall be made to the name of the insurant/ insured via the bank. In case the paid indemnity is transferred back to the account of the Agricultural Insurance Pool because the insured fails to collect it during such time

necessitated by the banking transactions, the insured may not claim interest or additional loss indemnity based on the late payment.

(4) Losses that the insurant may suffer as a result of misinformation or incomplete information shall be indemnified by the insurer and all sales channels.

B.7. Reduction of Indemnity or Forfeiture of Indemnity Right

(1) In case of any increase in loss amount due to default off insurant/insured after risk occurrence, excess loss is deducted from indemnity payable.

(2) In case insurant/insured intentionally causes occurrence of certain risks or acts intentionally to increase loss amount, their rights arising from the contract are lost.

(3) In case monthly product stock list could not be sent according to the Tariff and Instructions and on the dates written on the policy, Agricultural Insurance Pool reserves its right to cancel the policy or not to pay indemnity in case of loss.

B.8. Results of Loss and Indemnity

(1) Agricultural Insurance Pool legally substitutes the insured in proportion of indemnity amount and legal rights of the insured arising from the damage against the third person revert to Agricultural Insurance Pool in proportion of the compensated indemnity. Insured is obliged to provide such documents and information which is useful and available for any actions to be substituted to the Agricultural Insurance Pool.

(2) This insurance cover expires upon occurrence of the covered risk.

B.9. Sum Insured to be taken as Basis in Premium and Indemnity Calculation

(1) Sum insured that is basis of premium and indemnity calculations is found by multiplying unit price (written on the policy) of the product achieved the size of sale by the rate corresponding to the unit weights in the assessment chart set out in the annex to the policy.

(2) Sum insured stated in the policy for cage and net; from the purchase or establishment of cage and net, 15% depreciation ratio will be applied each year. Depreciation rate of cage and nets does not exceed 30% of the sum insured. Nets older than 12 years may not be insured but for cages there is no age limit.

1. Highest Stock Volume

Aquaculture stock volumes cannot exceed the values set out below.

Table 1. Aquaculture Stock Volume

Fish Species	Maximum Stock Volume (kg/m3)
Trout (300 gr):	25
Sea Bream (300 gr):	20
Sea Bass (300 gr):	20
Sea Bass / Sea Bream (Ground Pools)	5
Tuna	5
Granyoz, Porgy, Red band seabream, white seabream, Sharp snout seabream, Umbra, Blue spotted Seabream, Black Spot Seabream, Litrini seabream and Common Seabream (up to 100 gr)	5
White Seabream (above 100 gr):	8
Granyoz, Porgy, Red band seabream, white seabream, Sharp snout seabream, Umbra, Blue spotted Seabream, Black Spot Seabream, Litrini seabream and Common Seabream (above 100 gr)	15
Other Species	To be determined according to the characteristic of species.

2. Premium Calculation

(1) Deposit-provisional-premium is calculated by multiplying the monthly average sum insured declared in the aquaculture plan by the tariff rate.

(2) Final premium amount is calculated by applying insurance tariff rate to the average sum insured to be calculated on monthly product stock lists realized during aquaculture period. Premium difference to accrue in favor of or against the insurer or insured is collected or returned at the end of the policy period. In case premium amount to be returned exceeds 10% of deposit-provisional premium amount due to declared monthly stock values and accuracy of monthly stock details has not been certified by the insured, the part exceeding 10% of deposit-provisional-premium amount won't be returned. If monthly product stock lists have not been sent and the policy has not been cancelled, the insurer calculates the premium on the average sum insured declared in the aquaculture plan.
(3) Premium of cage and nets is calculated by multiplying separately determined sum insured of cage and nets by their premium rate.
(4) Minimum premium amount may not be less than TL 30.

3. Tariff Rate, Deductible and Coinsurance

(1) Risk category, tariff rate and deductibles related to Tariff 1 are applied as below:

Table 2. Tariff 1: Policies in which Deductibles are applied over Total Sum Insured

Species	Risk Category and Tariff Rate (%)				Deductible (%) (over Total Insured Sum)	Co-insurance (%) (insured' s share)
	1	2	3	4		
Sea or Lake based Farms (Seabream, Sea Bass, Granyoz, Trout- Reared in PE cages)	2,5	3,5	4,5	Non-insurable	5	0
Land based Farms (Trout-reared in pond, Seabass-Seabream soil pond)	3,5	4,5	5,5	Non-insurable	5	0
Tuna	3	3,5	4,5	Non-insurable	15	0
Sea Farm (Porgy , White Seabream, Red band seabream, White Seabream, Sharp snout Seabream, Umbra, Blue spotted Seabream, Blackspot seabream, Litrini seabream, Common Seabream, Sturgeon and others)	2,5	3,5	4,5	Non-insurable	5	0
Cage and Nets	0,3	0,4	0,5	Non-insurable	5	0

(2) Risk category, tariff rate and deductibles related to Tariff 2 are applied as below.

Table 3. Tariff 2: Policies in which Cage-Based Deductibles are applied

Species	Risk Category and Tariff Rate (%)				Deductible (%) (over sum insured of each cage)
	1	2	3	4	
Sea or Lake based Farms (Seabream, Sea Bass, Granyoz, Trout- Reared in PE cages)	3	4,5	5,5	Non-insurable	15
Land based Farms (Trout-reared in pond, Seabass-Seabream soil pond)	4,0	5,0	6,0	Non-insurable	15
Tuna	4,0	5	6	Non-insurable	25
Sea Farms (Porgy, White Seabream, Red band seabream, White seabream, Sharp snout Seabream, Umbra, Blue spotted Seabream, Blackspot seabream, Litrini seabream, Common Seabream, Sturgeon and others)	3,5	5,0	6,0	Non-insurable	15
Cage and Nets	0,4	0,5	0,6	Non-insurable	15

4. Short Term Premium Tables

(1). Collection rate will be applied as below in case policy cancellation.

Table 4: Short Term Premium Table Applicable in Insurance Cancellation

Policy period (%)	Collection Ratio on Total Premium (%)
Up to 1,91	0
In between 1,92 and 4,10	10
In between 4,11 and 8,22	20
In between 8,23 and 16,6	30
In between 16,7 and 25	40
In between 25,1 and 33,3	50
In between 33,4 and 41,6	60
In between 41,7 and 50	70
In between 50,1 and 58,3	80
In between 58,4 and 66,6	90
More than 66,6	100

(2) Premium will not be charged for cancellation of insurance which will be made within 7 days from the policy issuance.
(3) Premium will not be refunded for cancellation of insurance which made after two-thirds of the policy period.
(4) Normal policy period is considered as 210 days for tuna fish and 365 days for other fishes. It is calculated on the premium applied to the policy in such extensions following expiry of tuna policies on a daily basis.
(5) For the short term policies collection rates will be applied as in Table 5:

Table 5. Short Term Insurance Premium Table*

Policy Period (%)	Collection Percentage on Total Premium (%)
Up to 17,7	30
Between 17,8 and 25	40
Between 25,1 and 33,3	50
Between 33,4 and 41,6	60
Between 41,7 and 50	70
Between 50,1 and 58,3	80
Between 58,4 and 66,6	90
Above 66,6	100

(*) TARSIM is not liable for the proper and complete translation of the text. In case of any translation mistake; general and technical conditions written in the original policy language is in force.

5. Loss Event Periods

(1) Loss event periods according to the risks and diseases will be applied as below in Table 6.

Table 6. Loss Event Periods

Covered Risks	Period of One Loss Event
Diseases	45 days
Other risks	3 days

(2) Deductibles are applied for each loss event defined separately.

6. Discounts

(1) In a year following a free of damage period in case policy renewal, no claims bonus will be applied as 10% over tariff rate.
(2) The right to discount earned due to the policy renewal is valid for 15 days from the expiry date of the policy.

(3) In case the premium amount is fully paid in advance, a 5% discount shall be applicable from the total premium amount.
(4) In case the farmer taking out the policy is 30 years old and below; "Young Farmer Discount" at the rate of 5% over the policy premium is applied.
(5) In case the person who takes out the policy is a woman; "Woman Farmer Discount" at the rate of 5% over the policy premium is applied.

7. Effectiveness

(1) This Tariff and Instructions shall become effective on 01/01/2019.

8. Insurance companies to be applied (Table 7)

Table 7. Designated Insurance companies for TARSIM applications for insurance

Aksigorta INC..	HDI Sigorta INC..
Allianz Sigorta INC..	Koru Sigorta INC..
Anadolu Sigorta .INC..	Mapfre Sigorta INC..
Ankara Sigorta .INC..	Neova Sigorta INC..
Axa Sigorta INC..	Ray Sigorta INC..
Bereket Sigorta INC..	Quick Sigorta INC..
Doğa Sigorta INC..	Sompo Japan INC.
Eureko Sigorta INC..	Şeker Sigorta INC..
Generali Sigorta INC..	Unico Sigorta INC..
Groupama Sigorta INC..	Ziraat Sigorta INC..
Güneş Sigorta INC..	Zurich Sigorta INC..
Halk Sigorta INC..	

9. Tariffs With Exemption From Total Insurance Fee (*) (Table 8, 9, 10, 11)

Table 8. Tariffs With Exemption From Total Insurance Fee (*)

Product	Capacity (tons)	Insurance Cost (TL)	The premium amount to be paid by the farmer (TL)		
			Risk Categories		
			1	2	3
Trout	100	1000000	12500	17500	22500
Sea bass-sea bream	100	1800000	22500	31500	40500
Bluefin tuna	100	5000000	75000	87500	112500
Cages and nets	10 pieces(30m)	800000	1200	1600	2000

(*) calculated on the basis of lake and sea farms

Table 9. Tariffs exempted on cage / pool basis

Product	Capacity (tons)	Insurance Cost (TL)	The premium amount to be paid by the farmer (TL)		
			Risk Categories		
			1	2	3
Trout	100	1000000	15000	22500	27500
Sea bass-sea bream	100	1800000	27000	40500	49500
Bluefin tuna	100	5000000	87500	100000	125000
Cages and nets	10 pieces(30m)	800000	1600	2000	2400

(*) calculated on the basis of lake and sea farms

Table 10. Tariffs for exemptions applied over the total insurance cost

Product	Exemption (%)	Common insurance (%)

	(over total insurance cost)	(Share of insured person)
Sea and lake farms (Sea bass, sea bream, meagre, trout in PE cages)	5	
Farms on land (trout in ponds, Sea bass, sea bream in earthen ponds)	5	
Bluefin tuna	15	
Sea farms (common dentex, white sea bream, red banded Seabream, sharpsnout seabream, Bearded umbrine, blue spotted seabream, arrow blue eye, red porgy, common pandora, pink dentex, sturgeon, others)	5	0
Cages and nets	5	

Table 11. Tariffs exempted on cage / pool basis

Product	Exemption (%) (over insurance cost of each cage)	Common insurance (%) (Share of insured person)
Sea and lake farms (Sea bass, sea bream, meager, trout in PE cages)	15	
Farms on land (trout in ponds, Sea bass, sea bream in earthen ponds)	15	
Bluefin tuna	25	
Sea farms (common dentex, white sea bream, red banded Seabream, sharpsnout seabream, Bearded umbrine, blue spotted seabream, arrow blue eye, red porgy, common pandora, pink dentex, sturgeon, others)	15	0
Cages and nets	15	
Guarantee	Common insurance (%)Share for insured person)	
Optional theft coverage	30	