

**SUSTAINABLE MANAGEMENT OF TURBOT  
*PSETTA MAXIMA MAEOTICA* L.  
RESOURCES AT THE ROMANIAN  
BLACK SEA LITTORAL**

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**ABSTRACT**

The turbot (*Psetta maxima maeotica*), a demersal species that populates the continental shelf found under the Romanian jurisdiction at the Black Sea, represents an important segment of the fishing potential of commercial interest, demanded on the internal and international market. Black Sea turbot populations should be preserved for ecological, biological and economic reasons.

According to the present state of the fisheries the improvement and financial support of the reorganisation of the activities also ensuring a sustainable fishing are required, taking into account the environment protection, social development and economical welfare aspects. Romania is interested in protection of the turbot resources and in preservation of the customs of the fishermen communities and in their social and economical development for stabilisation of the turbot population from the coastal zone.

For the protection and preservation of this valuable species, management measures are required, especially adapted to the conditions on the Romanian littoral. This paper evidences technical and legal demands necessary to promote fishing activities in the Romanian Black Sea sector.

Financial support by the EU, should be directed to the fishing organisations which practice the coastal fishing and small scale operators, in following respects:

- technological innovations regarding the selection of fishing techniques and equipment;

- promoting the establishment of a production - processing - commercialization chain of fishing products;
- improving professional training and formation;
- improving the activities regarding the administration and control of the access condition in certain fishing areas;
- encouraging measures for the reduction of the fishing effort with the aim of protecting the resource;

**KEY WORDS:** management, Black Sea, turbot, resources, vessel, fishing techniques, catch, professional training and formation

## **INTRODUCTION**

Management of fishery resources is an integrated process of information gathering, analysis, planning, consultation, decision making, resource allocation and formulation and implementing regulations or rules that will govern fishing activity in order to ensure continued productivity of resources and achievement of revenue and other goals.

In the marine context, sustainability refers to both the resources and the fishing activity and their exploits be considered a resource that supports and sustains the fisheries resources which are in many respects independent objectives. In addition, it should consider the fact that besides fishing other human activities as well as natural changes affects the marine environment and in consequence limits the marine bioresources.

Data and information are necessary for formulation of fishery management plans, preparation and determination of management actions. So it is important for the management to ensure that data collected are analyzed properly, disseminated and used best in decision making process.

The authors propose that based on their research and documentation, to contribute to the development of scientific support necessary to develop a strategy for turbot resource management in the Romanian Black Sea sector.

## **MATERIAL AND METHOD**

Methodology and techniques that were used for collection, check, processing and analysis of data and for assessment of fish stocks are generally accepted for the Black Sea basin and in accordance with international methodology.

The quantitative catches of turbot were achieved by pooling, the time data obtained from the companies profile and interviews with fishermen. Fishing effort (vessels no. / poundnets no / trawls no. / hours number per trawl / nets no. / fishing days) was obtained from data companies, collected by of the National Agency for Fishing and Aquaculture (NAFA) inspectors.

## **RESULTS AND COMMENTS**

### *Current status of marine fisheries*

Marin fishing in the area of the Romanian coast of the Black Sea is carried out in two ways:

- Fishing vessels with coastal trawler, type *B-410, Baltica, TCMN*, other types, equipped with pelagic trawls and turbot gillnets, active offshore, at depths over 20 m.
- Fishing practiced along the coastline in the 28 fishing points between Sulina and Vama Veche, in the coastal area at small depth (3.0 to 11.0 m) with fixed gear (poundnets, gillnets, longlines, trammelnets and beach seine) and up to 40 to 60 m, with turbot gillnets and longlines.

### *Fishing with turbot gillnets, practiced by trawler vessels*

Although Romania is a coastal country to a landlocked sea, with a coastline of 244 km, in the last decade the new conditions of fishing practice, with the ceasing of state subsidy to the principles of alignment and competitive economy, have led to radical changes in national marine fisheries. However, the competition created by the opening of imports on fishery products, especially imports of frozen fish, the lack of experience of exploitation under the new conditions, the aging fishing fleet and especially the rising cost of fuel and maintenance have led to a drastic involution of active fishing in the Romanian Black Sea waters.

Year after year the activity of active fishing decreased gradually, to the point were in 2008, from more than 20 vessels that have entered in the Fishing Fleet Registry, only four vessels were specialized in turbot fishing: *Dragon*, *Hendem Mustafa*, *Meduza 4* and *Chefalul 10* (Fig. 1, Table 1).



DRAGONUL

HENDEM MUSTAFA

Fig. 1 – Types of coastal trawlers equipped for turbot fishing

Table 1 – Vessels, catch and fishing gear used in turbot fishing, between 2006 – 2008

<i>Operator</i>	<i>Vessel</i>	<i>Activity period</i>	<i>Catch (kg)</i>	<i>Gill net</i>	<i>Crew (no.)</i>
<b>Y E A R 2 0 0 6</b>					
<i>Blue Balena Trading</i>	<i>Hendem Mustafa</i>	II - XII	5,670	500	10
<i>Euromabile</i>	<i>Meduza 2</i>	V - X	310	50	7
<i>Fishing Meridian</i>	<i>Chefalul 6</i>	V - XI	30	10	6
<i>Miadmar</i>	<i>Meduza 4</i>	IV - X	15,560	70	7
<i>Dunaraf Trans</i>	<i>Chefelul 10</i>	IX XII	6,842	500	6
<i>Brivas fish</i>	<i>Dragonul 1</i>	IV - IX	1,727	450	7
<i>Morunul</i>	<i>Morunul</i>	IX	-	-	7
<b>T O T A L</b>	<b>7 vessels</b>	<b>II - XII</b>	<b>30,139</b>	<b>1,580</b>	<b>50</b>

<i>Operator</i>	<i>Vessel</i>	<i>Activity period</i>	<i>Catch (kg)</i>	<i>Gill net</i>	<i>Crew (no.)</i>
<b>Y E A R 2 0 0 7</b>					
<i>Blue Balena Trading</i>	<i>Hendem Mustafa</i>	II - XI	16,881	500	10
<i>Euromabile</i>	<i>Meduza 2</i>	III - VII	594	200	6
<i>Fishing Meridian</i>	<i>Chefelul 6</i>	V - X	14	10	5
<i>Miadmar</i>	<i>Meduza 4</i>	IV – VII	6,000	234	7
	<i>Flamengo 4</i>	V – X	888	100	6
<i>Dunaraf Trans</i>	<i>Chefelul 10</i>	VIII – IX	9,200	500	6
	<i>Chefelul 12</i>	VIII	388	200	6
<i>Brivas fish</i>	<i>Dragonul 1</i>	III - VIII	2,542	250	7
<i>Smart Fish</i>	<i>Yildirimilar 1</i>	III - VII	1,278	500	5
<b>T O T A L</b>	<b>9 vessels</b>	<b>II - XI</b>	<b>37,785</b>	<b>2,494</b>	<b>56</b>
<b>Y E A R 2 0 0 8</b>					
<i>Blue Balena Trading</i>	<i>Hendem Mustafa</i>	II – VIII	8,032	1,000	10
<i>Brivas fish</i>	<i>Dragonul 1</i>	III - VII	2,837	200	7
<i>Miadmar</i>	<i>Meduza 4</i>	IV - VIII	3,395	250	6
<i>Dunaraf Trans</i>	<i>Chefelul 10</i>	VIII – IX	26,791	500	6
<b>T O T A L</b>	<b>4 vessels</b>	<b>II -IX</b>	<b>41,055</b>	<b>1,950</b>	<b>29</b>

*Fishing with turbot gillnets, practiced by boat*

In the shallow coastal zone of the marine Romanian sector with small depth, fishing with fixed gears is characterized by the concentration of activity in the first three to four months of the season (April-July), when usually the turbot approaches the coast for reproduction and feeding. Fishing is being practiced along the coast, between Sulina and Vama Veche, in the 28 fishing points along the Romanian coastline (Table 2).

In the purpose of practicing a specialized turbot fishing for, licences for a number of about 120 vessels (69 motor-engine) and over 100 individuals have been released. They are using 889 boats, 24-30 poundnets and about 1,500 - 1,750 nets of skate / turbot gillnets, 10 beach seine and a staff of approximately 370 fishermen.

The capture level and the level of fishing productivity differs from one year to another, depending on the fishing effort (number of poundnets, number of turbot gillnets and effective fishing days), on the evolution of hydroclimatic conditions and, last but not least, on the state of turbot stocks (Table 3).

Table 2 - Number of vessels and fishing gears involved in the activity of marine demersal fish (turbot) in the period 2006 – 2008

No	Fishing point	Boats			Fishing gears			No. pers.
		Total	with smo	with sout	trap net	gill net	beach seine	
1	<i>Sulina</i>	2	2	-		100	-	3
2	<i>Sf. Gheorghe</i>	1	1	-	1	100	1	3
3	<i>Perișor</i>	3	-	3		10		8
4	<i>Periboina</i>	3	-	3	1	15	-	20
5	<i>Edighiol</i>	2	-	2		20	1	20
6	<i>Chituc cherhana</i>	4	3	1		-	-	2
7	<i>Vadu</i>	5	3	2	2	150	-	10
8	<i>Corbu</i>	3	-	3	1	212	1	7
9	<i>Cap Midia</i>	4	1	3	2	50	1	10
10	<i>Cap Midia cherhana</i>	6	3	3	2	50	-	12
11	<i>Tabăra Năvodari</i>	4	4	-	1	60	-	8
12	<i>Mamaia sat</i>	6	3	3	6	50	1	12
13	<i>Mamaia pescărie</i>	5	5	-	-	150	1	16
14	<i>Constanța Tomis</i>	2	2	-	-	50	-	5
15	<i>Agigea</i>	3	-	3	2	30	-	8
16	<i>Eforie Nord</i>	5	2	3	-	20	-	50
17	<i>Eforie Sud</i>	8	8	-	2	25	2	20
18	<i>Tuzla</i>	5	5	-	1	50	1	14
19	<i>Tuzla far</i>	3	1	2	1	20	-	6
20	<i>Costinești</i>	5	-	5	2	136	1	20
21	<i>Golful Francezului</i>	5	3	2	-	10	-	17
22	<i>Halta Pescaruș</i>	6	6	-	-	10	-	10
23	<i>Tatlageac (Olimp)</i>	6	5	1	2	25	-	12
24	<i>Jupiter Cap Aurora</i>	4	2	2	-	10	-	18
25	<i>Saturn</i>	3	-	3	-	10	-	16
26	<i>Mangalia</i>	6	6	-	-	100	-	20
27	<i>2 Mai</i>	6	4	2	2	20	-	15
28	<i>Vama Veche</i>	4	-	4	4	20	-	8
<b>T O T A L</b>		<b>119</b>	<b>69</b>	<b>50</b>	<b>30</b>	<b>1,503</b>	<b>10</b>	<b>370</b>

Table 3 - Black Sea turbot catches, by small boats,  
between 2006 and 2008

Operator / Association	Catches (kg)		
	2006	2007	2008
<i>Fructe de Mare</i>	0	23	113
<i>Marea Neagra Sud</i>	69	349	388
<i>Pescarii Dobrogei</i>	0	0	12
<i>Delfinul</i>	0	235	15
<i>Andreas Trading</i>	30	935	620
<i>Carmen Tina</i>	0	646	0
<i>Geofishing</i>	249	1,738	0
<i>Remico</i>	76	104	14
<i>Imperator</i>	68	0	0
<i>Bindar Co</i>	476	138	0
<i>Florio Fish</i>	0	668	0
<i>Mircom Impex</i>	0	110	296
<i>Miti &amp; Luiza</i>	0	5	0
<i>Efomarin</i>	0	124	300
<i>EfoDame</i>	0	15	245
<i>Mademar</i>	3	132	131
<i>Marimar VB</i>	40	0	26
<i>Sponte</i>	489	0	0
<i>Stefyo Team</i>	0	0	10
<i>Fishing</i>	0	0	133
<i>Gartone Constantin</i>	0	0	220
<i>Pescarul</i>	0	320	0
<i>Giurgiu Dan</i>	67	657	33
<i>Ban Nicolae</i>	0	0	22
<i>Predusel Dumitru</i>	0	0	16
<i>Oncescu Gheorghe</i>	0	15	0
<i>Petrache Marin</i>	0	67	0
<i>Petrescu Florian</i>	33	0	0
<i>Constandache Marin</i>	0	0	250
<i>Stefan Tudor</i>	0	41	24
<i>Chefalu Sulina</i>	0	1,209	1,095
<i>Thalassa Sulina</i>	3,369	1,482	3,881
<i>Black Sea Sturgeon</i>	0	216	146
<i>Amorel Sulina</i>	0	0	40
<i>Sabfisch</i>	0	0	27
<i>Piscicola Razim</i>	0	1,050	0
<b>TOTAL</b>	<b>4,969</b>	<b>10,279</b>	<b>8,057</b>

In our opinion, the specialized turbot fishing in the Romanian coastal area faces many problems, which take in consideration the following key:

- adverse weather conditions which effects fishing activities;
- aging fishing fleet and increased fuel costs;

- lack of minimum conditions for safe navigation, hygiene and storage of fish;
- ineffective marketing and poor promotion of fishery products;
- weak organization of producers and fishermen;
- non-standard gears;
- low productivity;
- low training levels;
- low sanitary - veterinary control;
- inadequate vessels for marine fishing;
- lack of almost all mechanization of fishing operations;
- risks of accidents at sea;
- reduced diversity of fishery products;
- species of low interest for local processing;
- limited access to financial resources;
- lack of landing facilities;
- insufficient technical equipment and obsolete installations;
- inadequate working conditions.

#### *Catch, fishing effort and c.p.u.e*

The catches caught at the Romanian shore have always been dependent on the activity and the technology used for fishing.

After 2001, economic operators working in the fishing sector along the Romanian coast, have changed their options and interests, giving priority to vessel equipping with specialized fishing gears this for kind of species. Catches have slightly increased, from one year to another, being accomplished production of 12,327 kg / 2001 and over 40,000 kg / year in recent years (48,064 kg / 2007 and 47,112 kg / 2008) (Fig. 2).

The quantity of catches recorded by Romania in 2008 is one of the lowest in the last 10 years. This fact was due to the reduction of fishing effort (decreased number of poundnets, the number of trawlers and coastal default personnel involved in the fishing activity), as well as due to the increasing production costs and the influence of hydroclimatic conditions on fish populations. Even so, the turbot catches were the largest. They were close to the allocated Total admissible catch (TAC).

The 47,112 kg obtained in 2008 are the largest catch obtained by Romania in the last four years, being 30% higher compared to 2005 and 2006 and about 45% higher compared to 2007 (Fig. 2).

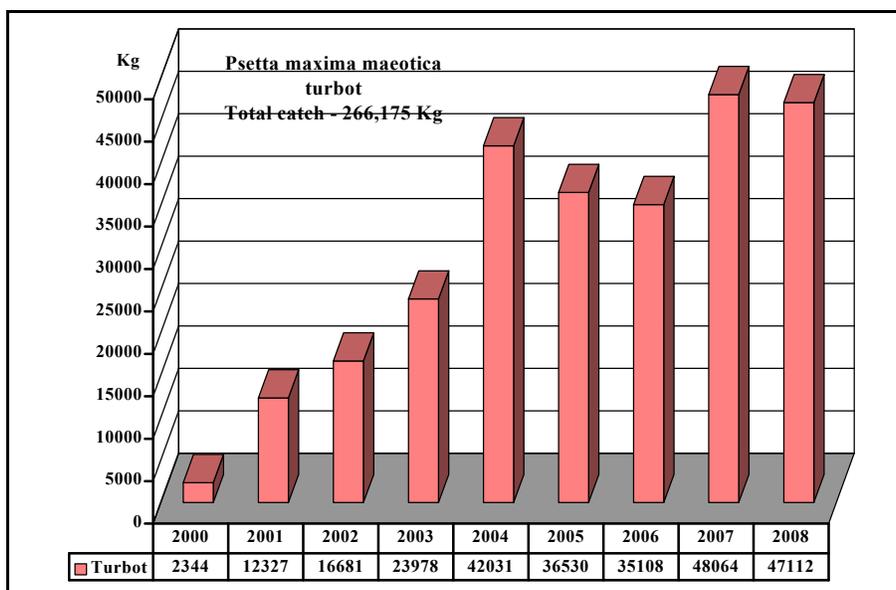


Fig. 2 - Turbot (*Psetta maxima maeotica*) catches between 2000 and 2008

The best periods for fishing are in from March to July and from November to December. Those intervals coincide with the formation of turbot agglomerations near the coast for breeding and feeding. In the other periods, the species are spreading across the entire Romanian Black Sea shelf (Fig. 3).

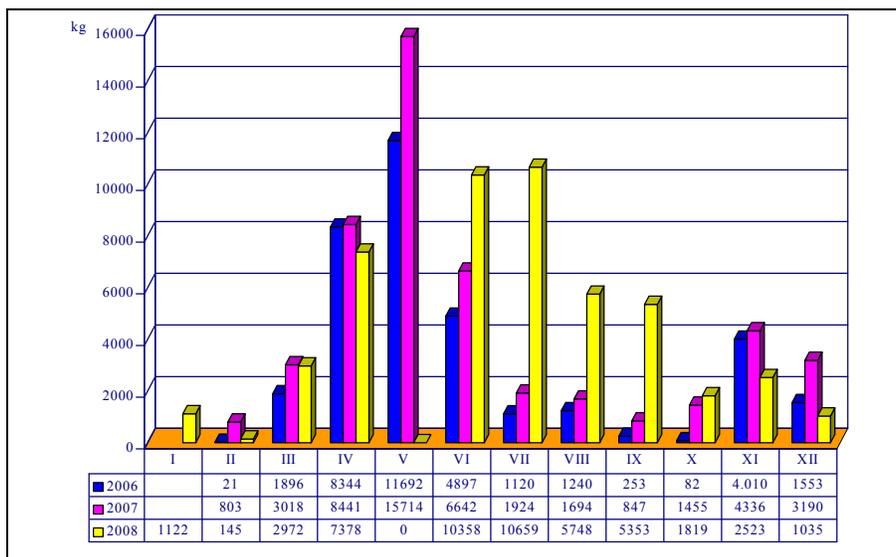


Fig. 3 - Capture of turbot (*Psetta maxima maeotica*), between 2006 and 2008

The average productivity obtained in 2008 reached 22.07 kg / gillnets, 265.47 kg / day, 9,972 kg / hour, in about 185 fishing days with 4,450 gill nets and 4925 hours of fishing (the interval in which the fishing gear was submerged) (Table 4).

Table 4 - Evolution of catches, fishing effort and c.p.u.e. in turbot fishing, in Romanian Black Sea sector, between 2001 and 2008

Years	Catch (kg)	E F F O R T			C. P. U. E.		
		no. gillnets	no. day	no. hours	kg / gillnets	kg/day	kg/hours
2001	<b>13.000</b>	980	100	2.400	13,265	130,00	5,416
2002	<b>16.681</b>	1.267	125	3.000	13,167	133,45	5,560
2003	<b>23.978</b>	2.765	150	3.600	8,672	159,85	6,660
2004	<b>42.031</b>	4.350	225	5.400	9,662	186,81	7,784
2005	<b>36.530</b>	3.856	205	4.920	18,94	178,19	7,425
2006	<b>35.108</b>	3.794	190	4.560	18,51	184,78	7,699
2007	<b>48.064</b>	3.788	192	4.608	25,38	250,33	10,431
2008	<b>49.112</b>	4.450	185	4.925	22,07	265,47	9,972

*Measures and recommendations concerning sustainable management of resources*

According to the present state of the fisheries the improvement and financial support for the reorganisation of the activities also ensuring a sustainable fishing are required, taking into account the environment protection, social development and economical welfare aspects. Romania is interested in protection of the turbot resources and in preservation of the customs of the fishermen communities and in their social and economical development for stabilisation of the turbot population from the coastal zone.

It is also important to develop fishermen communities and their involvement in the sustainable exploitation of aquatic living resources.

Financial support by the EU, should be directed to the fishing organisations which practice the coastal fishing and small scale operators, in following respects:

– *Technological innovations regarding the selection of fishing techniques and equipment*

- a. renewal and vessel modernization for improving the safety of navigation and to ensure the preservation of fishery products;
- b. vessel design for specific marine activities;
- c. providing small boats for fishermen, under 12 m length, built and adapted to the conditions of the marine environment;

- d. bonuses for young fishermen (under 40 years) who start for the first time this kind of activity;
- e. redesigning and improvement of fishing gears;
- f. clothes and gears manufactures;
- g. creating storage conditions for fishing products on board;
- h. equipments aimed at reducing the impact of fishing on the marine ecosystems and bottom;
- i. developing selective fishing tools;
- j. improving quality and safety of fish products, according to communitary quality and safety standards.

– *Modernizing and developing of fishing ports*

- a. infrastructure development in order to ensure a long term profitable and competitive fishing industry through the modernization of ports and landing points;
- b. improving landing conditions, take over and depositing fish products in ports or first selling points;
- c. when designing and building ports and landing points, must following conditions taken into consideration:
  - ensuring safe shelters and adequate installations for fishing ships, sellers and buyers;
  - ensuring enough fresh water resources;
  - ensuring the waste elimination systems (evacuation of the petrol products, water containing oil, fishing tools);
  - minimum level of pollution by sea activities and external sources;
  - fighting erosion and mudding effects.
- d. infrastructure for supplying services to ships and fishing boats;
  - fuel supply, materials, food and ice supply;
  - installations for maintenance and mending fishing boats and ships;
- e. endowment with boat-houses for improving safety in loading and discharging products.

– *Promoting establishment of production – processing – commercialization chain of fishing products*

- a. developing infrastructure with the aim of ensuring a profitable and competitive fishing industry on the long term, through modernization and construction of fishing harbors and unshipping points;

- b. increasing efficiency of fish processing and marketing activities, according to the requirements of consumers and to the food quality and safety standards;
- c. developing fish markets (stocks) and advertising campaigns for fishery products;
- d. financial support for development of fish markets infrastructure;
- e. increasing fish products consumption from 2.44 kg/inhabitant to 3.32 kg/inhabitant.

*Priorities*

- promoting commercialization of flat fishes with high alimentary value;
- applying quality promoting policy;
- promoting environmental friendly obtained products.

– *Improving professional training and formation*

Training aims at creating opportunities for the management implementation involving producers from the decisions adoption stage; Also, fishermen training concerns fish quality and safety improvement according to the Community standards for quality and food safety:

- a. training fishermen in order to acquire the minimal knowledge about living marine resources and their place in the ecosystem;
- b. creating the premises for implementation of a resource management involving with the participation of producers starting the decision-taking stage;
- c. implementing adequate training programmes for enhancement of work efficiency and productivity;
- d. developing programmes for fishermen training in other business than fishing;
- e. developing activities diversification to promote multiple jobs for fishermen.

– *Improving the activities regarding the administration and control of the access condition in certain fishing areas*

- a. for the protection, conservation and rehabilitation of the marine ecosystem a series of measures should be taken in order to prevent pollution of the coastal areas and are required some special measures to protect breeding and growing areas;
- b. to prepare management plans, the central public administration (NAFA), together with all interested groups, will investigate and analyze all

information on the implications of biological, social and economic strategies and different management options;

- c. fish management must take into account inter-annual variations of productivity, and needs to include them in its plans, fish availability must be treated very carefully not to be interpreted as changes in stock size.

- *Encouraging measures for reduction of fishing effort with the aim of protecting the resource*

Turbot fishing in the Black Sea is based on a special turbot fishing permits issued by NAFA. A boat may obtain special authorization for turbot fishing under following conditions:

- a. to be included in the index of ships and fishing boats;
- b. to hold valid fishing license;
- c. to pay taxes in force;
- d. to be equipped with turbot gillnets, with a side mesh size of at least 400 mm and marked in accordance with legal provisions;
- e. to have global positioning equipment (GPS) to mark the place where they are located and where turbot fishing gear are used;
- f. vessels greater than 15 meters to hold Black Sea fishing diary and ships / boats less than 15 meters to hold coastal fishing logbook;
- g. to have VHF communications equipment or GSM, as appropriate;
- h. have service contract with a center point of landing and first sale of the subordinated;
- i. was not involved in illegal fishing;
- j. to meet the work program of the center point of landing and first sale.

The obligations that vessels should have for special turbot fishing permits are:

- a. to comply the allocated area;
- b. to unload the caught fish on the given landing point center and to transport it obligatory to the center of first sale subordinated;
- c. to use tools (gill nets) side mesh  $2a = 400$  mm;
- d. to meet the minimum size for turbot, at discharge to be at least 45 cm;
- e. fishing diary to record the date and time of launching and positioning the turbot gillnets, position (latitude, longitude, depth) of installed tools and length of gillnets installed and the number of people involved in these activities;
- f. follow periods of prohibition of turbot fishing, the orders and prohibitions of annual EC Regulation No. 1287/2009 of 27 November 2009;
- g. telephone to announce at least 2 hours before departure time and two hours before arrival time.

- *Creating the necessary premises for development of specialized turbot fishing, along the Romanian coast, it is necessary:*

- a. renewal and vessel modernization for improving navigation safety and to ensure preservation of fishery products design;
- b. vessels for specific marine activities;
- c. equip fishermen with boats smaller than 12 m, designed, constructed and adapted to the marine environment;
- d. redesigning and improvement of fishing gears;
- e. clothes and gears manufactures;
- f. infrastructure development in order to ensure a long term profitable and competitive fishing industry;
- g. modernization of fish ports and landing points;
- h. professional training for fishermen for acquiring knowledge on minimum necessary living marine resources and their place in the ecosystem;
- i. development of downloading shelter for coastal fisheries in order to improve working conditions, discards and their conditioning before market capitalization;
- j. first-sale centers;
- k. implementing the European quality standards;
- l. financial support to fishermen and producers;
- m. improving the image of the fishery sector;
- n. socio-economic measures to help fishermen:
  - providing premium to young fishermen (under 40 years) which are starting for the first time a business in the fishing sector by purchasing a fishing boat / vessel;
  - programs for professional reconversion of fishermen in areas outside fisheries (tourism and ecotourism);
  - activity diversification in order to promote several occupations for fishermen.

- *Coordination at regional level of research activities, inter-calibration of sampling methods, data processing and interpretation*

- a. promoting special measures to eliminate illegal fishing practices in coastal areas and exclusive economic zone (EEZ);
- b. achieve an effective fishing inspection system;
- c. strengthening regional legal framework for sustainable management of fishing in the Black Sea through elaboration of legislative documents related to fishing;

- d. harmonizing development strategies of the fishing sector with those environment ones through implementing the concept of fisheries management based on ecosystem approach and the FAO Code of Conduct for responsible fisheries;
- e. initiating programs for evaluation of common trans-zonal fish stock.

## CONCLUSIONS

The present paper draws the turbot management at the Romanian Black Sea littoral in order to find ways to protect this valuable resource and to sustain its exploitation. Modern fisheries management is often referred to as a governmental system of appropriate management rules based on defined objectives and a mix of management means to implement the rules, which are put in place by a system of monitoring control and surveillance.

The main objectives of the turbot sustainable management are to: maximize sustainable biomass yield, maximize sustainable economic yield, secure and increase employment in coastal region, secure protein production and food supply, increase income from export, etc.

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