

SUMMARY REPORT

OF THE

WORKSHOP ON RESPONSIBLE FISHERIES IN THE BLACK SEA

AND AZOV SEA

AND

EVALUATION OF DEMERSAL RESOURCES

The UNDP-GEF Black Sea Ecosystem Recovery Project (BSERP) and Turkish Marine Research Foundation (TUDAV), one of the leading NGO's in Turkey focusing on research and project implementation on conservation of marine resources jointly organised the **'Workshop on Responsible Fisheries in the Black Sea and Azov Sea, and Evaluation of Demersal Resources'** from 15-17 April 2003, in Sile Istanbul. The Municipality of Sile hosted the Workshop. The European Commission- **Tacis Assistance to the Black Sea Environmental Programme** has also contributed to the Workshop through co-financing.

The Workshop aimed at reviewing the state of fisheries and other marine living resources of the Black Sea & the Azov Sea as well as their habitats; and formulating special recommendations for their management in an ecologically, economically and socially sustainable manner. The **Agenda** of the Workshop is provided in **Attachment 1**. The Workshop was attended by the representatives of Ministries in charge of fisheries management, members of the Advisory Group of the Black Sea Commission on Environmental Aspects of the Management of the Fisheries and Other Living Marine Resources, and scientists from all Black Sea coastal countries and international experts, including from specialised international organisations. The full **list of participants** are given in **Attachment 2**.

The Workshop consisted of two different parts; the session on the management of Black Sea fish and other living marine resources in view of the principles of responsible fisheries and ecosystem-based fisheries; and the scientific symposium on Demersal Fish Sources of the Black Sea and Azov Sea.

Prof. Dr. Sami Guclu, Minister of Agriculture and Rural Affairs of Turkey, and Mr. Mehmet Erkoç, Advisor to the Minister sent telegrams to the Workshop, expressing their support for increased cooperation between the Black Sea coastal states in the field of fisheries management, and their wish for the Workshop to yield concrete results for the benefit of the Black Sea and its peoples.

Mr. Ihsan Cayiroglu, the Mayor of Sile welcomed the participants to Sile, a beautiful Black Sea coastal town, whose economy is mainly based on tourism and fishing. Mr. Cayiroglu wished the meeting success, and the participants a nice stay in Turkey.

Ms. Sema Acar, Project Coordinator for the Black Sea Ecosystem Recovery Project, introduced the background on conservation of living marine resources and management of fisheries in the region, and beyond; and explained the objectives of the workshop. The

workshop was organised as part of the ‘**Black Sea Environmental Programme**’ (BSEP), a joint initiative of the **Black Sea Commission** and its regional and international partners to safeguard the Black Sea, in particular through implementation of the Strategic Action Plan for Protection and Rehabilitation of the Black Sea (BS SAP). The participants were briefed on the existing policy and legal background for conservation of the marine environment in the Black Sea region (‘**Convention on the Protection of the Black Sea Against Pollution**’, ‘**Protocol on the Conservation of the Biodiversity and Landscape**’, the ‘**BS SAP**’, as well as on previous activities and outputs¹ undertaken under the umbrella of the BSEP to study the status, the principles and methodologies for the sustainable management of living marine resources. The participants were informed that inter-governmental negotiation process for a **Black Sea Fisheries Convention** was initiated in 1993, continued until the year 2000 to produce a draft which was not formally endorsed, the Black Sea Economic Cooperation Organisation was invited by the Governments of the Black Sea coastal countries to facilitate the concluding of the Convention. However due to constituency problems BSEC had to decline the task, and eventually the Commission on the Protection of the Black Sea Against Pollution (The Black Sea Commission) was entrusted with the task of resuming the negotiations on the Draft Convention with a view to its formal adoption by the coastal States in the nearest future. The Black Sea Commission, until that time was developing and implementing its work programme, mainly through its Advisory Group on Environmental Management of Fisheries and other Living Marine Resources. The Group had three meetings until the date of the Sile Workshop, one of which was partially devoted to the draft Fisheries Convention based upon the above mandate given by the coastal States. The Fourth Meeting of the Advisory Group was scheduled to take place immediately after the Sile Workshop. The participants were also informed on the work currently undertaken by the European Environmental Agency on Environmental Indicators for Fisheries and Aquaculture. Supporting documents were provided to Workshop Participants.

The BSERP Project Coordinator explained the **overall objectives** of the Workshop as:

- Providing scientific and management guidance on Responsible/Ecosystem-based Fisheries for backstopping the inter-governmental negotiations on a legally binding instrument on fisheries management;
- Assessing the needs for capacity building for effective implementation of the future Fisheries Convention following its formal adoption;
- On the basis of the information submitted to the Workshop, formulating a practical approach for addressing regional priorities, which could be further followed up by the institutions represented, in particular by the Black Sea Commission through BSERP support in Phase 1, as well as its possible Phase 2.

With a view to achieve these objectives the **Workshop focused on the following tasks**:

- Providing an update of the status of fish stocks & living marine resources, and of fisheries management in the Black Sea since the last review made in 1997;
- A peer review of the status of demersal resources;

¹ FAO-GFCM Studies and Reviews No: 68, Environmental Management of Fish Resources in the Black Sea and their Exploitation. 1997; An Economic Analysis of Commercial Fisheries and Environmental Management in the Black Sea Region-BSEP Technical Report, Knowler, Duncan et al., 1997; Draft Strategy for a Joint In-situ Fishery Stock Assessment in the Black Sea, Prodanov, Kamen et al., 1997; Marine Aquaculture in the Black Sea Region, BSEP Technical Report, 1995; Transboundary Diagnostic Analysis, BSEP, 1996

- Identifying and prioritizing critical habitats, in particular for demersal species;
- Elaborating the implications of FAO Guidelines on Responsible Fisheries and the concept of ecosystem-based approach in the Black Sea;
- Consolidating the available information with a practical methodology which can be employed for monitoring the status of the fisheries/ecosystems as well as their management (status, process, and stress reduction indicators).

Expected **outputs** of the Workshop were:

- National reports on the state of fisheries and their management to be further incorporated in a pilot-data base, and published as hard copy;
- Proceedings of the scientific and technical review of demersal resources;
- Conclusions and technical recommendations of the Workshop.

Following the Workshop the presentations and discussions at the Workshop would also be made use of for a publication named ‘Guidelines for Responsible Fisheries in the Black Sea (including the Azov Sea) and to be disseminated to decision makers, fishermen, and other stakeholders in local languages.

Dr. Simion Nikolaev, Director of the Regional Activity Centre on Fisheries and Living Marine Resources located in Constanta, Romania, and Dr. Bayram Ozturk, President of TUDAV **co-chaired** the Workshop. Dr. Oksana Tarasova, PMA Officer of the Permanent Secretariat (BSC-PS) and Ms. Sema Acar were the **rapporteurs**.

Strategic principles, policies and actions set by the existing regional legally binding and non-binding instruments- Dr Simion Nikolaev made a presentation on the main findings of the TDA (1996), principles and priority actions prescribed by the BS SAP concerning sustainable exploitation of fish and other marine resources, and introduced the mandate and work-programme of the Advisory Group of on Environmental Aspects of Management of Fisheries and other Living Marine Resources, a subsidiary body of the Black Sea Commission. Similarly, Mr. Akaki Komakhidze, Director of the Regional Activity Centre on the Conservation of Biodiversity introduced the biodiversity conservation principles, policies associated with fisheries management, as well as the mandate and work-programme of the Advisory Group on Biodiversity Conservation, another subsidiary body of the Black Sea Commission.

Dr. Jordi Leonart, Senior Expert of the FAO-GFCM made a presentation on the **mandate, rules of procedure, institutional structure and work-programmes of the GFCM**, and invited the Black Sea coastal states, the Black Sea Commission, and scientists to participate in the activities undertaken by the GFCM. It was noted that although Black Sea was included in its geographical coverage, only few countries were official members of the GFCM and thus were able to take part in the Scientific Advisory Committee (SAC). The Workshop highlighted the importance of enhancing the Black Sea constituency in the GFCM with a view to better transfer the scientific and management expertise developed by GFCM into the Black Sea region, and introducing Black Sea related activities in the official work-programme of the GFCM, eg. Cooperative projects like COPEMED, ADRIAMED, MEDSUBMED etc. The PIU was requested to liaise with the GFCM and provide detailed information on membership requirements. On the other hand, the Workshop took note of the fact that participation of scientists and institutions in the meetings of the Sub-groups (stock assessment, statistics and indicators, marine environment and ecosystems, economic and

social aspects) did not require formal membership. The Workshop agreed that the work of the GFCM sub-groups were extremely relevant and useful for promoting responsible fisheries in the Black Sea, and encouraged the Black Sea institutions and scientists follow the work of the sub-groups through the GFCM website and participation in technical meetings (pls. see Annex). The participants pointed out the need for financial support for such participation.

In his second presentation Dr. Lleonart introduced the activities undertaken by the Sub-Group on Stock Assessment, different assessment methods (direct and indirect) used, lists of priority species and shared stocks, targeted stocks, reference points, sub-regions, main findings of the surveys conducted in the Mediterranean, and examples from recommendations submitted by the sub-group for the decision of the SAC.

Dr. John Caddy, international consultant for BSERP presented the Discussion Paper for the Workshop on Responsible Fisheries in the Black Sea and the Azov Sea: **A general approach to monitoring changes in the Black Sea ecosystem, the status of fisheries resources, and socio-economic context, by establishing indicator time series in support of management decision-making. The paper suggested that a** rule-based approach to fisheries management incorporating standardized indicators of fishing mortality, biomass, spawning potential, recruitment and productivity was needed. Monitoring contractions in the range and density of motile resources could provide useful and sensitive operational indicators using GIS techniques. These spatial indicators could also measure progress towards the re-establishment of year-round oxygenated shelf waters and a healthy demersal fish and benthos community, comparable in extent and biomass to that in the 1960's-70's. A complimentary role within the scope of the Commission is to achieve environmental restoration 'from the shore outwards', as also is the approach in the North American Great Lakes and the Baltic Sea. This should aim *inter alia*, to improve coastal and lagoon environments and reduce nutrient runoff. An overall objective could be to restore oxygenated bottom water in shelf areas on a year-round basis to the equivalent of a mesotrophic condition, which is likely to lead to restoration of productive demersal fisheries. Indicators could be used for combined environmental/fisheries assessment, but two specific approaches to combining indicators into specific characteristics were discussed in the paper – the PSIR and the Traffic Light approaches. Specific values of indicators (limit reference points) needed to be agreed to as a basis for a fisheries management law and for stock recovery plans. A decision is needed on which of these two approaches (recovery of stocks, or retention of stocks at current levels) is appropriate for key species at this point in time. Both activities should be based on a management plan agreed to by all parties throughout the Black Sea basin and implemented cooperatively in a non-discretionary fashion, using standardized indicators to measure the state of the resources and environment.

The participants expressed their appreciation of the scientific quality of the paper and their agreement with the suggested approach, and decided to consider the prospects for its implementation for the Black Sea during the deliberations at the Workshop.

Country Reviews on fisheries management- The BSERP national consultants presented their reports which evaluate the state of fisheries and its management in their countries on the basis of data and information that was gathered prior to the workshop in accordance with a data/information template provided to them. This template will be further developed and transformed into a relational data-base for future use by the Black Sea Commission and/or an emergent Fisheries Commission.

An immediate observation of the Workshop participants was that there was a great disparity between various country data sets in terms of different data categories, supportive information, data representativeness for the whole country, and time series. It was agreed by consensus that further improvement of most of the national data sets was compulsory in order to be able to collate these data sets in a regional data-base and in a regional synthesis report. Bilateral discussions were held with each consultant together with the representative of the official institution in charge of fisheries for that country with a view to completing the information gaps and improving the representativeness of the data for that specific country. The consultants were asked to finalize their data sheets and reports accordingly, and official authorities were requested to follow up and indicate their acceptance of the report to the Commission and the BSERP-Project Implementation Unit (PIU). Following that a pilot data base will be established by the BSC-PS and the BSERP-PIU. The Regional Activity Centre will provide the PS and the PIU information and material on the work undertaken earlier for the development of a Black Sea fisheries data-base. It was also agreed to prepare an updated version of the Black Sea fisheries review¹ incorporating the data/information obtained through this Workshop.

Full texts of the meeting documents and presentations made can be viewed/downloaded from the BSERP web-site (www.blacksea-environment.org)

Discussions

The discussions focused on the following topics:

- Responsible fisheries and conservation problems of the Black Sea fisheries
- Unreported and unregulated fisheries in the Black Sea and Azov Sea.
- Total allowable catch by species
- Fishing free zone and marine protected areas
- Identification of habitat type and diversity of demersal resources
- Fish landings and statistics problems in the region (Trawling)
- Precautionary approaches

Symposium on Demersal fish sources of the Black Sea and the Azov Sea

Scientists from the six Black Sea coastal countries presented papers to this session of the Workshop. Main topics of the symposium were:

- Evaluation of the demersal fish resources for each country ;
Turbot, Mullet, Red mullet, Whiting, Stingray
- Distribution of the Demersal Resources;
- Methodology of stock assessments;
- Cetaceans-demersal fish interactions;
- Conservation measures of the demersal stocks in the region.

Discussion

The information provided and recommendations made by the papers were discussed by the Workshop participants.

The Workshop proceedings edited by Dr. Bayram Ozturk and Ms. Saadet Karakulak were published by TUDAV and distributed to participants. Proceedings can be downloaded from

the BSERP and TUDAV web-sites (www.tudav.org) or requested from TUDAV or BSERP-PIU. Also power-point presentations made by the authors can be viewed on the BSERP web-site.

Conclusions and recommendations

Based on the discussions held in session on Responsible Fisheries as well as the Symposium on Demersal Fish Sources, the Workshop arrived at a number of **Conclusions and Recommendations** which are presented in Annex 1. The Workshop also suggested a **Pragmatic Approach** which is presented in Annex 2 for implementing the recommendations of the Workshops in the near and medium term within the framework of the Black Sea Environmental Programme .

Closure of the meeting

The participants expressed their appreciation of the contents and timeliness of the Workshop and thanked the organizers. Special thanks went to the Co-chairmen for the successful conduct of the meeting; and to the international organizations and specialists for their technical and/or financial support.

CONCLUSIONS

Black Sea demersal fisheries continue to represent an important economic activity having a very significant impact on the coastal population and on marine ecosystem.

The slight improvement of environmental conditions recorded in the last decade in the Black and Azov Seas create a favorable background for recovery of biodiversity and marine living resources (Report to Ministerial Meeting)

In spite of this improvement in the case of demersal fisheries the over-fishing, degradation of vital habitats, spawning and nursery grounds, and disturbance of structural balance in biota still continue.

In all Black Sea countries the legislative and regulatory framework that have been established permits the management of living resources at the national level, but still remains weak in some Black Sea countries and uncoordinated regionally in particular in harmonization of concrete regulatory tools.

Noting that each coastal country devoted efforts for assessment of marine living resources as a main management tool for responsible fisheries in the Black and Azov Sea, the scientists expressed their concern on following problems:

The fish stock assessment and monitoring activities are fragmented and irregular

Some data and methodologies used at the national level for assessment of demersal resources are not compatible and comparable for regional purposes

Monitoring of benthic communities (zoobenthos, phytobenthos) and of the environmental conditions that important for these community and demersal fish populations is poor and data deficient

The demersal fishing activities have an adverse impact on marine mammals through by-catch and on benthic communities through bottom fishing gears.

Illegal fishing remains one of the most important unresolved issue for all Black Sea coastal states

Demersal fisheries heavily affected by above problems still have potential for recovery. This will require financial resources which in current economic conditions of the Black Sea countries are limited.

RECOMMENDATIONS

The workshop recommends prioritization of actions aimed at recovery of demersal stocks. A step-by-step approach will be the most effective way, namely:

- development of indicators specific for the Black Sea in order to monitor and assess the state of key resources/habitats
- selection of key demersal species and their habitats and development of recovery plans for them
- based on the lessons learnt to prepare and implement the other fish stocks recovery plans for the Black and Azov Seas
- to follow principles of responsible fisheries and to implement specific measures based on these principles
- to harmonize methodologies for assessments and to establish well defined objectives for fisheries sector
- to elaborate criteria for selection and designating fishing free zones on the national and regional levels
- reduction of adverse impact on the benthic communities and improvement of bottom fishing gears selectivity
- to promote fishing methods and practices for minimizing dolphin by-catch
- to establish marine mammals stranding network on the national and region levels
- rapid adoption a regional legally binding document on responsible fisheries
- raising awareness of fisheries sector and general public on responsible fisheries
- To undertake concerted actions to combat illegal fishing and to establish regional consultation mechanism between the Black Sea coastal states
- to extend/designate protected marine areas of regional significance and establish a network for the Black Sea
- Cooperation with GFCM, EEA and other relevant organizations on the issues of common interest

The Workshop suggested a practical approach to implementing the above recommendations which is presented in Annex

Annex 2

Agreements reached on actions that need to be taken in developing indicators for selected commercial species and habitat/environmental indicators.

Apart from reporting responsibilities on catches which apply to all harvested species, as an initial approach, it would be better for the Commission to recommend a focus on collection of research indicators for a limited number of species and population characteristics, while allowing the possibility to revise the number of indicators subsequently if needed.

2) Some 'keynote species' should be decided on as focus for maximum effort of cooperative studies.

3) Country responsibilities for studies on keynote species are not only confined to those countries currently taking major catch – other countries should contribute data.

4) Suggesting a 'lead role' in studies for any country does not imply any special preference as to allocations, quotas etc in any future management regime. This is simply a function of availability of data on the species and of research interest.

5) Some other activities (e.g. on environment, biodiversity, sturgeons) are being discussed in other components of the Black Sea Commission activities, and by CITES, hence coordination is implied by listing them in the following tables in which fisheries sector may not wish to take lead role.

Table 1. Ecosystem/habitat focus for indicators (some overlap with biodiversity group – shown in italics)

(Indicator objectives: determine state of habitat/key resource using biomass, range, quality)

Indicator category	Indicator needed	Lead country(ies)	Comments
Critical habitats			
- Lagoons and inshore	Mugilidae biomass, distribution, size structure, demography. Mussels (range, quality of meats) Venus clam (range)	All All(not Russia) All	Local resources. But suggest a cooperative focus on lagoon restoration, including aquaculture applications. (A range of environmental data collected, incl. bottom water oxygen, resource contaminants). Cooperative studies/programmes of contamination Tech. Consultation on artificial reefs. Indicator of clean bottom conditions.
- Shelf areas	Turbot (See table 2) Rapana (range, catch	(Lead role:	Needs cooperative management.

	rate) Anadara cornea	Russia) Russia, Turkey, (Lead role: Georgia)	Local.
Gobies	Demography, cpue, <u>range</u>	Russia, (Lead role: Ukraine).	Indicator of oxygenation of northern shelf.
Red mullet	Demography, cpue,range	All (Lead role Turkey)	Indicator of clean bottom conditions.
- Pelagic biome	- Sprat, anchovy, horse mackerel (See table 2) - <i>Phytoplankton (Chl a density-seasonal)</i> - <i>Zooplankton (catch/tow seasonal)</i> - <i>Jelly predators (catch/tow- seasonal)</i>	All <i>All(Lead role: Russia)</i> <i>All (lead role- Russia?) Russia</i>	Coordination of survey programmes. <i>Remote sensing imagery</i> <i>Egg+larval+oceanographic plankton surveys</i> “ “ “ “ Organize oceanographic study of environmental impacts on stock migrations/abundance, and on impacts of pelagic conditions on demersal benthic biome.
- Conservation of threatened or endangered species.	- Sturgeons - Shads, Black Sea salmon. - <i>Dolphins (bycatch, range, sightings)</i> - Rays (range) - <i>Phyllophora</i>	Danube countries, Russia, Georgia, Ukraine + Turkey (lead role Romania) <i>Salmon:Lead role Georgia, Turkey. Shads: Lead role Romania+ other Danube countries.</i> All All Ukraine	Needs cooperative management. (Cooperation with Black Sea sturgeon initiative of CITES).Cooperative studies promoted with other agencies. Collect information on stocks and spawning rivers and environmental quality. ACABAS, Bonn Convention linkages. Compare current catch, size, distribution to historical data. Monitor area of seaweed beds.
Migratory species a) between Mediterranean – Marmara <-> Black Sea	Mackerel, bluefish, bonito (range, demography, migration routes)	(Lead role Turkey) – not Russia, Georgia	Transboundary and highly migratory stocks. (Cooperate with GFCM & ICCAT to establish range of species,

b) Between Azov +Black Sea.	Migration of species between Azov and Black S.	Esp. Russia, Ukraine	genetic identity, stock status in Mediterranean, Aegean, Marmara, Black Sea). Develop index of abundance of migratory species into/out of Azov?
Consider meeting to discuss validity/optimal approach to conserving genotypes through hatchery enhancement (e.g. turbot, sturgeon).			

Table 2. Keynote species focus for priority actions as indicators

(Indicator objectives: determine state of habitat/of key resource using biomass, mortality, growth, fecundity, range, quality)

Indicator category	Indicator needed	Lead country	Comments
Pelagic			
- Anchovy	Catch, cpue, age/size structure of catch, biomass, age or size structure; F, condition factor (seasonal), oil content, mean size at ages 1,2., popln. fecundity, range	All (Lead Turkey)	Needs cooperative management. Currently most catch taken by Turkey, but as important keynote species, some special sampling needed from other countries – especially for range/distribution. Needs management plan/control effort and/or TAC/alocations. <i>High exploitation rate for small pelagics may promote Mnemiopsis blooms and affect zoo/ phytoplankton abundance, possibly affecting shelf hypoxia through detritus loop in ecosystem.</i> <i>Organize modeling workshop to consider relations between key biota and linkages between pelagic and benthic habitats.</i>
- Sprat	Catch, cpue, age/size structure of catch, biomass, age or size structure, F, condition factor (seasonal), mean size at ages 1,2., popln. fecundity, range	All. (Lead Bulgaria)	Needs cooperative management. Currently most catches taken by Ukraine, Russia and Bulgaria. Important by catch of whiting. Needs management plan/control effort and/or TAC. <i>(See comment in italics for anchovy)</i>
- horse mackerel	(As above)	All. (Lead Turkey)	Needs cooperative management. <i>(See above comment in italics for anchovy)</i>

Demersal/benthic shelf			
- Turbot	Catch, cpue, age/size structure of catch, biomass, age or size structure; F, condition factor (seasonal), mean size at ages 1,2., popln. fecundity	All (Lead Turkey)	Needs cooperative management. Need for common B.S. stock assessment. Decide on common objectives in a management plan (limited entry, TAC, common fishery regulations, closed areas, gear types allowed etc). Organize meeting to discuss management plan.
- Whiting	Catch, cpue, age/size structure of catch; biomass, age or size structure; F, mean size at ages 1,2., popln. fecundity.	All (Lead Romania)	Needs cooperative management. Management of this species needs coordinating with that of sprat fishery.
Dogfish	Demography, cpue, range	All (Lead Turkey)	Slow-growing, low fecundity species – indicator of fishing pressure.
General			Considered desirable to prepare a small booklet for each key species with key information, assessments.

Table 3. Fishery ecosystem indicators

(Objective: locate indicators from fisheries data base that reflect health of whole ecosystem)

Indicator category	Indicator needed	Lead country	Comments (1 st 3 indicators await compilation of all species data).
Pelagic/demersal ratio	Indicator (biomass and/or catches) of pelagic resources and benthic+ demersal resources	All	A general indicator of health of demersal biome is a low value for ratio.
Piscivore/planktivore ratio	Indicator (biomass and/or catches) of food web exploitation.	All	A general indicator of degree of exploitation of the ecosystem.
Mean trophic level	Indicator of degree of truncation of food web and/or eutrophication using all ecosystem components.	All	A general indicator of anthropogenic impact on food web.
Marine protected areas and (seasonal) closed zones	Proportion of national sea areas included in closed areas.	All (Secretariat to organize)	Use GIS approach to document areas.
Develop historical atlas of species ranges, critical habitats,	Document ranges/densities (if possible for every	All (Secretariat to	Use common GIS approach to document in a fisheries Atlas together with ranges of all known

nursery/spawning areas.	decade since 1950's).	organize)	species. (Coordinate with FAO FIGIS for methodologies and data). – workshop on GIS/Atlas of fisheries?
Document distribution fleets/fishing areas by main ports.	Show this in fisheries Atlas.	All (Secretariat to organize)	Add boundary agreements/ fleet distribution data to fisheries Atlas.
Effect of gear on key species/habitats.	Monitor bycatch dolphin in gill nets/ Monitor distribn. of dredges/trawl gear & their impact on bottom oxygen levels.	All	Monitor gillnet by-catch of critical species. Consider regulations to reduce impacts of fisheries on migration routes (e.g. avoid blocking straits needed for migration – allow fishing in straits and migration corridors only a few days per week?). Closed areas/seasonal (summer) closures for bottom gear to avoid hypoxia. Experimental studies in summer of effects of hydraulic dredging on local oxygen H2S levels/incidental mortalities.

Table 4. General indicators of socio-economic nature (*This table is considered incomplete and items marked *require specialized socio-economic inputs*).
(Objectives: determine impact of sector, its economic health, capability of regulation and research)

Indicator category	Indicator needed	Lead country	Comments
Fleet numbers by category/target species of vessels licensed nationally to fish in 2002.	Description vessel, owner, current level of activity	All (Secretariat to organize)	A common database of vessels operating in 2002, and existing but inactive vessels which are licensed to fish.
Number of days fished per year by gear type/category/ target species. (Use EC vessel/gear categorization).	Total effort = sum (HP*days fished per year). This is an indicator of fishing pressure. Data may be obtained through sampling a known proportion of fishing trips/vessels using a standard and agreed sampling scheme.	All (Secretariat to organize)	Suggest a log book with common format be used to collect national data, and/or standard port interview form. It will be necessary to develop a sampling frame prior to developing approach to port visits.
Fleet tonnage/shelf area	An indicator of fishing pressure.	All (Secretariat to organize)	This is a general indicator of fishing intensity, and should be calculated separately for main gear types.

*Employment in fisheries sector. (primary/secondary) as proportion of population size. (Also indicate proportion of private sector participation, and info on cooperatives).	An indicator of effort, but also of interest in sector.	All (Secretariat to organize)	A general indicator of relative importance of fishery sector and how it is organized. Organize meeting to discuss how the fishery sector is organized in member countries.
*Fish consumption/per capita	An indicator of market demand.	All (Secretariat to organize)	Need to know consumption of local catch, but also imports/exports from and to countries outside the Black Sea area.
National regulations for keynote species	Document approaches to regulation, and Monitoring, Control and Surveillance.	All (Secretariat to organize)	Harmonizing regulations for keynote species is necessary first step to harmonized Black Sea management measures under the Commission.
MCS capability	Document number of staff dedicated to controlling adherence to regulations.	All (Secretariat to organize)	One suggestion here is to consider introduction of VMS (Vessel monitoring system) using satellite 'black box' on industrial scale vessels. (Suggest to organize meeting of national MCS personnel to discuss harmonization of MCS procedures).
Research coordination	List scientists/programmes by key species/problem areas. Document research vessel programmes and objectives.	All (Secretariat to organize)	This will be necessary for planning cooperative programmes. Calibration/coordination of survey methodologies will be needed.
*Consumer inputs NGO's	Define priorities for national requirements for fish Identify national groupings concerned with ecosystem and fishery resource health	All (Secretariat to organize)	Sponsor consumer surveys of fish consumption. Organize meeting of concerned NGO's to look at ecosystem priorities, and strategies to harmonize approaches with use of 'fish for food'. (See UNCED priorities). Look at sport fishing organizations and possible roles in conservation of habitats/resources.

Information about GFCM and subsidiary or related bodies

GFCM (General Fisheries Commission of the Mediterranean) and SAC (Scientific Advisory Committee)	http://www.fao.org/fi/NEMS/events/home_search_events.asp?search=1&lang=en&body=GFCM&month=13&syar=ALL http://www.fao.org/fi/NEMS/events/home_search_events.asp?search=1&lang=en&body=GFCM&month=13&syar=2002 http://www.fao.org/fi/eims_search/advanced_s_result.asp?statutory=9,22&sortorder=3&form_c=AND&lang=en
SCSA (Subcommittee on Stock Assessment)	FTP site: ftp://cucafera.icm.csic.es/pub/scsa/ Subscribing e-mail list: https://llistes.cmima.csic.es/listinfo/scsa
SCMEE (Sub-committee on Marine Environment and Ecosystems)	FTP site: http://www.cmima.csic.es/pub/scmee/ Subscribing e-mail list: https://llistes.cmima.csic.es/listinfo/scmee
COPEMED	http://www.faocopemed.org/en/index.htm
ADRIAMED	http://www.faoadriamed.org/
MEDSUDMED	http://www.medsudmed.org/
ICCAT	http://www.iccat.es/

