SCIENTIFIC COOPERATION TO SUPPORT RESPONSIBLE FISHERIES IN THE ADRIATIC SEA

MiPAF

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A preliminary contribution to the Mediterranean Operational Units

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FAO-Adriamed Project

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Abstract

The paper provided an overview of some of the basic information available relevant to the identification and listing of Operational Units in the Adriatic Sea (Geographical Management Units 17 and 18). Preliminary figures and composition of the Adriatic fishing fleet as a total and by country, fishing gear and vessel size were given together with the base ports. The sardine fishery in the Northern and Central Adriatic was used as an example of the application of Operational Units. Within this Management Unit (17) the sardine stock is considered to be shared by the fishing fleets of the coastal states and it is believed to be a single stock. Therefore, the paper proposed to consider only one Operational Unit for this resource and some of its specific, or elementary, components such as base ports, fleet segments and fishing seasonality were indicated as an example of the complementary and desirable information.

1. Introduction

This paper was made possible through the collaboration of experts from the countries participating in the FAO-Adriamed Project, it represents part of the output of the Joint Meeting of the Adriamed Working Groups on Shared Demersal and Small Pelagic Fishery Resources of the Adriatic Sea (Bari, 13-15 February 2001) and the follow up to an "*ad hoc*" meeting of the Adriamed National Focal Points (Fano, 20 March 2001). The information, which has as far as possible been standardized, was gathered in each country and the paper was prepared by Piero Mannini and Fabio Massa with the assistance of the Project staff.

The national experts who participated in the data collection exercise were: E. Kapedani and K. Osmani from the Fisheries Research Institute of Dürres (Albania); S. Jukić and G. Sinovčić from the Institute of Fisheries and Oceanography of Split and A. Misura of the Ministry of Agriculture and Forestry, Zagreb (Croatia); N. Cingolani from IRPEM-CNR of Ancona, C. Piccinetti from the Laboratory of Marine Biology and Fisheries of Fano and N. Ungaro from the Laboratory of Marine Biology of Bari (Italy); B. Marčeta of National Institute of Biology of Ljubljana and T. Karis of Delamaris d.d, Izola (Slovenia).

2. The Operational Unit concept

The GFCM Executive Committee requested that the SAC define the Management Units in the Mediterranean and thereafter to define and list the Operational Units within the Management Units.

The current definition was drawn up by the SAC-WG (Barcelona, 2000) and used in a study undertaken by Camilleri *et al.* (2000). A major step towards defining the Operational Units was taken although the agreed definition did not give a clear indication on how to systematical1y list and analytical1y process them. This first approach to OU definition and identification within the Management Units was carried out on the basis of the information available for different areas of the Mediterranean on related resources, fishing fleet/gear and fishing grounds.

The OU concept was also applied in a study on the identification and application of socio-economic indicators to Mediterranean Fisheries (Franquesa *et al*. 2000) "Feasibility assessment study on the setting-up of a socio-economic indicator database for Mediterranean fisheries".

3. The OU in the Adriatic context

The Adriatic can be considered as a semi-enclosed sea within the Mediterranean Sea, which itself constitutes a larger semi-enclosed sea. Six countries, whose coastline development differs greatly, border the Adriatic. In the Mediterranean coastal nations living marine resources have been intensively exploited for a long time and the majority of stocks are considered to be at least fully exploited (Caddy and Oliver, 1996; Grainger and Garcia, 1996).

A series of activities and meetings were held within the framework of the Adriamed Project in order to strengthen scientific cooperation between the countries participating in the Project as support for responsible fisheries. To improve the basic understanding of Adriatic fisheries, all available information from each country is being collected, compiled and assessed. In this context, regional experts identified and listed the main commercial species whose stocks are shared by national fishing fleets, research programmes on some of these species have been formulated and are under implementation (Adriamed, 2000; Adriamed, 2001_a; Mannini *et al*., in press).

Recently, the limits of the two Geographical Management Units (MUs) into which the Adriatic Sea is divided, have been jointly defined by the participating countries on the basis of recent geo-political changes, national statistical division, geomorphologic characteristics, fishery exploitation strategies and policy (Adriamed, 2001_b; see also the Report of the GFCM-SAC Working Group on Management Units, Alicante, Spain, 23-25 January 2001). The Northern and Central Adriatic is included in MU 37.2.1a (currently proposed by the *ad hoc* SAC-WG as MU 17), this area is characterised by relatively shallow bottoms over the much-extended continental shelf. Coastline and

territorial waters of Croatia, Bosnia-Herzegovina, Italy, and Slovenia fall within this MU. The Pomo/Jabuka Pit is the deepest area of the MU and serves as an important nursery area for high value species such as the hake. Management Unit 37.2.2b (now proposed as MU 18 by the SAC-WG) encompasses the Southern Adriatic (Albania, Italy and Montenegro-Federal Republic of Yugoslavia) and, unlike MU 37.2.1a, is characterised by a relatively narrow continental shelf and by a marked, steep continental slope (Figure 1). In this paper the revised boundaries have been applied.

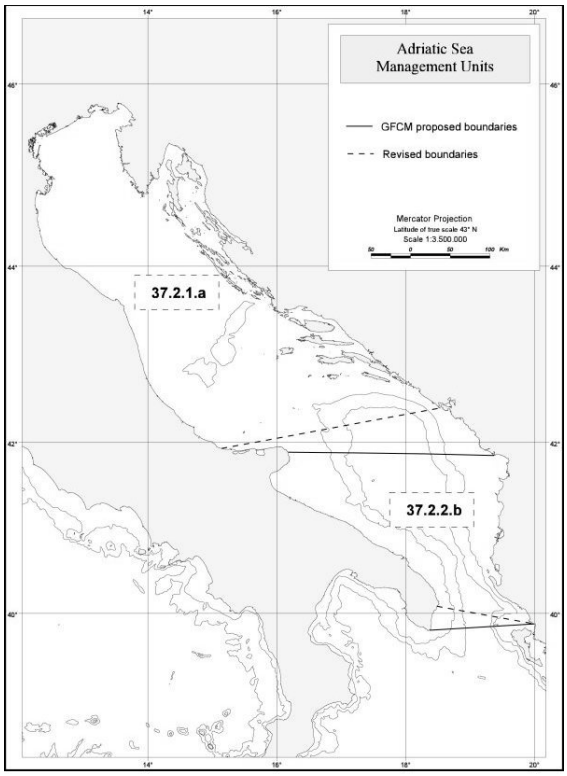

Figure 1. Map showing the boundaries of the Adriatic Sea Management Units 37.2.1.a and 37.2.2.b as originally indicated by the GFCM (solid line) and with the currently proposed revision (dotted line) defined as MU 17 and 18 respectively.

Adriatic capture fisheries are based on the exploitation of demersal and pelagic species whose stocks, in most cases, are considered as shared by the fishing fleets of coastal states. In this respect "shared fisheries" are a major feature of the Adriatic Sea.

The definition of an Operational Unit, as endorsed by the GFCM, encompasses four key-components: fishing effort; (group of) fishing vessels operating a given category of fishing gear (practising the same type of fishing operation); target resources (either made up of one species or group of species); and (similar) economic structure.

Therefore an Operational Unit could be considered as characterised and constituted by identified fishing vessel categories which target resources consisting of one or, more probably, of a species assemblage. This could be seen as species (or group of species)-related fishery, meaning, for example the bottom trawl fishery targeting on hake and co-occurring species.

Given this, the identification of Operational Units involves the prior identification of key-fisheries which at the initial disaggregated level may be seen as locally structured according to the resource, the local fishing grounds and related ports where the fishing vessels operate from and where the economics of production originate (*e.g.* access to local/regional markets, trading, processing, vessel-related activities and costs, etc.). These basic aggregations might be considered as elementary or sub-Operational Unit constituents.

An initial step is to assess the type, quality and quantity of information available, as this may be different from one area to another. This is particularly important when dealing with fishery resources exploited by more than one country, as it is the case for the Adriatic.

4. Preliminary global picture of the Adriatic Sea fishing fleet

Most of the Adriatic Sea fishing fleet is based in 109 fishing ports of which 94 are located within the Northern and Central Adriatic MU and the remaining 15 are in the MU of the Southern Adriatic (Figure 2). Some of the minor associated ports, mostly bases for small artisanal fishing boats, are probably not accounted for.

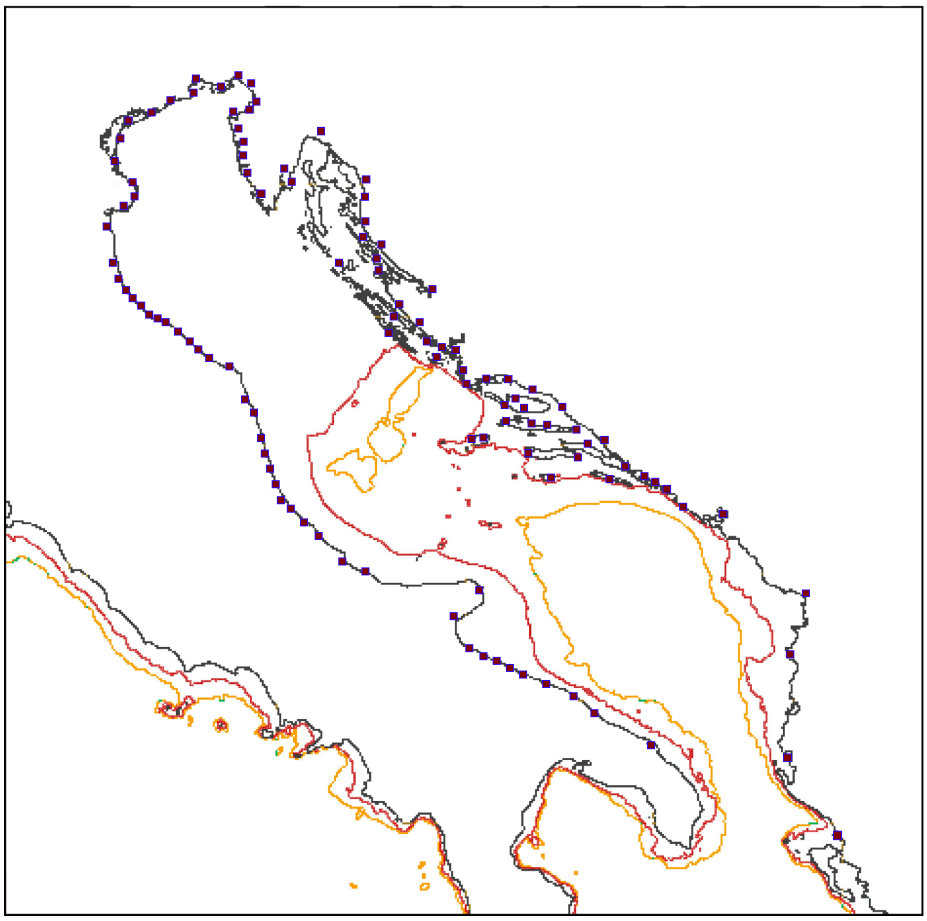

Figure 2. Distribution of fishing ports along the coast of the Adriatic Sea.

The preliminary compilation of the information from official and semi-official sources (*i.e.* from relevant national authorities and from fishery research institutes) on the Adriatic Sea nominal fishing fleet would lead to the following picture.

The total number of vessels of all sizes authorised to carry out professional fishing, both small-scale artisanal and industrial or semi-industrial, amounts to about 12800 units. A tentative breakdown by fishery (bottom, pelagic and artisanal-coastal fishery) and by target resources (demersal, pelagic and coastal resources) typology indicates that about 9500 fishing units of small size (*i.e*. less than 12 m LOA) operate small-scale artisanal fishing in coastal waters. To this figure 609 small to medium size vessels must be added which are equipped with hydraulic dredges and exploit bivalve molluscs along the Italian coast (this kind of information is not available for the other coastal nations).

Demersal trawl fishery is carried out by about 1600 trawlers mostly of small-medium size (*i.e.* up to 24 m LOA). The number of fishing vessel targeting pelagic (mostly small pelagic) stocks is about 500 units with the largest percentage (40%) made up of medium size (12-24 m LOA) vessels.

It has to be noted that to the bottom trawl and pelagic fleet composition previously given, a fleet of 528 Italian vessels must be added which are above 12 m length and licensed for the use of several fishing gears (*e.g.* bottom trawl, mid-water trawl, purse seine for small pelagic and tunas) and which cannot therefore be assigned to a single fishing category. This, still approximate, outlook of the Adriatic Sea fishing fleet is summarised in the following Tables 1 and 2.

Table 1. Percentage national and total fleet composition by main fishery category.

Country	Demersal	Small Pelagic	Coastal/Artisanal	Other/Unidentified
Albania	79	8	13	
Croatia	10	4	85	
Italy	13	4	60	22
Montenegro	15	7	78	
Slovenia	22	12	55	11
Whole Adriatic	13	4	74	9

Table 2. Percentage national and total demersal small pelagics fishing fleet composition by vessel size (LOA).

	Demersal			Small pelagic		
	Small	Medium	Large	Small	Medium	Large
Albania	Not yet available			Not yet available		
Croatia	62	33	5	53	37	9
Italy	Not yet available			4	45	51
Montenegro	45	55		100		
Slovenia	59	35	6		78	22
Whole Adriatic				33	40	27

5. The example of sardine fishery in the North and Central Adriatic

A simple attempt to define the sardine (*Sardina pilchardus*) fishery Operational Unit of the Northern and Central Adriatic (MU 17) was carried out using the basic information currently available. For the sake of clarity and to use standard terminology as far as possible, the terms employed by Franquesa *et al*. (2000) were tentatively adopted. Therefore, an Operating Unit is intended to mean a given fishing fleet segment operating within the MU concerned, and Local Operating Unit is the basic, or elementary, constituent of the Operational Unit and specifically refers to the fishing fleet based at each port exploiting the resource/s (*i.e.* the sardine stock) in a certain fishing ground.

At this stage, possible differences such as those in fishing effort allocation and fishing power of the small pelagic fishing fleets in the MU were not considered. Also, it was assumed that the sardine stock is not divided into sub-stocks, and that biological traits and genetic stock structure are homogeneous in the area.

The distribution of the ports where the Adriatic fishing fleet targeting on small pelagics is based is shown in Figure 3. In this MU the pelagic fishing fleet operates from 22 main base ports: 8 in Croatia, 12 in Italy and 2 in Slovenia.

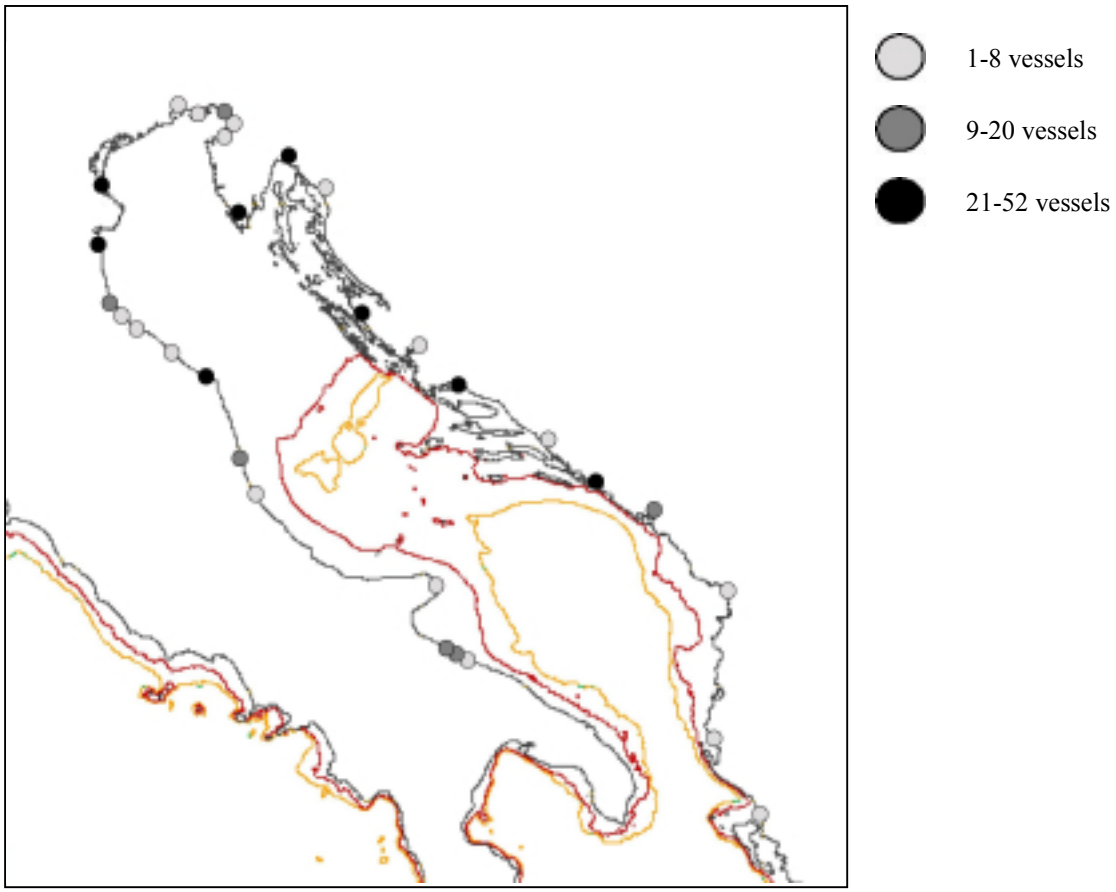

Figure 3. Distribution of base ports of the fishing fleet targeting on small pelagics in the Adriatic Sea, dotted lines indicates the boundaries of geographical managament units.

These 22 base ports and the small pelagic fleet, divided into several segments by fishing gear and vessel size (LOA), stationed at each of them can be considered as the Local Operating Units. Fleet composition by base ports, fishing gear and vessel size with indication of the fishing season, are given in Table 3.

Table 3. Adriatic small pelagic fishing fleet composition by base port, fishing gear and vessel size with indication of fishing season.

Geographical Management Unit 37.2.1.a										
Local Operating Unit	**Operating Unit (fleet segment)**									
	Purse seiner			**Mid-water trawler**			**Both gears**			**Fishing season**
Croatia	**1***	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	
Pula	46	4			17	3		6		Jan-Dec
Rijeka	11	14			2	2				Jan-Dec
Senj	2									Jan-Dec
Zadar	4	20	5		4			8	5	Jan-Dec
Šibenik	5				3		1			Jan-Dec
Split	47	15	7		6	1		1		Jan-Dec
Dubrovnik	34	6	1			2		1		Jan-Dec
Ploče	5					1				Jan-Dec
Total	**154**	**59**	**13**	**0**	**32**	**9**	**1**	**16**	**5**	
Grand Total		**289**								
Italy	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	
Trieste	9	4								Mar-Dec
Grado					6					Jan-Dec
Marano Lag.					4					Jan-Dec
Chioggia					28	2				Jan-Dec
Porto Garibaldi					27	17				Jan-Dec
Cesenatico					9	1				Jan-Dec
Rimini					4	4				Jan-Dec
Cattolica					2	2				Jan-Dec
Fano						6				Jan-Dec
Ancona						28				Jan-Dec
S.Benedetto T.			11			6				Apr-Dec; Jan-Mar
Giulianova			5			3				Apr-Dec; Jan-Mar
Total	**9**	**4**	**16**	**0**	**80**	**69**				
Grand Total		**178**								
Slovenia	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	
Izola	2				2	2				Apr-Nov; Jan-Dec
Koper	3									Apr-Nov
Total	**5**	**0**	**0**	**0**	**2**	**2**				
Grand Total		**9**								

* Vessel size category = **1**:<12m LOA; **2**: 12-24m; **3**>24m

Therefore, providing that the unit stock assumption is met and not accounting for differences in economic structure, actual fishing power and effort, it resulted that the Operational Unit for the sardine fishery in MU 17 of the Mediterranean Sea is composed of 22 Local Operating Units hosting a total of 476 fishing vessels (260 purse seine, 194 mid-water trawl units and 22 vessels operating both gear). In reality, this also applies to the important anchovy (*Engraulis enchrasicolus*) fishery as the same fishing fleet exploits the anchovy in this area. The importance as target species of sardine or anchovy depends on resource availability and national market demand. Further, an important aspect which should be assessed is whether this Operational Unit extends to include the adjacent MU 18.

6. The data model

The database "OP2001.test" is being developed by FAO as an example to demonstrate how the Operational Unit issue could be handled in the Mediterranean Region, satisfying, through a data management model the various users. This database has been designed mainly to respond to the SAC/GFCM request to list and report the Operational Units in the GFCM area by geographical management units.

7. Some concluding comments

A tentative global picture of the Adriatic fishing fleet is available and constitutes part of the necessary baseline knowledge to address the issue of Operational Unit identification and listing. Several components of the Operational Unit concept still require further information (*e.g.* socio-economic structure of national small pelagic fisheries, fishing ground mapping and related spatio-temporal effort allocation, etc.). Also, bio-economic criteria useful to limit the Operational Units (how extensive can an Operational Unit be?) would need to be taken into account. It might be worth considering the convenience of selecting target resource categories which, although characterised by one or few species, together with the assemblage of associated species, are the most representative of Mediterranean fisheries.

The sardine fishery example utilised in this paper is from a relatively simple situation where the resource is associated with only a few other species and the fishery is performed by mainly two kinds of fishing gear. It may be expected that the identification of Operational Units for demersal resources and relative fishery will be more complex due to the higher number of species and variety of fishing gear employed.

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