FISHERIES IMPACT ON DOLPHIN POPULATIONS IN THE BLACK SEA ROMANIAN SECTOR

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ABSTRACT

Over-exploitation of renewable resources, associated with the empirical and more often defective management, became one of the most dynamic disturbance force of natural capital from the whole eco-sphere, finalized with the erosion of biologic diversity.
Having in view the above consideration, the necessity of performing the research aiming to evince the risks of the present fishing tehnologies to the incidental catch of dolphins was imposed. Also, the elaboration of the measures and recommendations supporting the protection of these marine mammals is necessary.
These problems become a national concern, after Romania becomed Contracting Party of the „Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area" (ACCOBAMS).
The research program focused on the following topics:

- analysis of the current fishing practices;
- assessment of the fishing effort and the risk assessments of incidental catching dolphins;
- elaboration of recommendations supporting dolphin protection.

KEY WORDS: Black Sea, fishing, fishing vessel, poaching, gill nets, trammel nets, fishing effort, incidental catch, dolphins, turbot.

INTRODUCTION

Marine mammals along the Romanian Black Sea coast, represented by three species of dolphins: *Delphinus delphis, Tursiops truncatus* and *Phocoena phocoena* (Photo1) are particularly vulnerable to threats from a number of different human activities. These threats are more severe in the Black Sea and Mediterranean Sea because they are semi-enclosed seas, and due to human high density and intense of activities, particularly in the coastal zone.

As is it known, the main source of food for dolphins is fish but to a lesser extent some of them (*Tursiops truncatus* and *Phocoena phocoena*) consume crustaceans and mollusks, respectively.

Diminishing fish stocks, changes of the behavior, creating an intensive non-selective and destructive fishing, turn up on dolphin populations (present in the trophic pyramid) by reducing food sources and specific habitat degradation (Birkun, 2001, Anton, 2006).

Interaction between cetaceans and fisheries is a problem that can affect to a great extent the conservation of dolphin populations, through:

a) incidental mortality due to retain or entangle in the fishing gears;
b) diminishing the food sources for dolphin by over-exploitation, illegal fishing, specific habitat degradation of marine living resources.

Knowing the effects of the operation of commercial fishing gear and technology on marine living resources, enables the development of measures and recommendations that will lead to diminishing catches of dolphins directly or indirectly by reducing the impact of such gears, and thus protecting living organisms important for feeding fish / dolphins and their specific habitats (Nicolaev and Anton, 1981, Anton, 2001, Anton et *all.*, 2002, Anton, 2006).

Phocoena phocoena

Tursiops truncatus

Delphinus delphis

Photo 1 – Black Sea dolphin species

MATERIAL AND METHOD

To ensure the sustainable exploitation of marine living resources and protection dolphin populations along the Romanian Black Sea coast the effects of the operation of fishing gears and technologies used in Romanian fisheries in the marine environment, fisheries resources and populations have been assessed (Adam and *all*., 1981, Anton, 2001, 2006).

The main considered fishing gears are:

- *gill net and trap net* (Photo 2 and 3)

Photo 2 - Gill nets for turbot

Photo 3 - Trap net installed on pillars

- *dredges for sandy and hard substrate* (Photo 4 and 5)

Photo 4 - Dredge for sandy substrate

Photo 5 - Dredge for hard substrate

- *bottom and pelagic trawls* (Photo 6 and 7)

Photo 6 - Bottom trawl

Photo 7 - Pelagic trawl

Also, for monitoring the effects of gear operation, inspection and control activities of own boats and ships, coastal trawler vessels of fisheries companies along the Romanian Black Sea coast, and fishermen patrol and inspection vessels of the Border Police Inspectorate of Constanta and the National Agency of Fisheries and Aquaculture – Constanta branch have been used.

RESEARCH RESULTS

The effects of stationary fishing gear operation

Gill net stationary

It appears that gill nets are the most dangerous fishing gears for dolphins which swim for food in the areas where such tools are installed (Anton et al., 2002; Anton, 2001, 2006, Nicolaev et all., 1981) (Photo 8).

Every year, at the Romanian Black Sea littoral incidental catches of dolphins and mortalities induced (stranding) by these fishing gears are recorded. The most affected species is *Phocoena phocoena* that proved to be vulnerable to this type of fishing. This vulnerability can be attributed to the small size of the body, in relation to mesh size / fineness of the yarn, that lower reaction force compared with large species, when they get in position to scramble and confuse the structure net of this type of fishing gear.

(a)

Photo 8 - Dolphins caught accidentally in turbot gill nets installed
(a) - traces left on body netting dolphins hanging / entangled in gill nets

Information of operators engaged in a specialized turbot fisheries, revealed that along the Romanian littoral, the average number of dolphins caught accidentally in gill nets turbot is about. 1 to 2 dolphins on 30 - 40 gill nets (after a check carried out regularly, 4-5 days, the period depends on meteorological condition, too).

Literature shows that at the Turkish coast, the average catch are 1-2 dolphins to 33 gill net, Ukraine officially reported the following by catches: 150 harbour purpoise specimens (*Phocoena phocoena*) per 100 km turbot gill nets in 54 working days and 154 dolphins/100 km spring dogfish gill nets in the same working period. Also, an imminent threat to populations of dolphins is the abandoned or lost gill net (according to the observations they remain

functional and continue to retain specimens of dolphins that intersect them) (Photo 9).

Photo 9 - Dolphins accidentally caught in abandoned / lost gill nets turbot

The field investigations revealed that over 95% of dolphins stranded along the Romanian Black Sea coast originated in dolphins accidentally caught in the gill nets (Photo 10 and 11).

Photo 10 - Stranding dolphins

Photo 11 - Stranding dolphins

Photo 11 - Stranding dolphins

Trap net

Generally, dolphins are captive in trap nets installed on masts because at this type of plant the upper air walls of netting of the compartments seines composition may be at a considerable height from water level (0,5-0, 75 m), constituting a real barrier in the way dolphins arrived inside catching room of fishing gear (Nicolaev et al., 1981, Anton, 2001, 2006).

The dolphins which remain captive in the catching room of the trap net could be returned alive to the environment by lowering the side walls of the compartment when the inspection tool is made.

Effects functioning filtering towed gear

Dredge

Field research has shown that, using dreges (Photo 12) to collect mollusks, crustaceans or algae, generate indirect functional effects on dolphin populations, thought deteriorating of the specific habitat and disturbance of the benthic biocenoses with trophic or refuge role for fish that represent the basic food for dolphins (Anton, 2006).

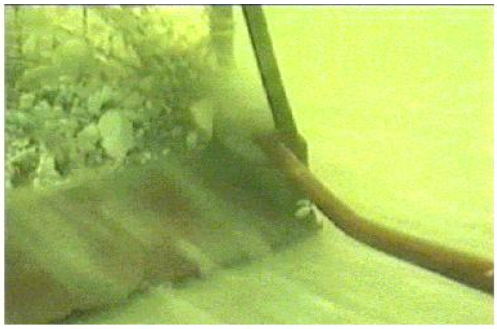

Photo 12 - Operation dredge of sandy substrate

Bottom trawl

Research findings revealed the existence of adverse functional effects by bottom trawl (Photo 13) in the ensemble through disturbing, perturbing and partial destruction of some components of biocoenoses bent, as follows (Nicolaev et al., 1981, Anton, 2006):

- disturbance of biocenoses benthic (molluscs, macrophytes, etc.) by displacement (mechanical effect occurs under the action of the cocking elements); hanging them in mesh network, that training components deployed to the restraining area (codent).

- partial destruction by breaking and crushing (pressor effects are generated by the action of the cocking elements);

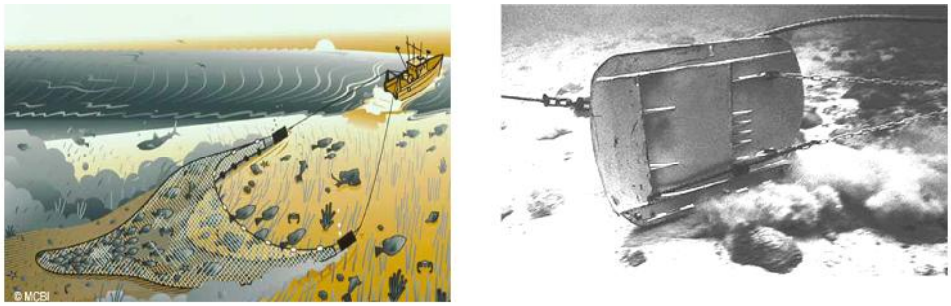

Photo 13 – Trawl operation ensembled mode

Both own research and consulting of specialized bibliography revealed that the most severe effects on the seabed by bottom trawling is not due to mechanical effects generated by all the trawling on biocoenoses bent, but mostly from dig up substrate, disorder and training by large amounts of fine sediment material, (the "pelite"fraction) in water (Fig.1)

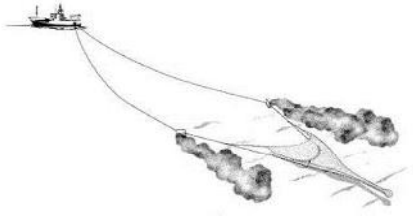

Fig. 1 - The effect of turbulence generated by bottom trawl of operation

These particles contain both minerals and organic matter which increases the eutrophication and the content toxic substances stocked in the bottom sea.

So, bottom trawl operation effects on dolphin populations are indirect: reducing the sources of food and the specific habitat degradation through to dig up biocoenoses benthic sediments and disturbance.

Pelagic trawl

In case of pelagic trawl bottom reinforced version, the functioning effects on biota they inhabit are the same as those above described above for bottom trawls (Fig. 2).

Under these conditions, the effects of pelagic trawl operations (bottom reinforced version) on dolphin populations can be indirect, by reducing food sources and specific habitat degradation and direct, by accidental capturing (Nikolaev et *all.,* 1981, Anton , 2006) (Photo 14)

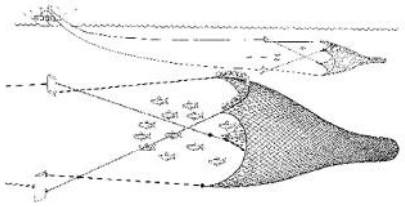

Fig. 2 – Pelagic trawl

Photo 14 – Accidental dolphin catches

MEASURES AND RECOMMENDATIONS

The development measures and recommendations for protecting dolphin populations and their specific habitats are based on the conclusions of our research and other sources of information considered essential to solving environmental actions required at national and regional levels.

Analysis and interpretation of considered available data and information highlighted some problems for whose solution the following measures are proposed and recommended:

- Development recommendations for fishing activity:

- use of a new type of fishing gear only after an environmental impact study;
- prohibiting the use of the dredges, bottom trawl and pelagic trawl in bottom reinforced version, as during operation, due to permanent contact with the sea they generate adverse effects on fishery resources and their specific habitat by perturbing of sediments and disturbance of benthic biocoenoses;
- prohibiting the use of turbot fixed nets with side mesh size under 200 mm and fineness of the yarn under tex 6, 350;
- prohibiting the use of gill nets without marking their position with buoys and identification marks;
- marking the brands of gear for establishing their legal affiliation and manufacturing;
- fitting with devices hidroacoustic turbot gillnets (pinger) for preventing the intersection of these tools with dolphins.

♦ Special protection of spawning areas, feeding and wintering fishery resources and marine mammals.

♦ Increasing control actions by fisheries inspectors, Border Police and Environmental Guard in the fishing areas.

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