IMPACT OF TRAWLING ON BENTHIC BIOCENOSES

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UTICAJ KOČARENJA NA BIOCENOZE BENTOSA

Abstract

Kočarenje predstavlja način ribolova gdje se mrežom povlači po morskom dnu. Ovaj način je u velikoj mjeri zastupljen u otvorenim vodama Crne Gore. Proces kočarenja uzrokuje brojne negativne efekte na morskom dnu kao što su degradacija bentosnih biocenoza i narušavanje strukture supstrata. Korišćenje mreže, koja je obično neselektivna sa morskog dna bivaju zahvaćeni i organizmi koji nemaju komercijanu vrijednost. Značajan dio ulova pripada različitim vrstama beskičmenjaka i ribljoj mlađi, čija veličina ne zadovoljava standarde tržišta, i sve ovo skupa čini nejestivi dio. Ovaj materijal poslije selekcije biva vraćen u more. To doprinosi narušavanju ravnoteže unutar životnih zajednica na morskom dnu. Kočarenje može da dovede do favorizovanja određenih vrsta dvojako. Jedan od načina je eliminisanje prirodnih predatora iz okruženja a drugi način je povećavanjem dostupne količine hrane putem vraćanja u more nejestivog dijela ulova. Kočarenje može dovesti do regresija u livadama *Posidonia oceanic*. Podizanjem mulja sa morskog dna stvaraju se veliki oblaci suspendovanih čestica u vodenom stubu, dovode do zamućenja vode tako da količina svjetlosti koja dopire do dna biva značajno smanjena. Ove čestice se talože na listovima morskih cvjetnica i usporavaju njihovu produkciju. Jedan od načina ugrožavanja morskih cvjetnica putem kočarenja je i čupanje rizoma iz podloge koje se dečava prilikom povlačenja mreže po morskom dnu.

Stepen uticaja zavisi u jednu ruku od fizičkih karakteristika opreme (material i težina) i uslova pod kojima se koristi (brzina kretanja i vrijeme trajnja) i u drugu ruku od vrste sedimenta i bentosne zajednice koja je na njemu razvijena.

Rezultati prikazani u radu su nastali kao dio projekta "Biološki resursi, jestivi i nejestivi, u kočarskom ribolovu na crnogorskom primorju" zbog toga što na datom prostoru ne postoji ni jedan projekat koji tretira ovaj problem zasebno.

Podaci su dobijeni na osnovu deset poteze (rastojanje između dvije tačke gdje počinje i završava vučenje mreže), na kojima je dubina bila u rasponu od 42 m do 350 m.

Dobijeni podaci pokazuju da je količina nejestivog dijela ulova bila u rangu od 1% do 36%. Ovo ukazuje da velika količina morskih organizama biva zahvaćena mrežom sa morskog dna i ponovo vraćena nazad jer nema upotrebnu vrijednost.

***Ključne reči**: kočarenje, bentosne biocenoze, nejestivi ulov*

INTRODUCTION

Trawling is fishing mode where the mash is pulled over the seabed. This fishing method is greatly present in the open sea of the Montenegro. Process of trawling generates numerous negative impacts on the seabed such as degradation of composition of benthic biocenoses and the structure of substrate (Tudela & Sacchi, 2003). Now days this problem has higher significance than before and the number of project who treat the problem is in progress. Trawling has strong negative influence on the sea bottom life for two reasons. One effect is manifested through unselective collection of the living organisms that is essentially useless for commercial purposes, either because of their inedibility either because of its size that does not meet commercial standards (Charbonnier, 1990; Machias et al. 1999). Reducing the number of certain species of animals disturbs the equilibrium of the bottom communities. Another negative effect realized by trawling is raising large amounts of suspended particles in the water column and thus reduces the amount of light that reaches the seafloor, slowing down production in the first place seagrasses (Tudela & Sacchi, 2003).

The level of this impact depends on one hand, on the physical characteristics of the gear (materials and weights) and the conditions of its utilization (speed and duration) and, on the other, on the type of sediment and the benthic biocenoses on it (Hall, 1999).

MATERIAL AND METHODS

Research on the impact of trawling on demersal biocenoses is part of the project "Biological resources, edible and inedible, in trawling fisheries at Montenegrin coast". Data collection was conducted during the summer 2009, on ten stations along the open part of Montenegrin coast. The material was collected in the depth range of 42 m to 350 m. Withdrawal of the network is carried out in positions where were present different types of biocenose on different substrates. The analysis included measurements of inedible catch – discard (various groups of invertebrates and juvenile fish). The collected material is measured by the trade balance and the percentage was determined by its representation of the total catch. The inorganic content of the mesh has been subjected to measurement too (mostly waste of anthropogenic origin).

RESULTS AND DISCUSION

The study comprised ten positions with various types of substrates as movable as unmovable. The muddy was dominated surface but the fishnet subsided over the sandy bottom as well as hard surfaces. Analysis of net content based on the percentage content of certain groups is shown in Figure 1. Participation of inorganic part of the catch ranged from 0% to a maximum of 50%. The inorganic part was mainly of anthropogenic origin and it was dominated by car tires and plastic bottles. As for inedible part, its share in the

total catch was within the range of 1% (position 4) to 36% (position 1). Within inedible material was prevailing invertebrate group echinoderms. Within this group according to the number of individuals stood out sea lilies (*Antedon mediteranea*) while the related to biomass sea cucumber (*Parastichopus regalis*) was dominated. Representatives of other invertebrates present on the investigated sites were Ascidiae, Mollusca, Cnidaria. As for the fish that really belong to the inedible part (discard) it was hard to determine their quantity, because the fishermen offer for sale on the market samples which size do not meet commercial standards.

One of the problems that occur in the fishing industry is that the whole non-edible (by-catch) portion returns back into the sea. In this way, discarded biomass can lead to changes in ecosystem structure favouring certain species that feed on animals recovered (Morant et al. 2000). Fishing may favour individual species in two ways by removed their predators from environment or increases the amount of available food by returning discard into the sea.

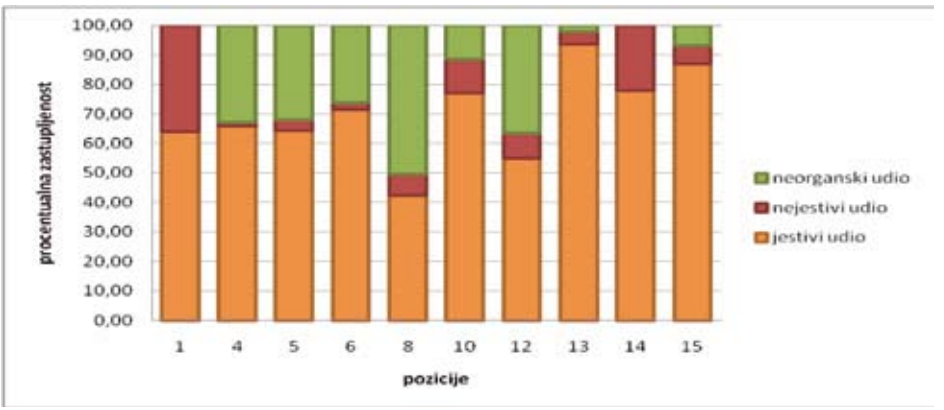

Figure 1. The percentage share of edible, inedible and inorganic part of the catch in trawl fishnet.

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Indirect effects on the seabed is reflected by size of the stress that benthos is exposed (Jones, 1992). Trawling is responsible for raising large amounts of sediment and its suspension in the water column. These clouds of mud have a negative effect on fish but also negatively affect production of benthic communities. However, the exact consequences of this phenomenon are not known.

Besides leading to disproportion in animal components of biocenoses trawling is the main reason of regression that occur in the meadows of *Posidonia oceanica* (Martin et al., 1997). In this way disturbed community, which used to be a shelter for large numbers of fish and their spawning place, cease to be (Sanchez-Jerez & Ramos-Espla 1996). Fish lose their natural habitat, and gradually comes to reducing their populations. Unfortunately we have no data that would detail out this problem but few studies are conducted in France and Italy, where it was done comparing the situation between

Posidonia meadows in areas where fishing is allowed and protected areas where fishing is prohibited (Buia et al . 1999; Harmelin-Vivien 2000; Francour 1999) and obtained results show decreasing mean weight, density and biomass of fish in exploited areas.

CONCLUSION

The use of networks in demersal fisheries has multiple negative effects on wildlife of the sea floor. The exact effects of this process are not fully tested because in our country has not conducted any detailed research, and an insufficient number of projects dealing with these issues in the region.

It is known however that non-selective fishing net from the ocean floor collect organisms that are builders of benthic biocenose and have no commercial value. They include representatives of numerous groups of invertebrates and juvenile fish, which did not reach commercial size. Besides animal components trawl is in violation of the vegetable component. This primarily refers to the area where the present *Posidonia oceanica*, whose development are prevented by particles of suspended sediments.

Own studies have shown that the proportion of the by-catch move up to 36%, which means that one third of the fishnet content is unusable for food and being separated from their natural habitat.

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