

MODULE 2. CONTENT

Elaborated by UNIDU – University of Dubrovnik

MODULE 2. DISCARDED SPECIES IN FISHERY AND SUGGESTED METHODS TO REDUCE

AUTHORS

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STRUCTURE FOR MODULE CONTENT

The content will be what the trainee/student will learn throughout the module after starting to take it.

TEACHING SPECIFICS

- SETTING (INDOOR/OUTDOOR/DISTANCE/BLENDED): Online (E-learning)
- DURATION (HOURS): 20h
- MATERIALS: Presentation, questions, case studies, self-study
- NO. OF LEARNERS/REPRESENTATIVES: Depending on the number of participants
- INDIVIDUAL OR GROUP WORK: Both, depending on the number and distribution of participants

INFORMATION ABOUT THE TOPIC

Discarding, that portion of the catch that is not retained on board and may include target species or other commercial and non-commercial species that are discarded dead or alive into the sea, is a worldwide problem. Discards usually result in a reduction of harvesting opportunities and can have negative consequences on the stocks, ecosystems and the marine environment. They increase changes in food chain ecology by generating increased levels of food through dead fish or fish that may not survive after release, altering the relative prey-predator abundance and causing additional interactions between species (e.g. scavenging organisms on the sea floor and feeding populations of seabirds, marine mammals, sharks). Especially in deep-sea environments where food is scarce, the input of organic matter from discards increases the diversity of benthic communities in localized areas. In contrast, species with low discard mortality in areas with extensive fisheries may increase in abundance and alter ecosystem relationships.

The extent of discarding varies by region, species, and fishery due to legal obligations or economic incentives, damage to fish, or prohibitions on catching these species. The multispecies/multi-gear fisheries in the Mediterranean Sea result in wide variation in catch, target species, sorting methods, and discard composition, both geographically and among different gears. Discard rates vary widely by fishing method and geographic area. Discarded fish depend on the fishing fleet and fishing methods, but even within the same fishing fleet there are large differences in discarded fish by target species or season.

Bottom trawlers show by far the highest discard ratios in the Mediterranean region, it is multi-species without clearly defined target species. Over 100 species are totally or partially discard and landings of some of them (e.g., hake, *Merluccius merluccius* (Linnaeus, 1758)) often include undersized catch (i.e., smaller than the Minimum Conservation Reference Size) due to poor selectivity in the Mediterranean trawl fisheries and the existence of market demands

for this part of the catch. In the purse seine fishery, *Engraulius encrasicolus*, *Sardina pilchardus*, and *Sardinella aurita* are the target species, and discard rates are very low, but quantities are also very high due to the large amount of pelagic fish that purse seiners catch. These are non-target species such as *Scomber* spp., *Trachurus* spp. and *Boops boops* that are undersized or have no economic value in a given time period. In artisanal fisheries, discard rates are low and depend on many factors, such as the gear used and the market.

Good fisheries management focusing on reducing discards requires understanding how fisheries work and being aware of opportunities for fishermen to reduce discards through improved gear selectivity. There are some legal restrictions on fishing, the main direct restrictions are: Gear restrictions, temporary gear closures, landing bans for undersized fish, discard bans - landing obligations. Given the lack of information on discards, it is important to establish and implement a comprehensive monitoring and control system to ensure compliance and collect adequate data for scientific and management information.

CAUSES AND DESCRIPTION OF HOW IT MANIFESTS

Module 2 provides basic knowledge of discards in fisheries, why they are not only an economic problem but also an ecosystem problem, and how they can be minimized. Discards depend on the geographic area and the tools used. One of the most important criteria is knowing that there are different types of fisheries with different types and amounts of discards, made up of different species of fish. Knowing these species gives us the possibility to use them as BARF for pets, and it is important part of MARIPET syllabus.

PRINCIPLES, BASIC TERMS, AND MEASURES WITHIN THE SPECIFIC MODULE

The module consists of four sub-topics:

- Introduction
- Mediterranean fishery
- Discard species in Mediterranean fisheries
- Methods to reduce discards

The first two subtopics describe the discard problem in general and the situation in the Mediterranean, where the discard problem is very large. The third topic, dealing with discards in the Mediterranean fishery, is divided by fishery type. The fourth subtopic, dealing with methods to reduce discards, is also divided by the different methods and examples of best practices from Norway and Iceland. The module will give an overview of the specific principles, basic terms, and measures related to each sub-topic.

TRAINING MATERIAL FORMAT (TASKS, CASE STUDIES, EXERCISES) WITH A SHORT DESCRIPTION

The training material for module 2 consists of a written chapter (29 pages) supported by a presentation (33 slides) that includes questions to the four sub-topics presented.

INSTRUCTION FOR ASSESSMENT

IQuiz assessment to be taken on Moodle

LINK TO ONLINE RESOURCES AND SPECIFIC IMAGES

- Celić, I., Libralato, S., Scarcella, G., Raicevich, S., Marčeta, B., Solidoro, C. 2018. Ecological and economic effects of the landing obligation evaluated using a quantitative ecosystem approach: a Mediterranean case study. *ICES Journal of Marine Science*, 75(6): 1992–2003. <https://doi.org/10.1093/icesjms/fsy069>
- Dalyan, C. 2020. The Commercial and Discard Catch Rates of the Trawl Fishery in the İskenderun Bay (Northeastern Levantine Sea). *Trakya. Univ. J. Nat. Sci.* 21(2): 123-129. <https://doi.org/10.23902/trkjinat.773435>
- Damalas, D. 2015. Mission impossible: Discard management plans for the EU Mediterranean fisheries under the reformed Common Fisheries Policy. *Fisheries Research* 165: 96-99. <https://doi.org/10.1016/j.fishres.2015.01.006>
- Demestre, M., de Juan, S., Sartor, P., Ligas, A. 2008. Seasonal closures as a measure of trawling effort control in two Mediterranean trawling grounds: Effects on epibenthic communities. *Marine Pollution Bulletin*, 56: 1765-1773. <https://doi.org/10.1016/j.marpolbul.2008.06.004>
- D’Onghia, G., Carlucci, R., Maiorano, P., and Panza, M. 2003. Discards from deep-water bottom trawling in the eastern-central Mediterranean Sea and effects of mesh size changes. *Journal of Northwest Atlantic Fishery Science*, 31: 245–261. <https://doi.org/10.2960/J.v31.a19>
- FAO. 2022. The State of Mediterranean and Black Sea Fisheries 2022. General Fisheries Commission for the Mediterranean. Rome. <https://doi.org/10.4060/cc3370en>
- Gil, M.M., Catanese, G., Palmer, M., Hinz, H., Pastor, E., Mira, A., Grau, A., Koleva, E., Grau, A.M., Morales-Nin, B. 2018. Commercial catches and discards of a Mediterranean small-scale cuttlefish fishery: implications of the new EU discard policy. *Sci. Mar.* 82S1: 155-164. <https://doi.org/10.3989/scimar.04735.03B>
- Nedreaas, K., Kuhnle, G.A., Iversen, S.A., Kjellekvold, M. 2022. The Norwegian small scale fishery and data provided for the IHH FAO-Duke-WorldFish project. Rapport fra havforskningen 2022-18 ISSN: 1893-4536
- Oro, D., Ruiz, X. 1997. Exploitation of trawler discards by breeding seabirds in the north-western Mediterranean: differences between the Ebro Delta and the Balearic Islands areas. *ICES Journal of Marine Science*, 54: 695–707. <https://doi.org/10.1006/jmsc.1997.0246>
- Sacchi J. 2008. The use of trawling nets in the Mediterranean. Problems and selectivity options. In: Basurco B. (ed.). *The Mediterranean fisheries sector. A reference publication for the VII meeting of Ministers of agriculture and fisheries of CIHEAM member countries* (Zaragoza, Spain, 4 February 2008). Zaragoza: CIHEAM / FAO / GFCM, 2008. p. 87-96. Options Méditerranéennes: Série B. Etudes et Recherches; n. 62
- Sardà, F., Coll, M., Heymans, J. J., and Stergiou, K. I. 2015. Overlooked impacts and challenges of the new European discard ban. *Fish and Fisheries*, 16: 175–180. <https://doi.org/10.1111/faf.12060>
- Spedicato, M.T., Lizaso, J.L.S., Tsagarakis, K. et al., 2022. Synthesis of the Landing Obligation Measures and Discard Rates for the Mediterranean and the Black Sea. Final Report. European Climate, Infrastructure and Environment Executive Agency. 73 pp. <https://doi.org/10.2926/237700>
- Tsagarakis, K., Nikolioudakis, N., Papandroulakis, N., Vassilopoulou, V., Machias, A. 2018. Preliminary assessment of discards survival in a multi-species Mediterranean bottom trawl fishery. *Journal of Applied Ichthyology*, 34: 791-1096. <https://doi.org/10.1111/jai.13691>

Tsarakis, K., Palialexis A., Vassilopoulou V. 2014. Mediterranean fishery discards: review of the existing knowledge. Journal of Marine Science, 71(5): 1219–1234. <https://doi.org/10.1093/icesjms/fst074>

Uhlmann, S.S., Ulrich, C., Kennelly, S.J. 2019. The European Landing Obligation: Reducing Discards in Complex, Multi-Species and Multi-Jurisdictional Fisheries. Springer Open pp. 43. <https://doi.org/10.1007/978-3-030-03308-8>

STEP-BY-STEP GUIDE

FIRST PART - INTRODUCTION – 4 SLIDES

The introduction is the first part of Module 2, explaining what discards are and why they occur. Discards are a worldwide problem, and this part will explain why.

FIRST ACTIVITY - QUESTIONS – 1 SLIDE

Two questions for discussion related to the sub-topic presented in the first part of the module are presented.

SECOND PART – MEDITERRANEAN FISHERY – 3 SLIDES

The second part gives an overview of the Mediterranean fishery and the reasons for the extensive discards, considering the special characteristics such as isolation, multi-species and multi-gear fishing, and the generally high fishing pressure to which the Mediterranean is subjected.

THIRD PART – DISCARD SPECIES IN MEDITERRANEAN FISHERIES – 7 SLIDES

The third part describes the implementation of the landing obligation and stock regulation. It also presents the main discard species caught by different gears in the Mediterranean fishery.

SECOND AND THIRD ACTIVITY - QUESTIONS – 1 SLIDE

Three questions for discussion related to the sub-topic presented in the second and third part of the module are presented.

FOURTH PART – METHODS TO REDUCE DISCARD – 15 SLIDES

The fourth part describes different methods to reduce discards and the discard management plan for Mediterranean fisheries. This part includes two examples of good practise.

FOURTH ACTIVITY – QUESTIONS - 1 SLIDE

Two questions for discussion related to the sub-topic presented in the fourth part of the module are presented.

FACILITATOR'S NOTES

TITLE	ESTIMATED TIMING	FACILITATOR NOTES	MATERIALS NEEDED
Questions - Part 1	15 min	Individual, followed by online class discussions.	Internet connection
Questions - Part 2 and Part 3	30 min	Individual, followed by online class discussions.	Internet connection
Questions - Part 4	30 min	Individual, followed by online class discussions.	Internet connection

APPENDIX 1 - TITLE

Add here:

- N/A

APPENDIX 1: REFERENCES

The following table summarizes the documents referenced in this document.

Location	Description
<URL or file path to where document is located>	The module syllabus presented as a text file
<URL or file path to where document is located>	The module presentation, which also includes questions



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