



## D.3.3 Summary of the environmental impact and the Cost Benefit Analysis

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## Overview

Recent studies estimate that approximately 27,000 tonnes<sup>1</sup> of plastic from fishing gear and Single Use Plastics (SUP) enter in the marine environment each year. The 41 %, 11,000 tonnes per year, are fishing gear lost from the active fishing fleet, concluding that as much as 550,000 tonnes of fishing gear might have accumulated in the European Economic area until today, given the development of the European fishing fleet over the past five decades. Unintentional and intentional loss of fishing gear at sea result in marine litter and negative environmental impacts. Abandoned, lost, or otherwise discarded fishing gear (ALDFG) containing plastic materials will degrade very slowly, remaining in the marine environment for decades if uncollected.

Current situation has serious environmental consequences for nature, mainly for the ghost fishing where nets continue trapping everything in their path, presenting a major problem for the health of our oceans and marine life. Ghost nets also harm coral reefs too—breaking corals, exposing them to disease, and even blocking the reefs from needed sunlight. On the other hand, it has socio-economic impacts since it negatively affects fishing and tourism.

By the execution of the project were studied and analyzed solutions for preventing the fishing nets to be lost in the sea and for recycling non-usable nets aimed to boost the circularity of fishing gears.

Besides, these solutions are expected to reduce the environmental impacts of the current situation where some fishing nets are lost in the sea and the ones that achieved their end-of-life are disposed but not recovered.

The reduction of the environmental impacts is validated by means of a dedicated Life Cycle Assessment for the different solutions achieved along the OCEANETS project.

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<sup>1</sup> EUROPEAN COMMISSION IMPACT ASSESSMENT. Reducing Marine Litter: action on single use plastics and fishing gear. Part 1/3 -28.5.2018

## Environmental assessment procedures.

According to the OCEANETS project, two different and complementary solutions were implemented. In one side, dedicated recycling processes were established for boosting the recovery of the non-usable fishing nets once they reach their end-of-life to replace the conventional waste treatment they have. On the other side, the use of ICT tools aimed for reducing the quantity of fishing nets lost in the sea.

The scope of this report is to assess the differences on environmental impacts for the current waste fishing nets treatment when the recycling process is implemented on the collected non-usable nets, and when the ICT tool is in operation. Accordingly, three different scenarios were modelled:

- CURRENT: based on the conventional waste management of end-of-life fishing nets
- RECYLING: based on the recycling process of end-of-life fishing nets validated along the OCEANETS project to obtain high-value plastic pellets ready to be used as recyclates
- RECYLING+ICT: based on the recycling scenario but implementing the ICT tool for reducing the fishing net losses in the sea

Three different scenarios were assessed. However, they share same data regarding the quantity of fishing nets at the initial stage (to be an operative fleet) and the ratio PA6:HDPE:PES in their composition by material type.

However, since the solutions that the OCEANETS project developed tackle the end-of-life of these nets, the replacement ratio for covering non-usable nets and the percentage of lost nets changed across the different scenarios. This also impacted the waste treatment process on each scenario.

SimaPro was used for the environmental assessment of the collected data. SimaPro is one of the software related to the development of LCA of greater trajectory and with implantation at international level. SimaPro allows to perform a high-level scientific and technical LCA, with multiple exposure options and results analysis. It integrates multiple inventory databases, among which ecoinvent stands out for its broadness and development, giving access to a large amount of material and process data.

Among the different methodologies available on the SimaPro software, the assessment presented was done following the Environmental Prices<sup>2</sup> methodology.

Environmental Prices methodology allows for having environmental impacts at midpoint level, as ISO 14040 and ISO 14044 recommends. These midpoint results were used for identifying the processes contributing the most to the overall environmental impacts of the different scenarios assessed. However, a deep analysis of each impact category was not conducted.

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<sup>2</sup> <https://www.cedelft.eu/en/environmental-prices>

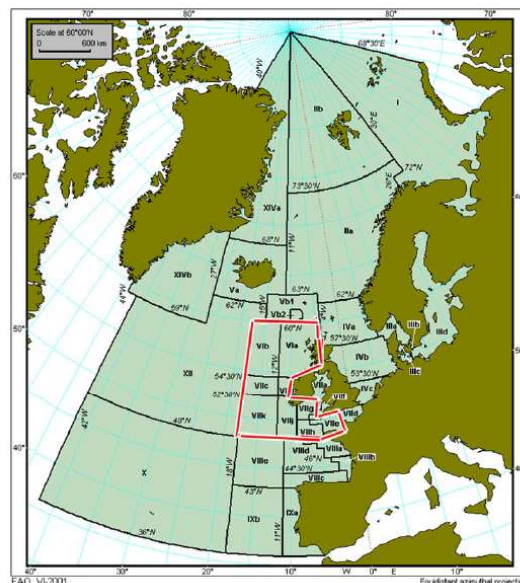
## Cost benefit analysis procedure

The cost-effectiveness of ALDFG measures can be considered by comparing their cost against the (estimated) benefits. Cost-Benefit Analysis (CBA) is generally applied in a context of policy assessment with the main objective to quantify in monetary terms the value of all consequences of a given policy to all members of a society (Boardman et al., 2006). The broad purpose of CBA is to help in the decision-making process with more rational judgement elements to allocate efficiently society's resources.

CBA allow us to quantify the social benefits not just in physical units but also in monetary terms. The great advantage of converting social and biophysical impacts on non-market goods into monetary units (i.e., monetizing LCA) lies in the capability to compare heterogeneous impact categories and their costs and benefits already expressed in monetary units (Alroth, 2014).

The CBA would allow us to quantify the environmental cost savings of the LCA comparing the defined scenarios per functional unit (e.g., 1 kg of fishing net). However, it is necessary to aggregate results into a socio-economic scale that will be the basis for the development of relevant policies following the results from Oceanets project according to our assessment of the potential environmental benefits of recycling fishing nets. For the purpose of this work, we select the Galician trawl fleet working on the Great Sole fishery, highly linked to the project partner ARVI.

The Great Sole is a fishing ground located in the Atlantic Ocean, to the west of British Isles (Fig. 1). It is noted for its rich fishery, especially for hake with a great economic performance. In Table 1 is shown relevant information to assess the aggregated impact in this area.



**Figure 1. Delimitation of the sub-areas in Great Sole fishing ground (Source: FAO, 2001b)**

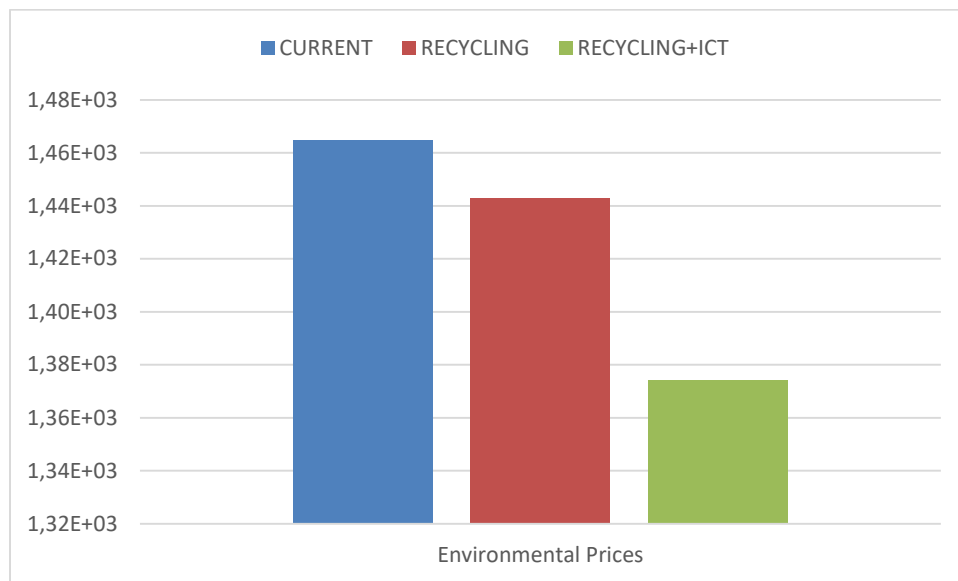
**Table 1. Great Sole fishing ground information (Source: MAPA, 2014).**

Nº of fishing gears per trawler and campaign	6
Fishing gear weight (kg)	825
Average fishing gear breakage volume (kg/trawler)	2,475
Purchase new fishing gear per year	3
Nº of trawlers (trawl fleet)	55
P.E./trawler (kg)	2,55
Nylon/trawler (kg)	420
P.E./year (kg)	113,025
Nylon/year (kg)	23,100
Potential annual net consumption by the trawl fleet (kg)	136,125

## Main results and conclusions.

The combined use of the ICT tools for avoiding the loss of fishing nets, and the application of different recycling processes, for the end-of-life fishing nets, allowed to decrease the environmental impacts of the current scenario, where some nets are lost, and the wasted nets are disposed under the conventional scenario (non-recycled).

When the environmental impacts of the three assessed scenarios are weighted in a single score comparison, based on Environmental Prices methodology, expressed as EUR2015, the previous obtained results are highlighted (Figure 2):



**Figure 2. Weighting process of midpoint impacts into a single (price) score<sup>3</sup>.**

Just by recycling the waste nets to be used in new products instead of their disposal, there is a slight reduction in the environmental impacts because of the recyclates obtained replace virgin plastics. When the ICT tool is also implemented, the need for new fishing nets for keeping the Gran Sol fleet is minimized. Thus, the total impacts are significantly reduced compared to the current situation. This is ascribed to the fact that main environmental impacts for all the assessed scenarios come from the fabrication of new fishing nets. Thus, reducing the quantity of new nets by the implementation of the ICT directly impacts on the environmental behavior of this scenario, beyond the inherent benefits obtained from the recycling process, and the use of the recyclates, coming from the end-of-use nets.

<sup>3</sup> <https://simapro.com/2019/calculate-the-costs-of-pollutionin-simapro-with-environmental-prices/>



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