BLUE MISSION BANOS

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SEARCULAR – Project Overview

1st Mission Arena by Blue Mission BANOS
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Project Overview
General

- Topic: HORIZON-MISS-2022-OCEAN-01-05
  “Marine litter and pollution – Smart and low environmental impact fishing gears”

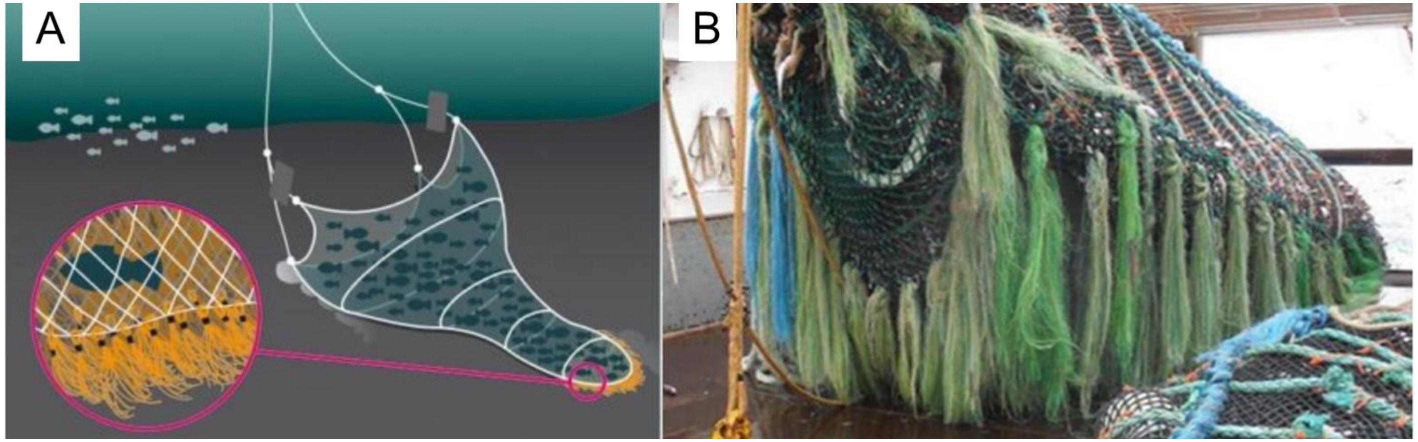
- Objective
  - The main objective of SEARCULAR is to **reduce the amount of marine litter and microplastic** from among the most relevant European fishery contributors (demersal trawlers, demersal seiners, tropical tuna purse seiners) and to introduce circular economy practices within the fishing sector value chain including ports, by fostering behavioural change.

- Timeline
  - September 2023 – August 2026

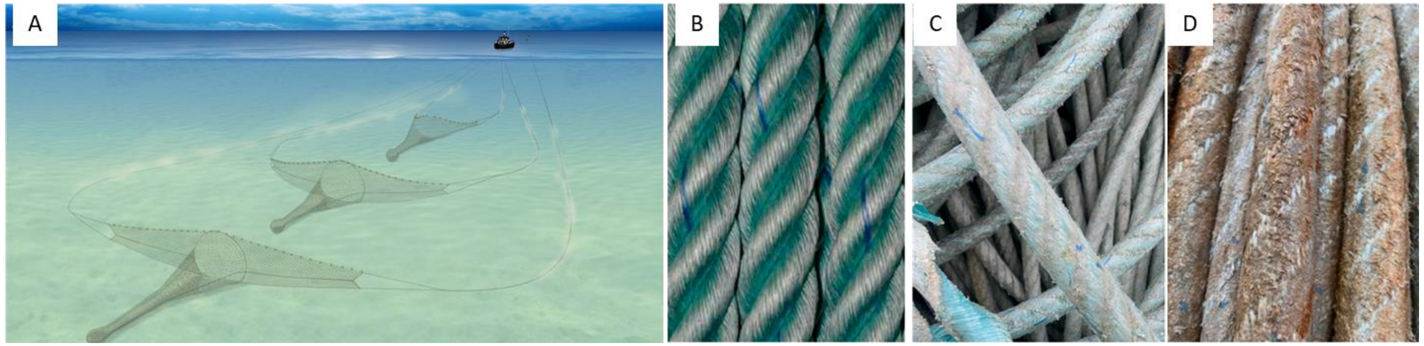
- Development of four Solutions (TRL 7-8)

Project Overview
Solutions 1 and 2

- Dolly ropes made of recycled polyamide (PA)
  - Fossil resources usage ↓
  - Abrasion and microplastics ↓



- Biodegradable highly resistant demersal seine ropes
  - No persistent microplastics
  - Usage time ↑



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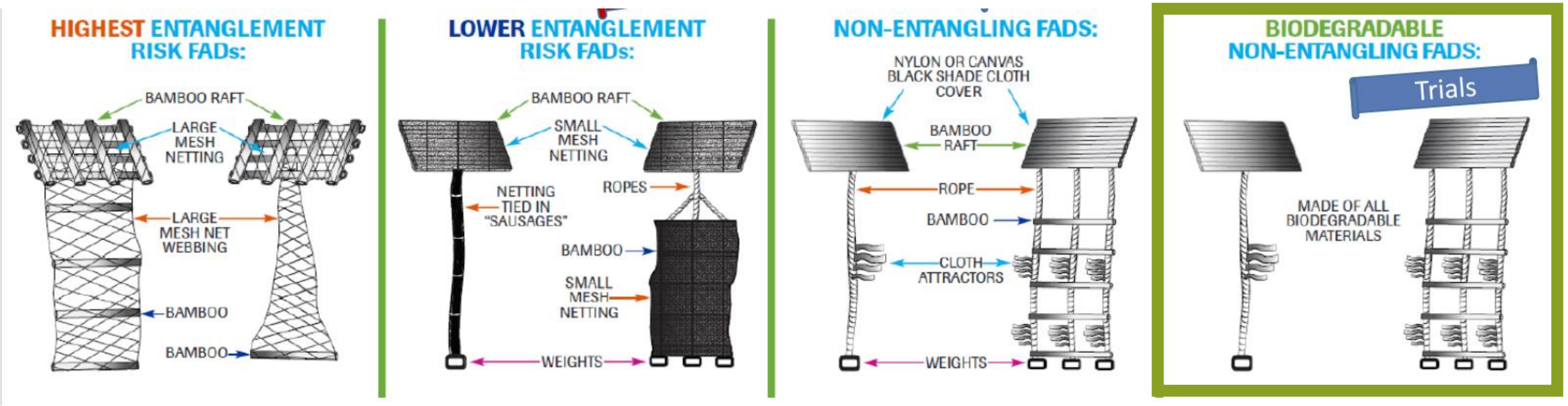
Project Overview

Solutions 3 and 4

- Biodegradable drifting fish aggregating devices (dFADs)
  - Fossile resources usage ↓
  - No entanglement risks (based on Jelly-FAD design)
  - No persistant microplastics



- Port-based solution for recycling of end-of-life (EOL) fishing gears
  - High-quality recycling (pyrolysis)
  - Less discarded FGs ↓

Project Overview

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- Conducting comparative Life Cycle Assessments (LCAs) to analyse potential environmental impacts of the solutions
  - Cooperation with VTT (Finland)
  - The LCA follows **ISO 14040:2006** and **ISO 14044:2006**
  - ISO 14040: Environmental management – LCA – Principles and framework (ISO 14040:2006)
  - ISO 14044 : Environmental management – LCA – Requirements and guidelines (ISO 14044:2006)
- The assessment is followed by a detailed contribution analysis
- The results will be documented in a report

Life Cycle Assessment

LCIA methodology & Choice of impact categories

- Impact assessment method
  - Product Environmental Footprint (PEF 3.1)
  - In combination with a plastic pollution impact assessment method
- Impact categories investigated
  - 13 »standard« categories (see table)
  - **New category: plastic pollution equivalents (PPe)**

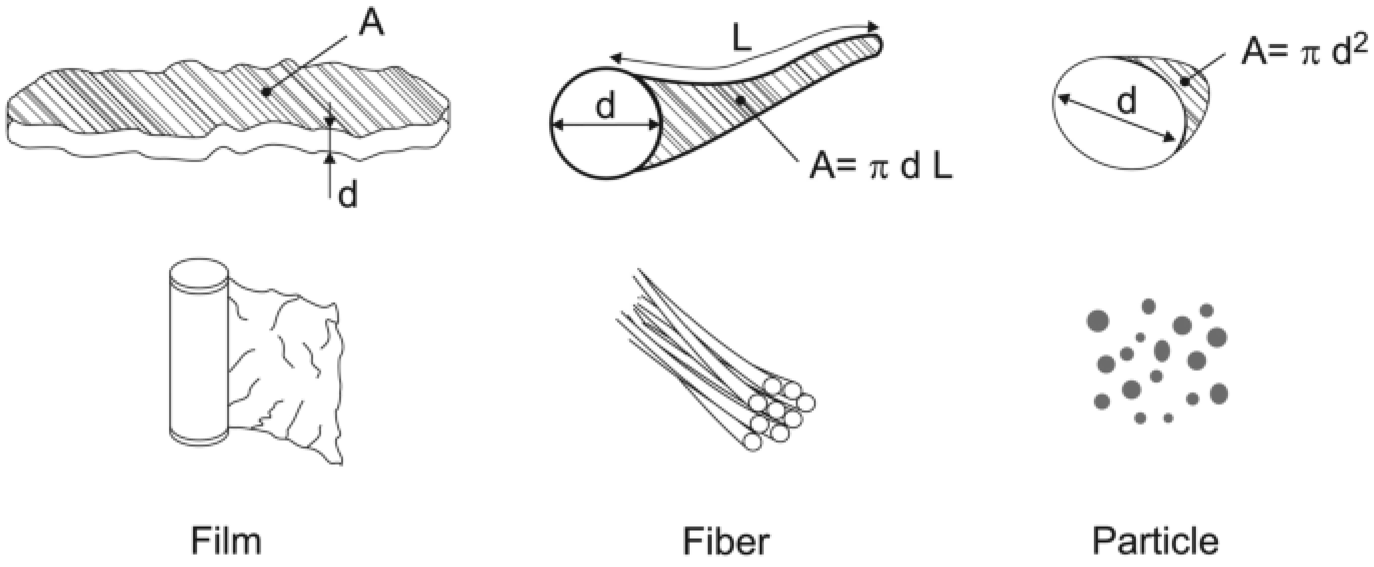
Impact category	Unit	LCIA Method
Acidification	Mole of H+ eq.	Accumulated Exceedance model [Seppälä et al. 2006; Posch et al. 2008]
Climate Change	kg CO_2 eq.	Bern model – Global Warming Potentials (GWP) over 100-year time horizon [IPCC 2013]
Eutrophication freshwater	kg P eq.	EUTREND model [Struijs et al. 2009] as implemented in ReCiPe
Eutrophication marine	kg N eq.	EUTREND model [Struijs et al. 2009] as implemented in ReCiPe
Eutrophication terrestrial	Mole of N eq.	Accumulated Exceedance model [Seppälä et al. 2006; Posch et al. 2008]
Ionizing radiation - human health	kBq U^{235} eq.	Human Health effect model [M. Dreicer et al. 1995]
Land Use	Dimensionless (aggregated index)	*Soil quality index based on LANCA [Bos et al. 2016]*
Ozone depletion	kg CFC-11 eq.	Steady-state ODPs [WMO 1999]
Particulate matter	Disease incidences	PM model recommended by UNEP [UNEP 2016]
Photochemical ozone formation - human health	kg NMVOC eq.	LOTOS-EUROS model [van Zelm et al. 2008] as applied in ReCiPe 2008
Resource use, fossils	MJ	CML 2002 model [Guinée 2002; L. van Oers et al. 2002]
Resource use, mineral and metals	kg Sb eq.	CML 2002 model [Guinée 2002; L. van Oers et al. 2002]
Water use	kg world eq. deprived	*Available WAter REmaining (AWARE) as recommended by UNEP [UNEP 2016]*
Plastic pollution	Plastic pollution equivalents PPe	Maga et al. 2023

PEF: Product Environmental Footprint

Data requirements

LCIA methodology

- Probability of loss and abrasion of devices
  (10-25% for today's dolly ropes and;
  purse seine ropes; 40% of dFADs;
  to be determined for the newly developed solutions)
  - Calculation of emissions:
    1. Polymer type (PE, PA etc.)
    2. Shape: film, fiber or particle
    3. Size: d (thickness), A (area), L (length)
- → Plastic Pollution Equivalents



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Method to assess plastic pollution impacts

LCIA methodology

- Plastic pollution equivalents according to Maga et al. (2022)[1]
  - Persistence of plastic emissions in the environment as a proxy for their environmental impact
  - Based on the redistribution pathways and degradation speed of a plastic emission in environmental compartments
- Focusing on direct emissions (loss and abrasion of gear); indirect emissions (tire wear during material transport, ship paint abrasion, etc.) out of scope
- Possibility to integrate effect factors, e.g., regarding entanglement or toxicity
- Normalized based on Galafton et al. (2023)[2] and weighted with both the highest and lowest weighting factor recommended by the European Commission for the PEF 3.1

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https://doi.org/10.1007/s11367-022-02040-1

NON-TOXIC IMPACT CATEGORIES ASSOCIATED WITH EMISSIONS TO AIR, WATER, SOIL

Check for updates

Methodology to address potential impacts of plastic emissions in life cycle assessment

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Abstract
Purpose Products made of plastic often appear to have lower environmental impacts than alternatives. However, present life cycle assessments (LCA) do not consider possible risks caused by the emission of plastics into the environment. Following the precautionary principle, we propose characterization factors (CFs) for plastic emissions allowing to calculate impacts of plastic pollution measured in plastic pollution equivalents, based on plastics' residence time in the environment.
Methods and materials The method addresses the definition and quantification of plastic emissions in LCA and estimates their fate in the environment based on their persistence. According to our approach, the fate is mainly influenced by the environmental compartment the plastic is initially emitted to, its redistribution to other compartments, and its degradation

1) https://doi.org/10.1007/s11367-022-02040-1
2) https://doi.org/10.1007/s11367-023-02167-9

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Thank you for your attention

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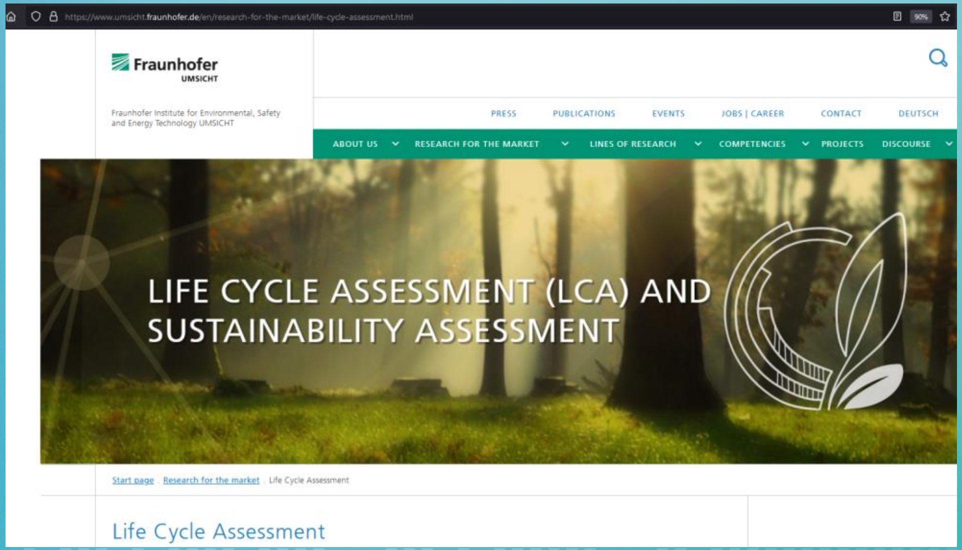

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