Tools for Assessment and Planning of Aquaculture Sustainability

TAPAS CASE STUDY: Nutrient retention of fish farm effluent and site assessment for the feasibility of Integrated Multi-Trophic Aquaculture (IMTA) in Malta

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TAPAS: Tools for Assessment and Planning of Aquaculture Sustainability

- **TAPAS** is a four-year EU Horizon 2020 collaborative research project of 15 partner organizations including research institutions, SMEs and regulators.

  Project duration 2016-2020

- The **TAPAS** project focuses on the aquaculture sector in both marine and freshwater environments with the aim to:

- ➢ - Decrease the licensing time for new and existing developments

- ➢ - Enhance the public image of aquaculture

- ➢ - Improving the sustainability of aquaculture in the EU

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The **TAPAS** project is implemented through a series of parallel **case studies** throughout Europe

The case studies cover a range of different production aquaculture systems including **I**ntegrated **M**ulti-**T**ropic **A**quaculture (**IMTA**)
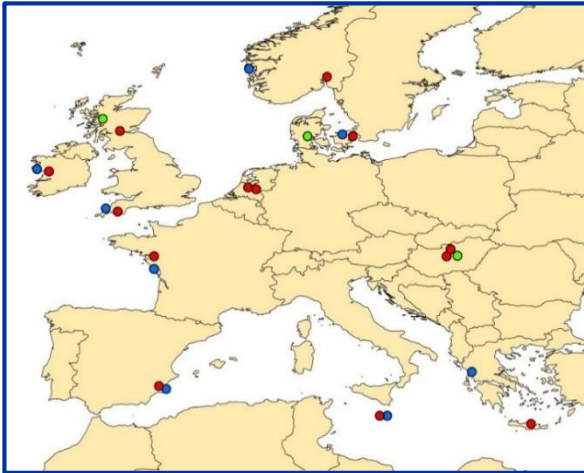
● TAPAS partners

● Freshwater case study

● Marine case study

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AquaBioTech Group

Assessment of **NUTRIENT RETENTION** of fish farm effluent and site assessment for the feasibility of
INTEGRATED MULTI-TROPHIC AQUACULTURE system.

Nutrient Retention

Samples collected:

- Suspended sediments
- Invertebrates
- Sediment
- *Posidonia oceanica*
- Farmed Fish Sea bream (*Sparus aura*
- Fish Feed

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Nutrient Retention

Stable Isotope Analysis results:

- ^{13}C & ^{15}N isotopic composition

- Illustrate which substrate is retaining the most nutrients

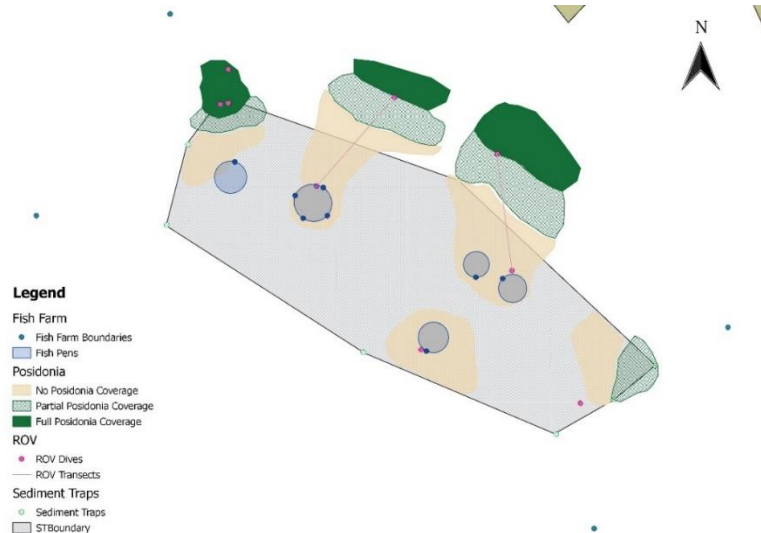- Determine most suitable area for IMTA study

Nutrient Dispersion

ROV Survey

- Distribution of *Posidonia oceanica* within aquaculture farm

- Use the densities to validate the dispersion of nutrients

Legend

Fish Farm
- • Fish Farm Boundaries
- ☐ Fish Pens

Posidonia
- ☐ No Posidonia Coverage
- ☐ Partial Posidonia Coverage
- ☐ Full Posidonia Coverage

ROV
- • ROV Dives
- — ROV Transects

Sediment Traps
- ◦ Sediment Traps
- ☐ STBoundary

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Nutrient Dispersion

Current Profiler and modelling

- Collect hydrographic data around the fish farm area

- Modelling the main pattern of nutrient dispersion

- Determine most suitable area for IMTA study

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## Integrated Multi Trophic Aquaculture System **IMTA**

- Duration: August 2018 – July 2019

- Growth models for deposit-feeders estimate their efficacy to remove particulate organic matter and incorporate it into biomass. IMTA trial validates the growth model.

- Assess survival, growth performance and bioremediation potential of *Holothuria poli* when cultivated at different distances from the fish cage.

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IMTA Trial: Experimental Design

Cultivation of *H. poli* in 3 replicate cages placed in 3 locations chosen at increasing distance from the fish farm 0 m, 10 m, 25 m and in 2 reference sites in the bay near by the fish farm.
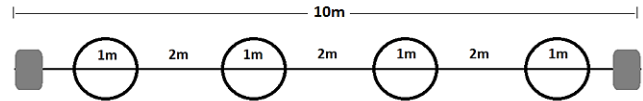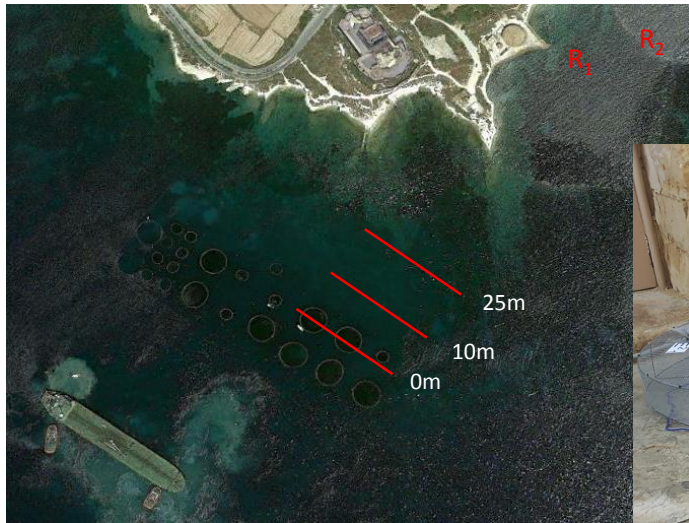
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IMTA Trial: Monthly Sampling

Standardised measurement of whole body wet weight of *H. poli*

Environmental parameters at experimental depth at each site:

Water quality: Temperature, DO, salinity, pH, ammonia, nitrite, nitrate & suspended solids (Niskin sampler)

Sediment quality: organic matter, TOC, inorganic N, redox potential (Core samples & Sediment traps)

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IMTA Trial: SIA Sampling

- *H. poli* sampled from each cage at experimental locations and reference sites at 3, 6 and 12 months after the beginning of the trial and analysed for the ^{13}C & ^{15}N isotopic composition

- Baseline samples: sediment from cores and sediment traps, invertebrate rack & *P. oceanica* samples collected from each cage at experimental locations and reference sites at 3, 6 and 12 months after the beginning of the trial and analysed for the ^{13}C & ^{15}N isotopic composition

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IMTA Trial: Future Results

- Use Stable Isotopes Analysis for assessing the nutrient uptake of the extractive species and surrounding habitat

- Use biometric data of extractive specimens for assessing somatic growth

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