

# **IMPAQT – AN INTELLEGIENT MANAGEMENT SYSTEM FOR INTEGRATED MULTI-TROPHIC AQUACULTURE- A CASE STUDY: CAMLI PILOT SITE**

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## **Introduction**

As aquaculture evolving through industrial scales by exploiting advance technology, a world wide interest in both land-based and nearshore aquaculture systems for combining as an integrated systems comprising fed aquaculture species (e.g. finfish), inorganic extractive aquaculture species (e.g. seaweeds) and organic extractive species (e.g. suspension- and deposit-feeders) has become more concrete (Chopin et al, 2008; Bird et al., 2009; Silva et al. 2012). Integrated Multi-Trophic Aquaculture (IMTA) describes the arrangement whereby species are co-cultured for mutual benefit. IMTA allows the by-products, including waste, from one aquatic species to be the input (fertilizer, food) for another (STFC, 2013). Currently, such systems, which has been referring as “Integrated Multi-Trophic Aquaculture (IMTA)”, has also been perceived as the most prominent progress towards the sustainable of aquaculture, by considering on its potential economic, societal and environmental benefits without any substantial contradictions since it is based on the principle of exploiting waste nutrients from higher trophic-level species for producing lower trophic-level species as added commercial value within a single production system (Troel *et al*, 2009). Such an integrated system not only mitigates considerably emission of production related wastes and thus reduces the nutrient load in the water (FAO,2018), but also increase capability for managerial efficiency in terms of cost reduction and improved product quality The IMPAQT project is an ambitious challenge to design and demonstrate an IMTA system supported by and Intelligent Management System (IMS). The project’s demonstration has been planned to be carried out at six different pilot sites around Europe and one in China, all which has their production and product properties comprising different trophic species such as seaweeds, mussels, scallops, lobster and fish. The pilot in Camli (Cesme, Turkey) has been installed within the boundaries of the offshore production sites of a commercial enterprise at industrial scale which mainly produces seabream, seabass and meagre. It has been designed to carry out an integrated aquaculture production for seabass, blue mussel and sea lettuce. The development of such an offshore IMTA system requires the identification and analysis of environmental, economic and operational costs and benefits in order to be able to compare to a traditional monoculturing offshore system with a similar scale . The comparatie results of such investigations will enabel to assess the actual feasibility for anIMTA system for the future development of offshore aquaculture.

## **IMPAQT Camli Pilot in Cesme-Turkey.**

The IMPAQT project (<https://impagtproject.eu/>) has an overall objective for developing and validating in-situ a multi-purpose (inland, coastal and offshore productions), multi-sensing (heterogeneous sensors and new/emerging technologies) and multi-functional (advanced monitoring, modelling, data analytics and decision making) management platform for sustainable IMTA production. Its ambition is to drive a paradigm shift in the

European Industry by paving the way to both a more environmentally friendly and more efficient/higher yielding European Aquaculture Industry.

IMPAQT's approach is to synchronize 4 main target objectives: *i*) To design and implement new/emerging efficient and cost-effective technologies in monitoring and management systems for IMTA production, *ii*) To validate the IMPAQT systems and IMTA model in-situ and the fish/seafood product in laboratory, *iii*) To demonstrate an optimal sustainable IMTA development in a holistic perspective based on ecosystem services and circular economy principles, and *iv*) To promote an effective transfer of knowledge derived by IMPAQT activities to the EU aquaculture stakeholders.

The Camli Pilot site is appended to the only commercial offshore site at industrial scale with a production capacity about 12500 tonnes of marine fishes. A system composed of three offshore fish cages, a floating pipeline for mussels and another one for seaweeds has been installed within the allocated marine area of the company Camli AS. As a pilot capable to carry out commercial scale production, the experiences that are obtained through the planned activities of IMPAQT project contains a series of information and knowledge of interest for the aquaculture society. The aim of this presentation is to share those experiences with emphasizing the pros and cons so that the future issues to be implemented or challenged can have their place into the agenda of the European Aquaculture Society. The presentation will provide information on the level of contribution of IMPAQT IMTA system and discuss them in terms of a series of aquaculture aspects such as;

- monitoring growth and feed consumption for the optimization of stocking, feeding and harvesting,
- monitoring and preventing health related problems
- monitoring environmental footprint, and.
- monitoring welfare of cultured organisms.

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