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APPLICATION OF SPACE TECHNOLOGY FOR OCEAN FARMING SUSTAINABLE DEVELOPMENT

Abstract

Ocean farming is one of the most promising food industries for helping to feed the growing world population. However, it faces several problems such as Ocean acidification, Harmful Algal Blooms, invasive species, strong weather conditions , marine litter pollution, and pirate fishing events. The main goal of AIOFAR (Artificial intelligence for Ocean Farming) solution is to maximise ocean farming performance by analysing its threats and studying the feasibility of these kinds of farms in selected locations. This objective is reached by combining Navigation and Earth Observation information with in-situ data using smart algorithms based on artificial intelligence.

This solution relies on the monitoring of specific ocean parameters and multispectral imagery gathered from Copernicus satellites and IoT devices deployed onsite. Furthermore, a priori information from owned and external specialised databases, GNSS positioning data, and Weather Forecasts are also analysed. Processing all this information together, our algorithms will detect and predict harmful events that can damage the farms as well as identify the factors that affect their viability.

The results of our analysis will reach the users through a mobile phone and a website application that will be available to receive information of probability of Ocean Farming threats and feasibility study based on geolocation capabilities.

The Moroccan Atlantic coast has been selected as the bounded region to demonstrate the possibilities of the AIOFAR solution. The selection of this area is explained by both environmental and technical reasons. First, the Moroccan Atlantic coast is subject to the influence of coastal upwelling towards the ocean surface which in turn is affected by the anticyclone of the Azores and the zone of intertropical convergence (ITCZ). The upwelling has a direct impact on the abundance distribution and availability of fishery resources which is a relevant characteristic when setting up ocean farms. Moreover, the coast of Morocco is frequently revisited by most of the Earth Observation satellites that are the focus of our study which includes Sentinel 1, 2, 3, 6, and JASON3 satellites.

Another important objective of our research is the aim to increase the sustainability aspect of ocean farms by monitoring their impact in real time and encouraging new techniques that avoid the damage traditional aquaculture activities cause.

This paper aims to investigate and describe the advantages and the capabilities that can be reached with the use of AIOFAR, and satellite data for a specific application of Maritime Surveillance on the Moroccan coasts.