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Is lack of space a limiting factor for the development of aquaculture in EU coastal areas?

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ABSTRACT

This study examines the spatial occupancy of marine finfish aquaculture in the European Union (EU), identifies geographical clusters and administrative areas where cage aquaculture development is particularly significant and provides evidence on the interactions between aquaculture and the touristic use of the coastline.

Despite the increasing demand for seafood in the EU, its aquaculture is not expanding at the same rate (FAO, 2014), and the low number of new licences issued in recent years is a clear sign of the difficulties of the sector to expand.

In this study, Google Earth satellite images and GIS methods were used to map and analyse spatial properties of marine finfish aquaculture sites in the EU. The analysis covers ten member states (Cyprus, Spain, France, Greece, Croatia, Ireland, Italy, Malta, Slovenia, United Kingdom) representing around 95% of EU marine finfish aquaculture production by volume, and Turkey.

The results indicate that existing marine aquaculture sites occupy around 230 hectares (ha) in Greece, and 34 ha in UK, which represent respectively 28% and 44% of EU marine finfish production by volume. Considering these very low figures of occupied surface, it is difficult to imagine that the expansion of marine aquaculture in the EU would be constrained by a lack of space in absolute terms. Limitations to growth may be better explained by the competition for space which takes place at the local level with more established coastal economic activities. To examine in particular the interactions with the touristic use of the coastline, the analysis considered the distribution of hotels around the aquaculture sites and found that there is evidence of strong negative spatial interaction up to a distance of 3 km. These quantitative findings corroborate more qualitative considerations on the conflicts affecting the establishment of marine aquaculture in specific coastal regions in USA, Canada, Australia and New Zealand described in the literature. Another contribution from this study lies in the identification and mapping of geographical clusters and local administrative units where aquaculture production is particularly significant. Since socio-economic data for the individual aquaculture sites in the EU are not easily accessible, the mapping of EU aquaculture clusters is the prerequisite for further research to understand the local enabling conditions apart from bio-physical conditions which favoured the expansion of aquaculture in specific areas and not in others and identifying examples of best practices for the governance of the sector.

1. Introduction

While in the last three decades (1980–2010) world food fish production from aquaculture expanded at least tenfold, at an average annual growth rate of 9.5% (FAO, 2014), in the EU production is stagnating in the freshwater and molluscs segments and growing at a much lower rate of 4% in the case of marine aquaculture (own elaboration on the basis of FAO data). Following this low growth rate, the EU share on world aquaculture production fell from 2.3% in 2009 to 1.5% in 2011. Presently the EU only supplies 35% of its seafood demand and the remaining 65% is imported (STECF, 2014).

As regards the potential of growth in the EU, in its report of 2013 on the economic performance of the EU aquaculture sector, the

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Scientific, Technical and Economic Committee for Fisheries (STECF) stated: “Marine fish aquaculture is characterised by being generally capital intensive, with high input and high labour productivity. This segment has potential to compete on the increasingly globalised market but it faces constrains which hinder further expansion” (STECF, 2013).

Marine aquaculture developed in EU member states in the mid-1980s and 1990s, although with large differences between countries in the rate of growth and development (FAO, 2012). It was essentially an economic development within small and medium sized enterprises in remote areas where alternative employment was scarce. This has been particularly evident for Atlantic salmon in Scotland, Norway and Ireland, sea bass and sea bream in the Mediterranean and mussel farming by line or raft in Ireland, Spain and France (Fernandes et al., 2000).

Information from competent authorities and aquaculture associations in the main fish farming member states revealed that no or only very few (1 or 2) new farming licences were issued in the past 10–15 years for marine finfish in cages (Hofherr et al., 2012).

The very few new licences are indicative of problems of governance of the sector in addressing some common constrains. One reason for not expanding could be the economic performance of fish farming. Especially in the Mediterranean Sea, the segment of sea bass and sea bream production had a low profitability and a process of restructuration and consolidation can be observed (STECF, 2014). Despite favourable market conditions, also in the salmon production no licences for new sites have been issued (STECF, 2014). Analyses of the governance and regulatory systems for the EU aquaculture commissioned by the European Parliament (Hedley and Huntington, 2009) and evaluations of the sector's performance (OECD, 2010; Hofherr et al., 2012; STECF, 2013; European Commission, 2013; OECD, 2014; STECF, 2014) indicate that EU aquaculture development is hindered by i) competition for space in coastal areas, ii) lack of clear priorities for the development of the sector, iii) fragmentation of competences for the authorization of aquaculture sites, and iv) diverging interpretations and applications of environmental legislations which is causing uncertainty for potential investors. Also for Turkey comparable constrains are described by Yucel-Gier et al. (2009). A recent in-depth analysis of conflicts in relation to the environmental justice theory confirms the complex set of claims of the various actors over finfish aquaculture in Europe, often aligning opposition from the tourist sector, small scale fisheries, local population and NGOs (Ertör and Ortega-Cerdà, 2015).

Similar problems for the development of aquaculture are observed in coastal regions in the United States, eastern Australia and northern New Zealand (Gibbs, 2009). In these countries the recreational and amenity services provided by coastal regions, have become highly prioritised values, and aquaculture is often perceived to be a threat to these values. These values often are confused or mingled with other arguments regarding the overall sustainability of aquaculture activities. Where Gibbs sees a risk that prospective operators and administrative regulators are confronted with the need to demonstrate ‘indefinite sustainability’, other authors describe ways and criteria to assess ecological, economic and social aspects of aquaculture activities for a wide range of applications, e.g. Trujillo (2008) to have an objective tool to demonstrate long-term sustainability.

Differently to the isolated view on marine aquaculture, Coll et al. (2012) studied in a fine-scale analysis the spatial accumulation of human activities for the Mediterranean Sea. The findings show that the interaction between cumulative threats and areas of high marine biodiversity is mainly concentrated along certain coastal areas. Most of these areas are also used for aquaculture. Putting greater emphasis on the ecosystem approach, these findings could stimulate the tendency of moving aquaculture further offshore or in closed systems on land (recirculating aquaculture systems - RAS).

An extensive review of the literature on determinants for aquaculture siting listed approximately 20 bio-physical and 10 socio-cultural variables affecting the positioning of marine farms (Rennie, 2002). Among the bio-physical variables, water quality and sheltered conditions are considered key requirement for most farming systems. Over time there was lower relevance assigned to sheltered conditions which may be explained by the availability and adoption of technological solutions (i.e. submersible cages, mooring technologies) which allow farming in more open waters avoiding competition in areas close to shore. In many cases the difficulties encountered by aquaculture can be traced back to social conflicts arising from the incompatibility of the aquaculture activities with the social context, rather than with issues related to the biophysical environment. In an attempt to avoid conflicts, aquaculture enterprises, increasingly consider remoteness and distance from urban areas as key criteria for site selection (Rennie et al., 2009).

The kind of social conflicts and opposition faced by aquaculture development in coastal area is variegated and determined by local socio-political conditions. In some cases aquaculture enterprises are seen as outsiders to the local community and the allocation of licences for the establishment of aquaculture farms is seen as a form of expropriation of the common sea space used for traditional fishing activities by local groups (Pinkerton and Silver, 2011; Marshall, 2001; Suryanata and Umemoto, 2003). In other cases it is the external touristic use of the coastline which is seen more hindering the aquaculture development. Communities are in general less motivated to embrace aquaculture if they see opportunities to generate local employment elsewhere and conflicts increase closer to urbanised areas and areas popular for recreation (Gibbs, 2009).

Science may play a manifold role in the debates around the siting of aquaculture activities. These debates are characterised by divergent sets of values favouring or contrasting aquaculture development using sustainability concerns as the main argument. The interplay between science and these values are seen at the opposite ends in the influences of “client-science” supporting the industry and “civic-science” supporting the preservation of local tradition from the establishment of new aquaculture activities (McGinnis and Collins, 2013).

The European Commission in the context of the new EU Common Fisheries Policy issued guidelines for the sustainable development of aquaculture to boost the growth of the sector (European Commission, 2013). The guidelines contain recommendations to improve governance systems and reducing bureaucracy. According to these guidelines, EU member states are expected to establish marine spatial plans in which the needs for the development of the sector are balanced against other uses of the marine space in coastal areas.

Despite the relevance of the issue of lack of space in coastal areas often indicated by the aquaculture industry and the high priority assigned to spatial planning for a better governance of the sector, information on the spatial characteristics and needs of marine aquaculture is limited, especially when zooming out from a very local geographical scale of specific coastal regions. On one side there is statistical and economic data collected through the EU Data Collection Framework which is highly aggregated at national level (European Commission, 2009) and on the other side there is spatial information on specific sites (European Commission, 2008a) which is used for spatial planning and environmental impact assessment at a local geographical scale. Both levels of spatial aggregation don't allow appreciating the socio-economic factors which favoured the establishment of aquaculture in specific coastal regions in a country