

Methods

Google Earth satellite images and GIS methods were used to map and analyse spatial properties of the cages/pens of marine aquaculture sites. The position of the aquaculture sites was identified starting from coordinates available in national registers on aquaculture production established according to the EU veterinary legislation (Commission Decision 2008/392/EC). This information was combined with a mapping exercise of aquaculture in the Mediterranean by Trujillo *et al.*, 2012.

Several spatial analysis methods were applied to define geographical clusters, calculate the sea surface occupation and the length of coastline affected. The analyses were performed using a combination of packages in the statistical software R (rgeos, sp, maptools) and in ARGIS.

The geographical clustering was performed by applying a buffer around the polygons and grouping the sites which were intersecting. Several buffer sizes from 500 to 8500 meters were tested to determine the most appropriate criteria for clustering. The selection of the best buffer size was done analysing silhouettes widths of the generated cluster which is a common method for determining the natural number of clusters. According to this method the optimal buffer size was chosen on the basis of the highest average silhouettes width of the generated cluster. A high value of the average silhouette is indicative of clustering that minimises the average distances between observations in each cluster and maximises their average distances from observation in other clusters.

In addition to the geographical clustering each site was linked to the closest municipality on land to compute a series of descriptive statistics by administrative units (only applied for the ten Member States).

To calculate the length of coastline affected by aquaculture activities the centroids of the aquaculture sites were snapped on the closest point on the coastline, a buffer of 1500 meters was created around each of these points, the resulting intersecting polygons were dissolved and finally the length of the section of coastline falling in the dissolved polygon was computed.