Case Study #4
“Strait of Sicily - Malta”
Western Mediterranean

31 December 2018
Version 2

SIMWESTMED

Co-funded by the European Union

Supporting Implementation of Maritime Spatial Planning in the Western Mediterranean region

European Commission
Directorate-General for Maritime Affairs and Fisheries

Grant Agreement: EASME/EMFF/2015/1.2.1.3/02/SI2.742101

Component: 1.3.6. and Establish Case Studies on Approaches to MSP Implementation

Sub-component: Case Study #4 Strait of Sicily (Italy-Malta)

Deliverable Lead Partner: CORILA

Start Date of Project: 01/01/17

Duration: 24 Months

Version: 1.1

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Dissemination Level

PU	Public
PP	Restricted to a group specified by the consortium (including the Commission services)
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CO	Confidential, only for members of the consortium (Including the Commission services)

Document Information

Deliverable Title	**Case Study #4 "Strait of Sicily - Malta"**
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Recommended Citation	**Farella, G., Borg., M., Bassan, N., Campostrini, P., Coletta, M., Contarini, L., Di Carlo, D., Fadini, A., Fabbri, F., Formosa, S., Garofalo, G., Gissi, E., Gristina, M., Hili, O., Innocenti, A., Maccarrone, V., Manea, E., Maragno, D., Menegon, S., Morelli, M., Musco, F., Quattrocchi, F., Sarretta, A., Varone, E., Vella, A., Venier, C., Barbanti, A. 2018. Case Study #4 "Strait of Sicily - Malta". EU Project Grant No.: EASME/EMFF/2015/1.2.1.3/02/ SI2.742101. Supporting Implementation of Maritime Spatial Planning in the Western Mediterranean region (SIMWESTMED). CORILA. 138 pp. DOI: 10.5281/zenodo.2599815**

Version History

Date	Document Version	Reviewer	Revision
22/11/2018	1.0	CORILA Team, PA	Initial draft/Structural and content revision/Subsential structural revision/Content revision/….
12/12/2018	2.0	CORILA Team, PA	Finalization

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Acronyms

AIS	Automatic Identification System
CEA	Cumulative Effect Assessment
CNR	Consiglio Nazionale delle Ricerche
CORILA	Consorzio per il coordinamento delle ricerche inerenti al Sistema lagunare di Venezia
DG MARE	Directorate-General for Maritime Affairs and Fisheries
EU	European Union
GES	Good Ecological Status
GFCM	General Fisheries Commission for the Mediterranean
GIS	Geographic Information System
IAS	Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino
IRBIM	Istituto per le Risorse Biologiche e le Biotecnologie Marine
ISMAR	Istituto di Scienze Marine
MIT	Italian Ministry of Infrastructures and Transport
MSFD	Marine Strategy Framework Directive
MSP	Marine Spatial Planning
MUC	Maritime Use Conflict
PA	Malta Planning Authority
SOS	Strait of Sicily
SIMWESTMED	Supporting the Implementation of Marine Spatial Planning in the Western Mediterranean sea

1. GENERAL OVERVIEW OF THE STRAIT OF SICILY-MALTA

1. CASE STUDY BOUNDARIES

The definition of spatial limits for the Strait of Sicily - Malta Case Study have been elaborated considering needs and priorities emerged from the Initial Assessment, as well as existing knowledge on: (i) maritime uses and economic domains; (ii) ecological features; (iii) legal jurisdictions and borders and (iv) trans-boundary issues. The definition of the case study area's spatial limits constitute boundaries for the purpose to foster a proper analysis on human uses, ecological processes, synergies and conflicts, governance continuity, and define recommendations to establish appropriated strategies and plans.

The boundaries have been drawn according to the scope of the project (e.g. to support the implementation of Maritime Spatial Planning in EU Member States with a concrete cross-border initiative) and the activities to be developed therefore on one hand they are representative of local conditions and policies and, on the other, they take in account potential transboundary and cross-border issues of MSP. The SIMWESTMED case study for Malta is focused on the Malta - Sicily marine waters, bordering the south of Sicily and the north of the Maltese Islands and including part of the continental shelves of Italy and Malta. **The boundaries for the case study area are defined without prejudice to Italy's and Malta's sovereign rights and such boundaries have no effect whatsoever on the continental shelf extent of each State.**

The geographical extent of the case study covers the area surrounding the agreed median line between Malta and Italy and extending outwards to the respective coastal areas of Malta and Sicily. The definition of the Case Study area followed morpho-bathymetric contours and considered known geographical, ecological and anthropic features. The area features portions of territorial waters, international waters (waters beyond the territorial waters and above the continental shelf of each State), continental shelf areas (jurisdiction is only on the seafloor and sub-seafloor), Malta's Contiguous Zone and Malta's Fisheries Management Conservation Zone (FMCZ). Internal waters (i.e. marine waters on the landward side of the baseline, in which coastal states have full jurisdiction; Maes, 2008) are also part of the case study analysis.

European and national legislation (Italian and Maltese as relevant) together with a number of management frameworks apply to the considered area. According to art.2 and art.3 of the Directive 2014/89/EU on Maritime Spatial Planning:

The Directive shall apply to marine waters of Member States, without prejudice to other Union legislation. It shall not apply to coastal waters or parts thereof falling under a Member State's town and country planning, provided that this is communicated in its maritime spatial plans.

‘Marine waters’ means the waters, the seabed and subsoil as defined in point (1)(a) of Article 3 of Directive 2008/56/EC and coastal waters as defined in point 7 of Article 2 of Directive 2000/60/EC and their seabed and their subsoil.

The Italian State exercises its jurisdiction on the seabed and subsoil and on the water column up to the territorial waters (12 nautical miles from the baseline) and only on the seabed and the subsoil from the territorial waters boundary up to the median line. Malta’s jurisdiction includes the seabed and subsoil and on the water column of the territorial waters (12 nm from the baseline), the water column of the Contiguous Zone (up to 24nm) and the Fisheries Management Conservation Zone (adopted by Council Regulation EC No. 1967/2006 under the EU Accession Treaty, 2003) up to 25 nm for fisheries management, both regulated by the Territorial Waters and Contiguous Act, Cap.226, as well as the seabed and subsoil as defined by Continental Shelf Act Cap.535). In addition, the area upto 25nm is subjected to a Maritime Spatial Plan which is the Maltese Strategic Plan for Environment and Development area.

The study area (9420 km2) comprises about 1990 km2 of Italian territorial waters, 5760 km2 under Maltese jurisdiction, and 1670 km2 of International waters. The perimeter (425 km) includes 209 km of Maltese and 105 km of Italian coasts (Fig. 1).

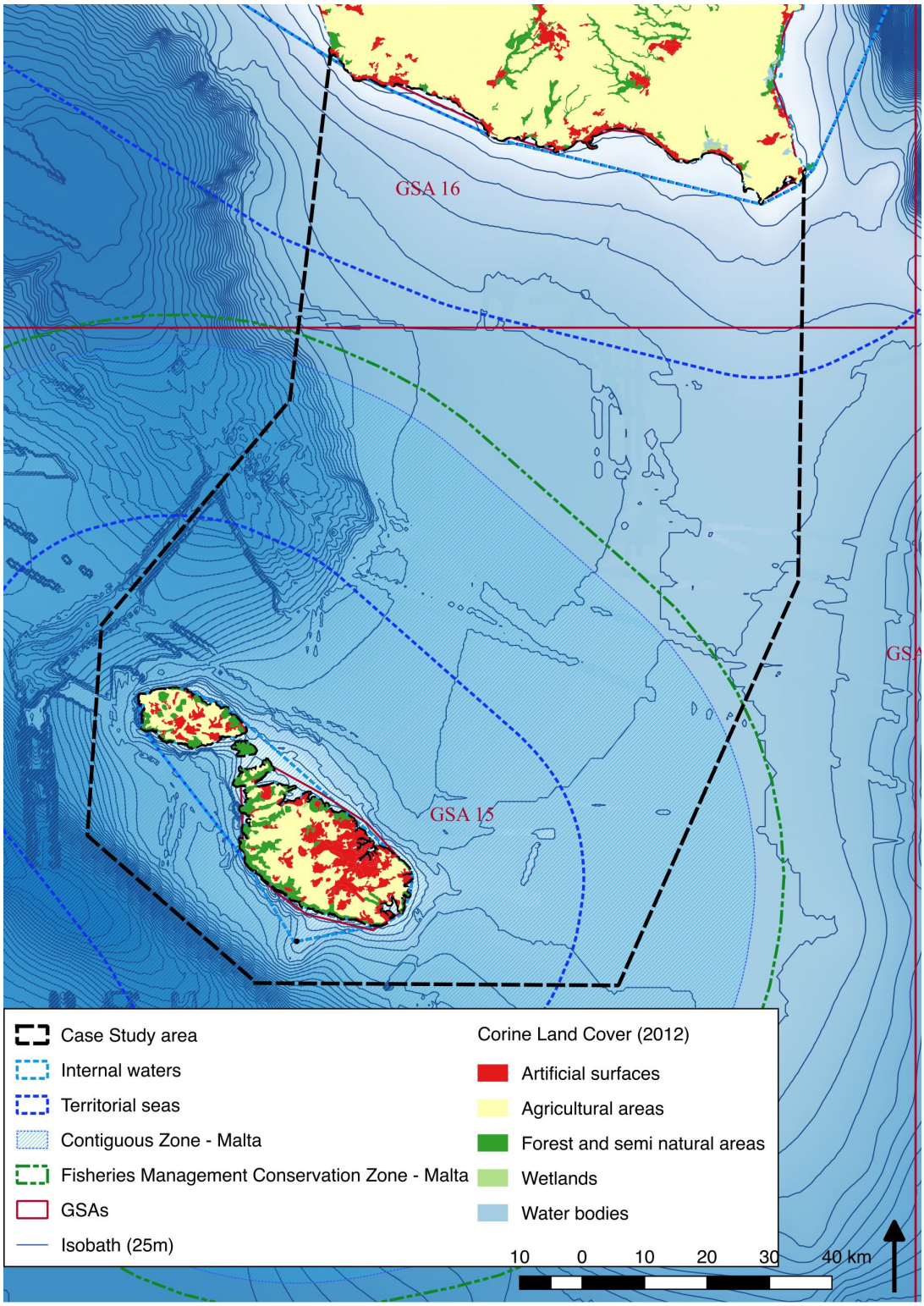


Figure 1 - Case Study area boundaries and main features.

The study area, therefore, was chosen based on the following considerations:

The Sicily-Malta Channel serves as one of the most important sea routes in the Mediterranean Sea, linking the western and the eastern regions of the basin (e.g. traffic routes from Suez to Gibraltar). Intense activities, such as maritime and coastal tourism, maritime transport of goods and passengers, fishing, aquaculture, research and exploitation of hydrocarbons, energy and

communication pipelines, are present within the area, which also includes vast extents protected areas at sea (Natura 2000 sites). Most of these activities are expected to grow in the coming years with a possible increase in the potential for conflicts with other uses as well as pressures on the environment.

The growing demand for energy and communication infrastructure has seen the development of an electricity cable connecting Malta with Sicily, as well as a number of cables for telecommunication and digital services. Furthermore, increased potential for connectivity with the countries bordering the shores of the southern Mediterranean is likely to require space in the area between Malta and Sicily.

The transnational context of the area which influences the management of marine resources exploitation (e.g. fishstock), the sharing of the marine space (e.g maritime transport routes), as well as cross border influences/pressures affecting the activities and the marine components of the case study area and that derive from the maritime activities carried out by neighbouring countries.

In consequence, there is an apparent need to better understand the relationship between existing activities occurring in the marine waters bordering the south of Sicily and the north of the Maltese Islands, and their interactions among each other in terms conflicts, synergies and potential transboundary implications as well as impacts on the environment. The environmental aspects, including the specific provisions relating to conservation, must be referred to broader eco-regional contexts. The complex oceanographic features in the Sicily-Malta channel, which include surface and bottom circulations, hydrology and typical winds regulating water masses circulation, play a crucial role in determining the ecological and oceanographic processes and coastal configuration.

The case study boundaries have been considered in a flexible and permeable way. In fact, it is evident how many of the uses present in the area are unavoidably influenced by what happens outside the maritime space addressed by this case study and within the adjacent areas. This is an important aspect of significant relevance for maritime spatial planning. Examples of uses influenced by cross-border and transboundary dynamics are fishing (the area is part of the much larger GSAs 15 and 16 - GFCM) and maritime transport. Such transboundary influences have transnational connotations (e.g. the management of fish stocks and maritime traffic main routes), and MSP has to consider them and support a shared management regime among neighbours. This is in compliance with the Directive, art. 11 of Legislative Decree no. 201/2016, and regulation 7 of Subsidiary Legislation 552.27 which call for "Cooperation with Member States and third countries" in their maritime spatial planning actions, in particular with Member States that share the sea basin, in order to ensure the coherence and coordination of respective plans for managing the maritime space of the region or marine sub-region.

In addition, boundaries define the domain of analysis of the area, including the possible areas of management at different levels. According to UNESCO-IOC (2009), two “types” of boundaries can be identified: “boundaries for analysis”, which are meant to include transboundary effects and to intercept external instances that might influence MSP in the case study; “boundaries of management”, on which planning proposals and implementation can be elaborated. The two types of boundaries can eventually coincide or the first can include smaller portions of areas defined as “boundaries for management”. The possible identification of focus areas will be driven by considerations in terms of intensity of uses in particularly crowded sub-areas and complexity in legal framework.

In conclusion, by considering the aforementioned characteristics of the case study area, the level of available knowledge related with it, as well as the requirements of the MSP Directive, the chosen study area appears to be an excellent test bench for the application of the local MSP process. The case study and the related results will contribute to comply with Directive 2014/89 / EU as required by Legislative Decree no. 201/2016 and the Subsidiary Legislation 552.27, providing a concrete example and a good practice of implementing the MSP at the inter-regional level.

2. MARINE ENVIRONMENT – GENERAL DESCRIPTION OF MAIN CHARACTERISTICS

1.1.1 Physical description

The Strait of Sicily (SoS) is an area of transition between the Western and Eastern Mediterranean sub-basins, characterized by a narrow continental shelf in the central part, bounded by two wide (approx. 100 Km) and shallow (100 meters depth) banks on the western (Adventure Bank) and eastern extremities (Malta Channel area), including the Sicilian and Tunisian shelves. The geomorphology is complex and characterized by seamounts (banks) composed of sedimentary or volcanic rocks (Civile et al., 2016). The slope shape is extremely irregular, with many steep declines, and seamounts that are cut off by sub-horizontal areas (Consoli et al., 2016). Such topography affects the currents around the banks resulting in significant upwelling, thus increasing the overall productivity (Di Lorenzo et al., 2016). The shelf is influenced by the inflow of terrigenous material from the Atlantic Ionian Stream (AIS) which forms a wedge of well-stratified sands and silty shale with thickness varying from 56 m near the coasts to almost zero at the edge of the shelf (Fig. 2; Colantoni et al., 1985). The water mass circulation in the SoS plays an important role in the overall Mediterranean Thermohaline Circulation (MTHC). It is characterized by a highly dynamic system that exchanges water masses between the eastern and western sub-basins (Béthoux, 1979; Astraldi et al., 1999; Würtz, 2010). Within the CS area, the meandering flow of the AIS promotes the formation of a large cyclonic vortex, off CapePassero, the Ionian Shelf break Vortex (ISV).

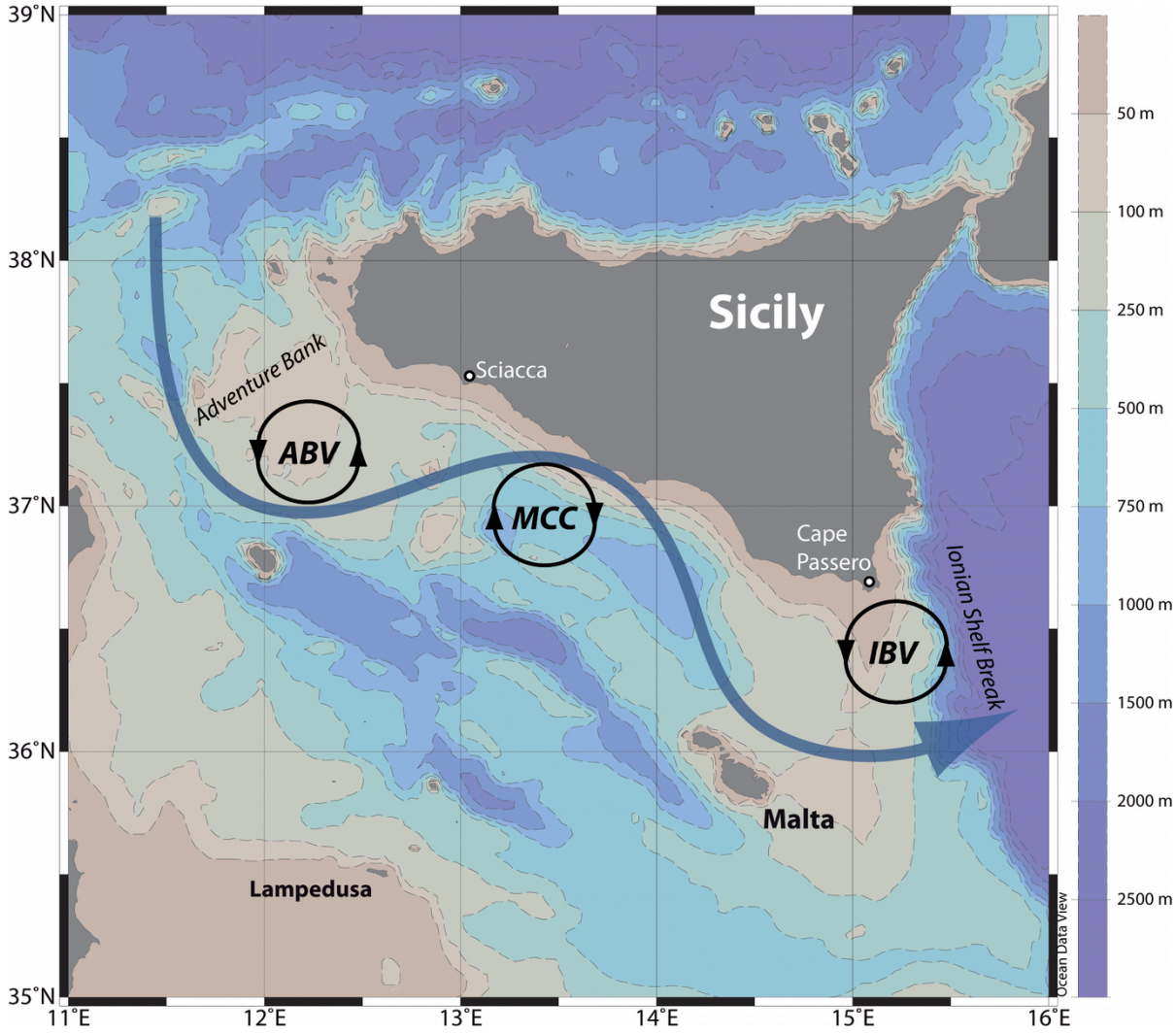


Figure 2 - Flow of the Atlantic Ionian Stream (in blue). ABV: Adventure Bank Vortex IBV: Ionian Shelf Break Vortex MCC: Maltese Channel Crest (from Falcini et al., 2015)

The topography of the continental shelf in the CS area is characterised by a plateau in the middle part, with an average depth of 150 m. The shelf is flanked by a submarine ridge, which protrudes as a submerged extension of Cape Passero and embraces the shelf area along the eastern and southern perimeter. The CS area borders the south-eastern part of the Siciliy region, between Siracusa and Ragusa cities, known as the Hyblean platform. It is a wide structural carbonate plateau between 450 and 600 m, dissected by many fluvial valleys and canyons. The carbonate nature of the rocks facilitates the formation of karst features such as dolines and fluviokarstic channels (Fantappiè et al., 2016). The narrow coastline is mainly characterized by sand dunes and flood plains. The Maltese Archipelago, aligned in a NW-SE direction, is located on the southernmost extremity of the Malta platform. The Maltese Islands represent the emerged part of this ridge while Hurd Bank to the north east of Malta shallows to a depth of just over 50 m. To the southeast a series of relatively shallow areas, notably the Medina Bank, maintain an average depth of less than 300 m. The shelf is interrupted from its extension towards the west by the relatively

deep Gela Sicilian basin separating it from Adventure Bank. On its eastern extremity, it deepens abruptly into the deep Ionian Sea with a very sharp escarpment (known as the Malta Escarpment). The Malta Trough (referred to as 'Malta Graben') to the south west of Malta forms part of a cluster of flat bottomed depressions reaching a depth of around 1650 m. The islands are very close to the shelf break and flanked by a very steep bathymetry in the South.

1.1.2 **Ecological description**

The peculiar geomorphology, topography, hydrograpy and consequent overall productivity make the SoS one of most important biodiversity hotspots in the Mediterranean basin (Vega Fernández et al., 2012).

The Southern Sicilian coast and the North-eastern coast of the Maltese Islands are characterised by gently sloping shores and rocky bottoms. Further offshore, a change in seabed type from rocky to sandy occurs. The latter substratum is generally highly heterogeneous and may be characterised by a mosaic of substrata, which apart from bare sand would include sand intermixed with cobbles/pebble/shingle, small boulders and patches of bedrock covered by a thin layer of sand. In contrast, most of the Southwestern coast of the Maltese Islands is characterised by cliffs and boulder screes. The seabed adjacent to the coastline within these sites is characterised by vertical drop-offs with boulder fields at their base. The seabed within the area extending from offshore north Gozo to south-east Malta covers the bathymetric depth range of 5–250m and is mainly characterised by flat to gently sloping seafloor. A steep slope at a depth of 120–130 m divides the seafloor into two parts: (i) the 'shallow' part, at depths less than 45 m is mostly covered by *Posidonia oceanica* meadows colonising both coarse grained sediment and bedrock. At greater depths, this part is mainly characterised by maerl associated with sand and gravel, however it also comprises areas characterised by medium-fine sands. (ii) The 'deeper' part of the seafloor is a smooth, featureless surface almost entirely composed of medium to fine sand. Overall, the least extensive natural seafloor composition class is non-vegetated bedrock.

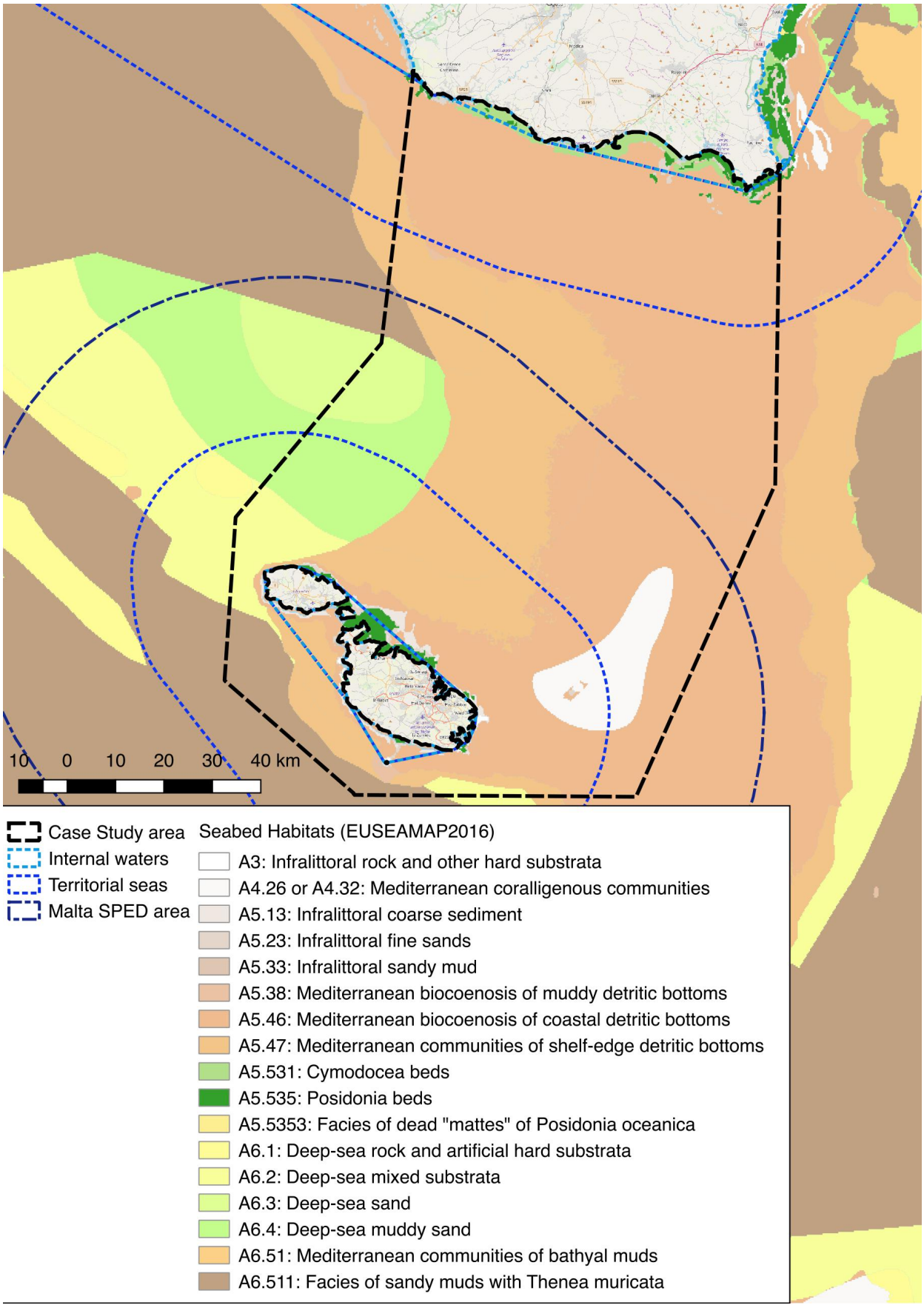


Figure 3 – Case study area seabed habitats (data source http://www.emodnet.eu/seabed-habitats)

Seagrass meadows constitute a key habitat in the context of coastal areas for its diffused distribution, as well as for its fundamental ecological role being habitat of nursery, protection and foraging for several marine organisms. Two genus of seagrasses have been listed in the case study area, *Posidonia oceanica* and *Cymodocea* spp. *Posidonia oceanica* is the predominant forming habitat seagrass species in the Western Mediterranean Sea. Along Sicilian coasts, hese plants form vast underwater meadows between zero and 50 m depth in the open sea (fig. 4).

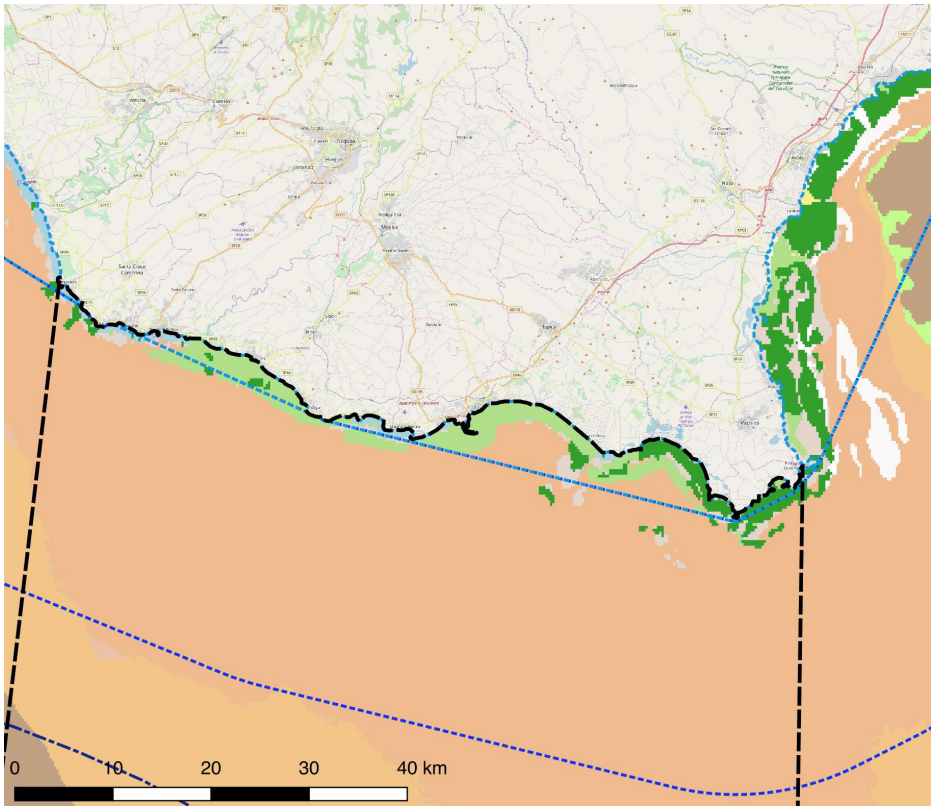


Figure 4 - Distribution of *Posidonia oceanica* (dark green) and *Cymodocea* spp. (light green) meadows along the Italian coasts

Southerly, around Malta Islands, *Posidonia oceanica* beds develop mainly in littoral and shallow sublittoral sediments, covering a total area of 168 km^2 (Figure 5).

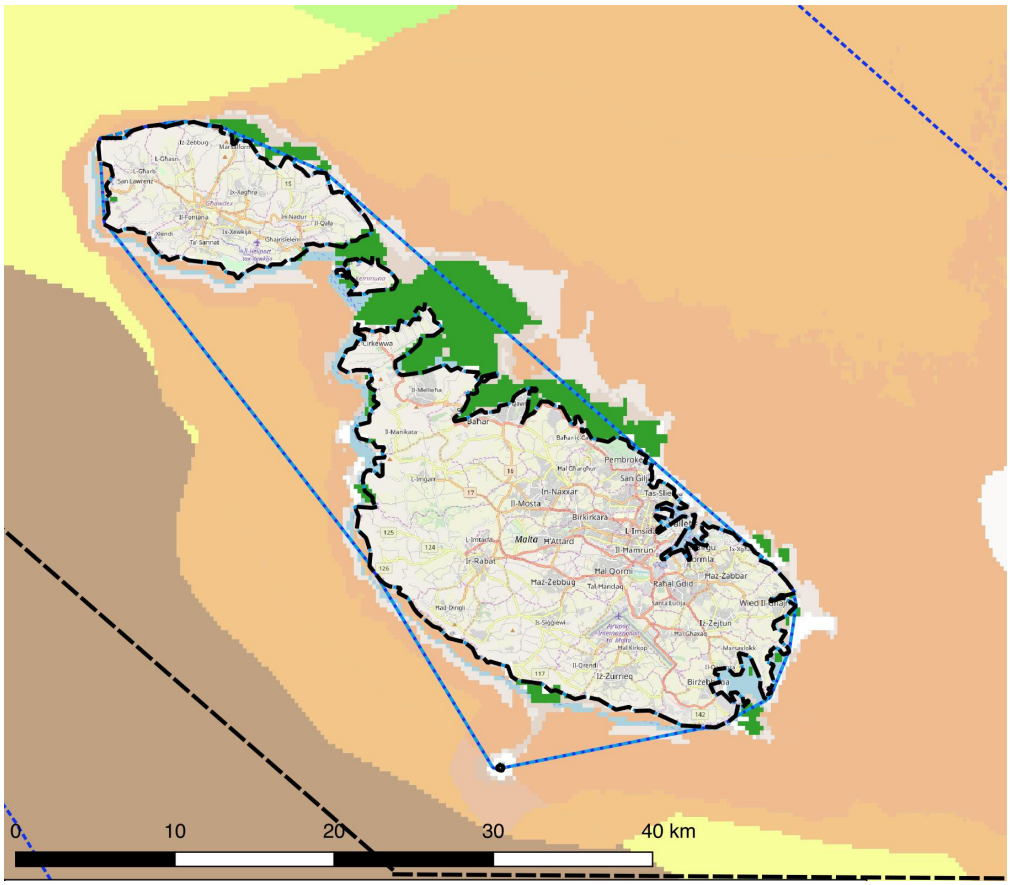


Figure 5 - Distribution of *Posidonia oceanica* (dark green) meadows in the Maltese coasts

Specific monitoring surveys (side scan sonar, multibeam and R.O.V.) and macro structural, functional and ecological investigations should be planned for a better understanding of seagrass population estate and trends.

Other highly important benthic habitats are those formed by calcareous bio-constructions such as **coralligenous** and **maërl beds**. Bioconstructions such as coralligenous assemblages are typical Mediterranean underwater seascapes, comprising coralline algal frameworks that grow in dim light conditions (Ballesteros, 2006). Because of their extent, biodiversity and production, coralligenous rank among the most important ecosystems in the Mediterranean Sea, and it is considered of great significance both for fisheries and carbon regulation. Coralligenous assemblages are directly threatened by specific human activities such as trawling or the exploitation of the red coral by prohibited gears. It seems also to be subjected to indirect effects and be vulnerable to climate change impacts (e.g. heat waves and acidification). These threats affect the stability of this ecosystem and strongly mortgage its future maintain. Maërl beds are another specific type of representative calcareous bio-constructed habitat with high ecological importance in the Mediterranean region. Maerl beds are formed by an accumulation of unattached calcareous red algae (Rhodophyta) growing in a superficial living layer on sediments within the photic zone (Barberà et al., 2003). The European Commission's 'Habitats Directive' mandates the conservation

of two of the main European maerl-forming species, *Phymatolithon calcareum* and *Lithothamnion corallioides*. European maerl grounds suffer a variety of anthropogenic perturbations including direct exploitation through extraction, fishing impacts and chemical pollution by organic matter and excess nutrients. Both coralligenous and maërl beds main threats are trawling, artisanal and recreational fishing, anchoring, invasive species, global warming, waste water discharges, aquaculture, changes in land use and coastal infrastructure construction and urbanization, recreational activities (e.g. scuba diving), non-indigenous mucilaginous and filamentous algal aggregates. For the Sicily area, bioconstruction presence has been recorded and its depth range is estimated to be between 34 and 50 m depth. In Malta coralligenous beds are also found but no data have been provided on its distribution and trend. Life Bahar in an ongoing project (http://lifebahar.org.mt/) designed to survey offshore benthic habitats, and detected in Maltese waters the presence of areas with extensive and diverse living coral assemblages (300–1000m depth), including white, black, red (deepest known presence at 1016 m) and gold corals. The major maërl beds in Malta covers an estimated seabed area of 20 km^2 off the north-eastern coast, at 30-100 m depth.

While benthic habitats host strictly bottom dependent ecosystems, **pelagic habitats** include the water column features and their associated organisms. Aside from all the key ecosystems previously identified, there are species of particular relevance for their key role in the ecosystem functioning, their high sensibility to specific impacts and in most cases for showing a highly migratory behaviour and therefore a wide and heterogeneous spatial distribution. This group of animals include seabirds, cetaceans, elasmobranchs, fishes and other invertebrate species. The area also features and high density of **essential fish habitats (EFH)** of fish and invertebrate species (e.g. crustaceans, molluscs, etc.), with commercial interest (Fig. 6 and 7).

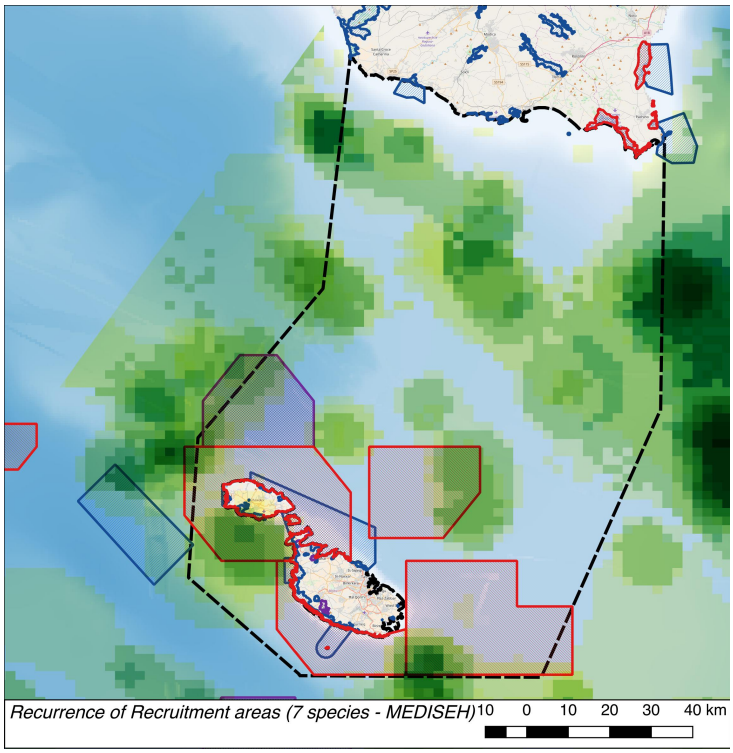


Figure 6 – Recurrence of nursery habitats (data from MEDISEH -MAREA project): *Parapenaeus longirostris* (Deep-water rose shrimp), *Merluccius merluccius* (European hake), *Illex coindetii* (Broadtail shortfin squid), *Nephrops norvegicus* (Norway lobster), *Aristaeomorpha foliacea* (Giant red shrimp), *Galeus melastomus* (Blackmouth catshark), *Raja clavata* (Thornback ray) within the CS area (in black) and Natura 2000 sites (red: SPAs; Blue: SCIs; Purple: SPA+SCI).

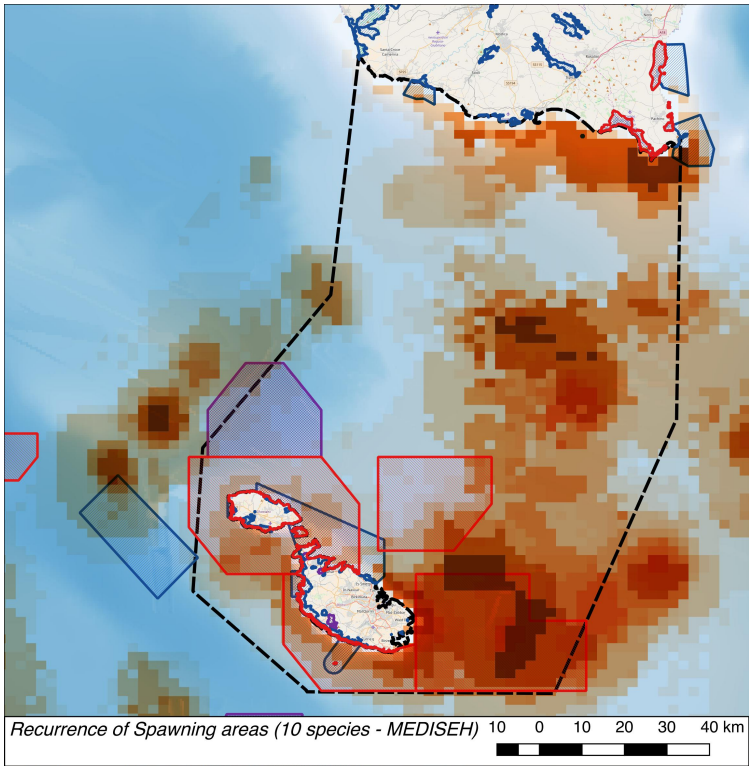


Figure 7 – Recurrence of spawners (data from MEDISEH -MAREA project): *Mullus surmuletus* (Striped red mullet), *M. barbatus* (Red mullet), *G. melastomus* (Blackmouth catshark), *I. coindetii* (Broadtail shortfin squid), *Pagellus erythrinus* (Common Pandora), R. clavata (Thornback ray), P. longirostris (Deep-water rose shrimp), *A. foliacea* (Giant red shrimp), *N. norvegicus* (Norway lobster) within the CS area (in black) and Natura 2000 sites (red: SPAs; Blue: SCIs; Purple: SPA+SCI).

As for the whole Western Mediterranean area, the situation of fish stocks is away from sustainable fishing levels and far from the target of exploiting stocks at maximum sustainable yield (MSY) by 2020. Scientific assessments on major fish stock (e.g. within the Italian National Triennial Fishing and Aquaculture Programme 2017-2019) confirm a situation of excessive exploitation, although the situation is not homogeneous in the different geographic sub-areas (GSAs). Specifically, most of the stocks are in a state of overfishing and large pelagic fishes, such as Atlantic bluefin tuna (*Thunnus thynnus*) and swordfish (*Xiphias gladius*), are valued as overexploited in all the Mediterranean area without division in GSAs.

In Maltese waters fish and elasmobranchs species with existing or potential commercial value found at depth ranging between 50 m and 800 m, showed different trends in biomass (increasing, stable or declining trend) depending from the species. With regard to Maltese fish stocks, data gaps are mainly in relation to the fish functional groups as defined by the MSFD Commission Staff Working Paper, other than the 'Demersal fish' and 'Demersal Elasmobranchs', on which data with respect to species representative of such groups is either very limited or completely lacking. With respect to 'Demersal fish' and 'Demersal Elasmobranchs', data limitations are mainly due to the fact that the main source of data for these two functional groups, the MEDITS surveys, are focused on target species which have an existing or potential commercial value. Other non-target species for which biological parameters are not measured in relation to the MEDITS protocol may also be representative of the functional groups in question. Current data on large pelagics in Malta is restricted to stock assessments of the main commercial species (*T. thynnus* and *X. gladius*) carried out at the regional scale in the framework of the International Commission for the Conservation of Atlantic Tunas (ICCAT). Maltese ecosystem functions and the spatial and temporal distribution of the selected species should be further analysed. Such knowledge is currently limited, thus also limiting the interpretation of the results of this analysis.

For the marine area surrounding Malta, the majority of the existing data pertains to inshore waters, with only sporadic data available for deeper offshore habitats, with respect to the distribution, extent and conservation estate. The uneven data distribution on marine habitats is attributed to the fact that ecological surveys in Malta throughout the past years focused on depths that could be reached by SCUBA diving and/or inshore areas subject to coastal developments. Deeper waters have only recently started being scientifically investigated.

The case study area waters fall within an Important **Marine Mammals** Area (IMMA). Despite this, no systematic monitoring activities have been conducted in the waters of the Strait of Sicily (Notarbartolo di Sciara, 2016). Eight species have been regularly observed in the area: striped dolphin (*Stenella coeruleoalba*), common bottlenose dolphin (*Tursiops truncatus*), common

dolphin (*Delphinus delphis*), Risso's dolphin (*Grampus griseus*), long-finned pilot whale (*Globicephala melas*), Cuvier's beaked whale (*Ziphius cavirostris*), sperm whale (*Physeter macrocephalus*) and fin whale (*Balaenoptera physalus*), but little is known on their distribution and abundance. Data related with the distribution of the Common dolphin (*D. delphis*; IUCN: Least Concern) in Malta is limited to recent campaigns (BirdLife Malta for 2007/2008 and 2012) thus suggesting that this dolphin is more common off the Northern and North-eastern coasts of Malta and seems to be more common in spring. However, these observations would need to be verified through long-term monitoring. A 2012 survey encountered 6 individuals in groups of 1-3 individuals of Risso's Dolphin (*G. griseus*; IUCN: Least concern). Sightings of this species in Malta are not frequent. At this stage, the range and population characteristics of this species in Malta are not known.

Five **marine turtle** species are reported in Malta waters: Loggerhead Turtle (*Caretta caretta*, IUCN: Vulnerable), Leatherback Turtle (*Dermochelys coriacea*, IUCN: Vulnerable), Green Turtle (*Chelonia mydas*, IUCN: Endangered), Hawksbill Turtle (*Eretmochelys imbricata*, IUCN: Critically Endangered), Kemp's Ridley Turtle (*Lepidochelys kempii*, IUCN: Critically Endangered). *C. mydas*, *L. kempii* and *E. imbricata* are known from single records while *D. coriacea*, which has been recorded on several occasions particularly between the 1970s and 1980s, is not considered a Mediterranean species. Out of the five recorded species, *C. caretta* is considered the most 'abundant' species and it is the only species of marine turtles which is regarded as a stable member of the Sicilian and Maltese fauna. The SoS provides important nesting sites for *C. caretta* in the central Mediterranean, whilst also providing an important dispersion/migration route for the species (Bentivegna et al., 2007). Important nesting sites are present along the CS Sicilian coast (Mingozzi et al., 2007; ISPRA 2013; Casale et al., 2014). There are no available data on loggerhead sea turtle distribution population trend, however it is estimated that 50% of the population migrates from Greece, Central Turkey and Libya and the pressures on this species in the Western Mediterranean basin can affect the population trend of this species in the Eastern Mediterranean. In order to better understand population trends, abundance and migratory patterns of *C. caretta* in this area need further studies with particular attention to the anthropogenic impacts sensibly affecting the estate of conservation of this species (e.g. fishery).

Offshore waters are also visited by pelagic fish (bluefin tuna and swordfish) as well as small pelagic fish (sardines, sprats, anchovies), which are key species within the trophic networks on which many species depend directly to complete their life cycle.

2. MAJOR USES AND ACTIVITIES (AREA/USE-BASED)

2.1 FISHERIES

Fish and shellfish harvesting are among the most representative marine human activities within the Mediterranean context for their historical, cultural, social and economic value, they are spread across the entire basin and they are carried out through different extractive techniques depending from the species harvested and the local traditions.

The South-Western Sicily is comprised within the FAO Area 37.2.2 “Division Ionian” and GSA 16. Sicilian professional fishing fleets are among the highest in Italy for fishing capacity, in terms of number of vessels, gross tonnage (GT) and engine power (kW), with fleets dominated by small-scale vessels. The analysis of the total days of activity for the main types of fishing gears (2012) allows to the individuation of the most important sectors per region. In Sicily data show the highest national values of small-scale fishing, trawling, passive multi-purpose gears, purse-seine fishing, and longline fishing. Among Sicilian fisheries, the town of Mazara del Vallo has the highest number of fishing boats, and represents the main commercial fleet of trawlers in the area and one of the most important in the Mediterranean Sea. Sicilian trawlers between 12 and 24 m LOA operate mainly short-distance fishing trips ranging from 1 to 2 days at sea, and fishing takes place on the outer shelf and upper slope. Sicilian trawlers measuring over 24 m in LOA go on longer fishing trips, which may last up to 4 weeks. These vessels operate offshore, in both the Italian and international waters of the Strait of Sicily (Russo et al. 2014). The second part of the Sicilian fleet is represented by a small-scale fishery. This fishery uses different fishing gears (including trammel nets, bottom and floating longlines), usually operates in coastal areas, mainly between 0 and 3 miles off the coast, and play an important role in the social structure and the cultural identity of the coastal areas.

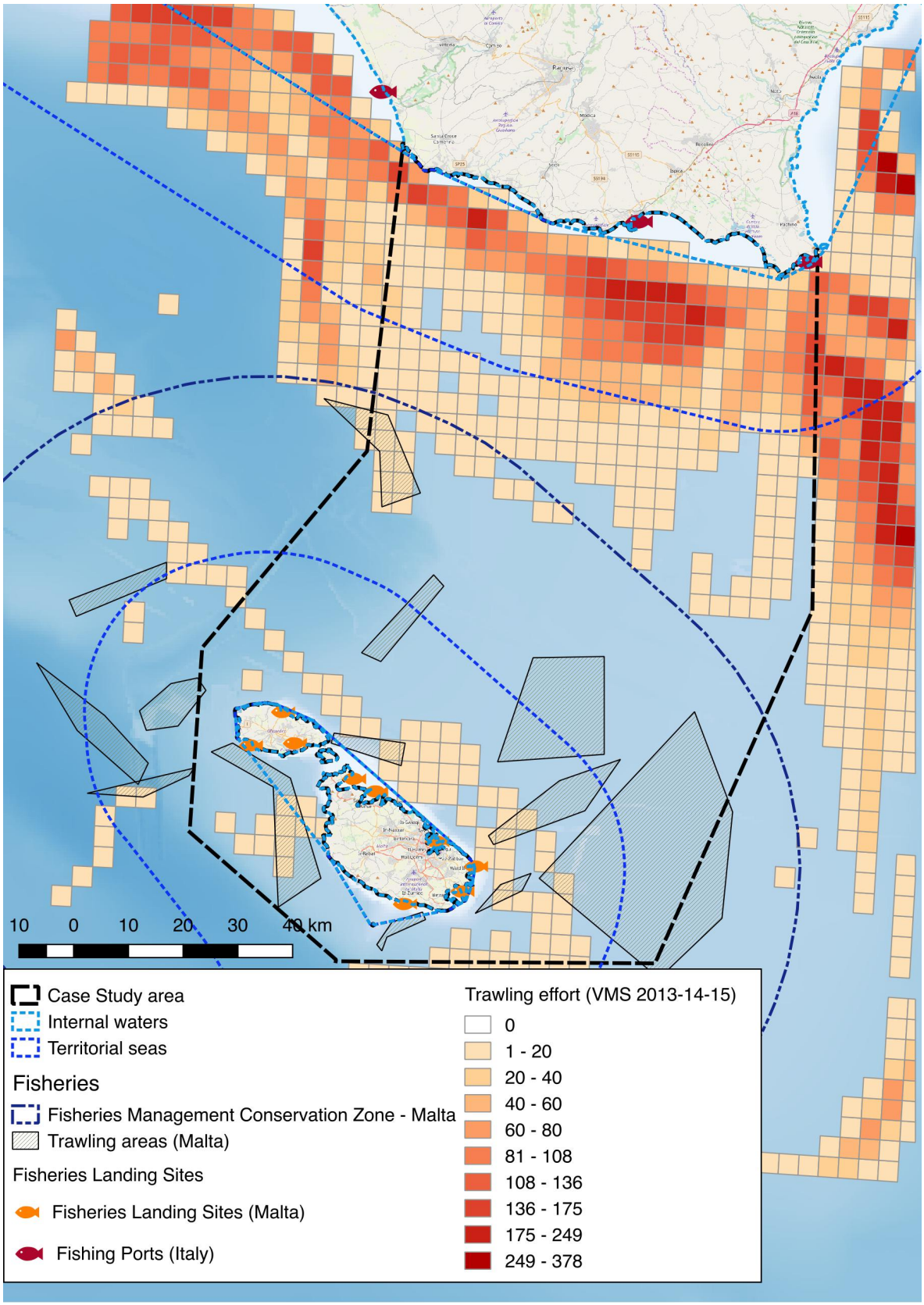


Figure 8 – Fisheries activities within the CS area. Trawling effort is expressed in fishing hours/year (data from Russo et al. 2013 and updates)

In the Sicilian context, the CS study area present smaller fishing fleets than other regional areas, in terms of number of vessels, engine power and gross tonnage. The composition of the fleets underline the prevalence of artisanal fisheries in the area (Tab. 1).

Table 1 - Sicilian area fishing fleets

PORT (East to West)	METIER	N.M/P	day/year
PORTO PALO DI CAPOPASSERO	SET GEARS	85	99,47
	TRAWLING	45	147,15
	FLYING	5	116
POZZALLO	SET GEARS	50	102,86
	TRAWLING	9	194
SCOGLITTI	SET GEARS	39	106,25
	TRAWLING	15	204
GELA	SET GEARS	25	105,63
	TRAWLING	2	177,17

Following national trends, fishing sector is in steady decline, due to several factors and the decrease of fishing capacity, requested by the Common Fisheries Policy measures. In the Sicilian CS area, fisheries result steadily under reduction in the last years, mainly because of the increase in intermediate costs and fuel price, the decrease in production level, and the implementation of restrictive management measures. Artisanal small-scale fisheries show a stabilization of the declining flow of the number of vessels in the Sicilian fleet after a very strong decrease in the period between 2010 and 2013, while trawling fleet is under constant reduction. Over the next few years, with the implementation of the FEAMP 2014-2020, a further reduction in industrial fishing capacity is expected, while recreational fisheries are in possible expansion, in connection with actions for the diversification of tourism offer and the incentive of fishing tourism in the Sicilian CS marinas.

Fisheries in Malta are comprised within the FAO Area 37.2.2 “Division Ionian” and GSA 15. Fleets are typically artisanal, predominantly non-industrial and mostly distributed along the coast. Maltese fisheries are also considered as multi-species and multi-gear fisheries, whereby fishers alter between fishing gears throughout the year, depending on the species targeted. Trawling in Malta is regulated and carried out in designated areas. The social and cultural importance of the Maltese fishing industry far outweighs its negligible economic contribution to the national Gross Domestic Product. According to the National Statistics Office data published in 2016, as of 2014 the Maltese fishing fleet was composed by 2943 fishing vessels. Out of the total number of registered fishing vessels, professional fishing vessels operating on a full-time basis (MFA category) account for 13.6% and professional fishing vessels operating on a part-time basis (MFB category) account for 20.9%. The largest percentage of registered fishing vessels, amounting to 65.5% of the fleet, are

non-commercial fishing vessels (recreational) and amount to 1927 vessels. The Maltese fisheries are described as multi-species and multi-gear fisheries, whereby fishermen switch between fishing gears several times throughout the year. As such the Maltese fleet is known to land a variety of species, often exceeding 80 species in number. The total annual landings for 2014, reached 867 tons indicating a constant decrease since 2010 when total annual landings were 1303 tons. The wholesale value of fish landings at the official market in 2014 amounted to 5,419,000 €. The majority of these landings consisted of 7 species, namely shrimp, stone bass, dolphin fish, dogfish, swordfish, Bluefin tuna and bogue.

No strategic plan has been formally published for Maltese fishery management and coordination; however, the sector is managed through the implementation of Council Regulation (EC) No 1967/2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea. This regulation applies to the conservation, management and exploitation of living aquatic resources and constitutes a number of provisions including the regulation or prohibition of specific fishing activities on protected or sensitive habitats, in particular Posidonia oceanica, coralligenous habitats, mäerl beds and corals. Provisions in this regulation are also related to regulation of mesh sizes, hook sizes, and specification of minimum sizes of marine organisms that are caught. The regulation also calls for the establishment of Fishing Protected Areas in which fishing activities may be banned or restricted in order to conserve and manage living aquatic resources or to maintain or improve the conservation status of marine ecosystems and for the adoption of management plans for specific Mediterranean fisheries by each EU Member State (Article 19). Malta has submitted 'Fisheries Management Plans' for three types of fisheries, Lampuki Fish Aggregating devices (FAD) fishery, 'Lampara' fishery (use of strong lights and purse seine) and bottom otter trawling. These regulations adopt a 25 Nm Fisheries Management Zone around the Maltese Islands, stipulates provisions regulating fishing within this zone and prohibits fishing for dolphinfish within the 25 Nm Fisheries Management Zone by FAD from 1 January to 5 August each year. It further stipulates that the number of vessels for dolphinfish fishery shall not exceed 130. The regulation also sets the authorized trawlable areas within the 25 Nm Fisheries Management Zone (Annex V). Malta's Fisheries Management Plans however indicate that the Maltese authorities are currently studying the possibility of relocating part of these authorized trawlable areas due to a rationalization exercise that has led to the closure of parts of the areas due to protected habitats present in the zones. Specifically, the management plans point out that the authorized trawling zones as per Annex V of regulation 1967 of 2006 include areas which are found within the 3 Nm zone, which areas should be reconsidered to protect coastal resources from trawling activities and to give priority to artisanal fisheries. No long-term strategy exists for the management of Maltese fisheries and there is lack of systematic long term

monitoring. Fisheries in Malta are mainly artisanal and are considered as having a socio-economic value at the local level in view of the cultural characteristics attributed to this industry. Traditional fishing villages have over time been marketed as a tourism attraction. According to the MSFD Initial Assessment for economic purposes, the Gross Value Added for Fisheries and Aquaculture for 2012 in Malta was given at €17,674,000, with an employment rate of 928 full time equivalent (FTE). Among the opportunities for this sector in Malta there are diversification of the sector, synergy with aquaculture/environment and tourism/recreation, further there is potential to improve the research in the area. In general, in the entire Mediterranean the high marketability of small fish in many countries encourages the targeting of the juvenile fraction of some species, often in violation of laws regarding minimum sizes.

2.1 AQUACULTURE

Considering data for 2013, Sicily features 10 facilities for fish and 3 for molluscs. Until 2010, the aquaculture sector in Sicily guaranteed over 15% of national production; subsequently it suffered a sudden collapse, which led to the closure of more than 50% of the farming plants (2013 data). The mollusk farming in Sicily is represented exclusively by four plants only dedicated to the housing of mussels. Potentials for new sites in Italian CS area is under analysis but at the moment no aquaculture facilities are present.

Malta's aquaculture (fig. 9) production started in the early 1990's with production of sea bass (*Dicentrarchus labrax*) and Gilt-head seabream (*Sparus aurata*) and continued to develop in 2000 with the first farm for the fattening of the Atlantic Bluefin tuna (*Thunnus thynnus*).

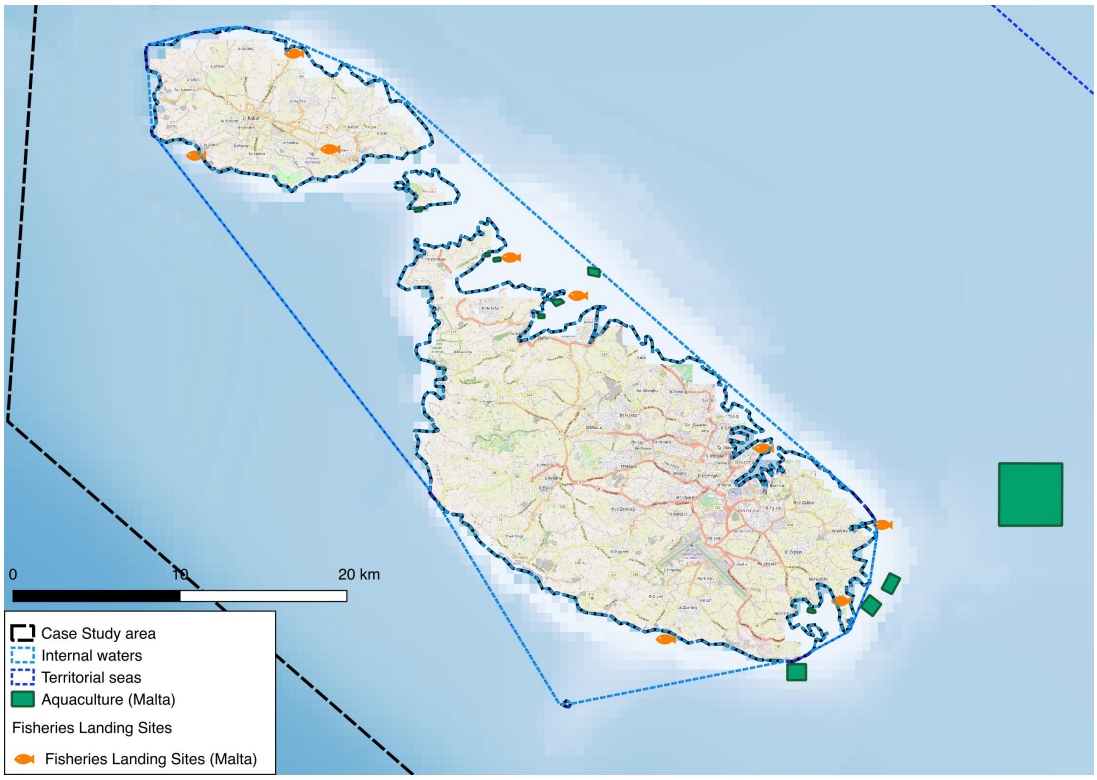


Figure 9 - Geographical distribution of fish farm cages in Maltese waters

At the time of reporting the MSFD Initial Assessment in Malta there were nine marine sites for the culture of seabass and seabream, a small production of meagre and fattening of the Atlantic Bluefin tuna. Cages used for the culture of sea bass, sea bream and meagre are located approximately one kilometre offshore, while tuna farms were originally situated approximately 2 km offshore, with two tuna pens located within the aquaculture zone 6 km off the south-eastern coast of mainland Malta.

Priority areas for aquaculture in Malta are generally found on coastal waters and designated aquaculture zones. An aquaculture strategy for Malta was adopted in 2014 covering the period up to 2025. The main strategic goals identified, based on a targeted scenario are: a production target for closed cycle species of 5,000 tons yearly; current levels of capture based species (dependent on Bluefin tuna quotas) maintained; the development of a hatchery; a stronger emphasis on research. The strategy applies to marine waters under Malta's competence. This sector has provided a diversification of the local economy with farmed fish being exported to both EU countries and third countries particularly in the Asian market. For information on the economic relevance of this activity refer to fisheries section as both sectors are reported together in national statistics. In Malta, there is a long term operational and regulatory experience for aquaculture. Opportunities in this sector may rise from product diversification. Potential spatial limitations for sectoral growth, self-regulation by operators have been addressed as main weakness of this sector. All the farms

established in Malta since 1992 have been subjected to a permitting procedure, which included an environmental impact assessment EIA. Following public outcry as a result of fish feed and oil reaching coastal areas, enforcement action in 2016 and revocation of planning permits, all tuna cages had to be relocated. In 2017 two operators located along the southern coast of Malta have been relocated to the Aquaculture Zone. Another operator located 2 km offshore in the north of Malta has been temporarily relocated further offshore along the north of Malta.

2.2 EXTRACTION OF WATER

Extraction of marine water is commonly undertaken to obtain, through desalination techniques, fresh water which can be used for human consumption. Desalination provides freshwater guaranteeing sufficient supply mainly to public services, industry and the farming. Its use allows development in areas where water scarcity is a limiting factor.

In **Italy** - according to Istat data revised by WATEC Italy 2017 - the extraction of marine or brackish water for domestic use is just 0.1% of the total levy (13,619 million cubic meters, out of a total of 9,108 billion cubic meters of water is extracted from the various sources). In Sicily, water is desalinated for 12.6 million cubic meters (92.5% of the total national), even if no plants are present in the CS area.

Freshwater resources in the **Maltese** Islands are scarce and subjected to intense pressures from various users. According to the MSFD Initial Assessment of 2012, the total fresh water demand is estimated to be 57 million cubic metres per year. During 2011, approximately 16.7 million cubic metres of potable water were produced through desalination. During 2015, the total desalinated water produced was 17.8 million cubic metres. Three desalination plants currently exist on the island of Malta and is distributed to Gozo and Comino via underwater pipelines crossing the channel between the islands. On average seawater extracted from shore wells is approximately 40 million cubic metres per year. Brine discharge amounts to 24 million cubic metres per year. There is no national strategy in Malta for this activity. The three desalination plants are located along three different coastal locations on the island of Malta. The only potential issue is linked with the plant in the North, at Cirkewwa, since it is in proximity to the inter-island ferry terminal linking the two main islands of Malta and Gozo.

2.3 OIL & GAS RESEARCH AND EXTRACTION

This activity implies the research and exploitation of hydrocarbons (oil and gas) deposits below the marine subsoil. It is one of the maritime activities with the greatest commercial interest. In the Western Mediterranean it is carried out on specific marine areas mainly on the continental shelf. It

implies the research of natural hydrocarbons deposits and their exploitation after the perforation of the subsoil through sophisticated technologies. Prospections are carried out through specific boats while drilling and extraction of hydrocarbons from the subsoil takes place on special platforms.

As regard the state of such activity in **Italy**, the licenses of exploration and exploitation of hydrocarbons in the offshore are granted by the Ministry of Economic Development in the areas of the continental shelf governed by Italian laws and ministerial decrees. They are called "marine zones" and named with capital letters. The Law No. 613/67 has defined five marine zones (from A to E), while two additional sections F and G have been later opened by ministerial decrees. Concerning the area examined from the Italian CS area, the interested zone is the C. In Italian marine areas, there are 344 offshore production wells in the 67 cultivation concessions. The C area feature a total of 30 producing wells and 5 platforms. Within the area is present the Vega field (permit C.C 6.EO), 22 km south of Pozzallo (RG). In production since 1987, the field is operated by Edison with a 60% working interest (Eni is the partner with 40%). The Vega cluster consists of Vega A, the field currently in production, developed with 20 wells, a platform located in 130 metres of water designed to process 60.000 barrels of oil per day and a floating storage and offloading tanker (Leonis) with a capacity of 110,000 tons to temporary store production (DGS-UNMIG; Fig. 10). The crude oil is transported from the Leonis to refineries by tankers shuttles. Two adjacent research permits granted to Northern Petroleum insist in the area, C.R146.NP (Suspended until the finding and availability of a suitable drilling rig) and C.R149.NP.

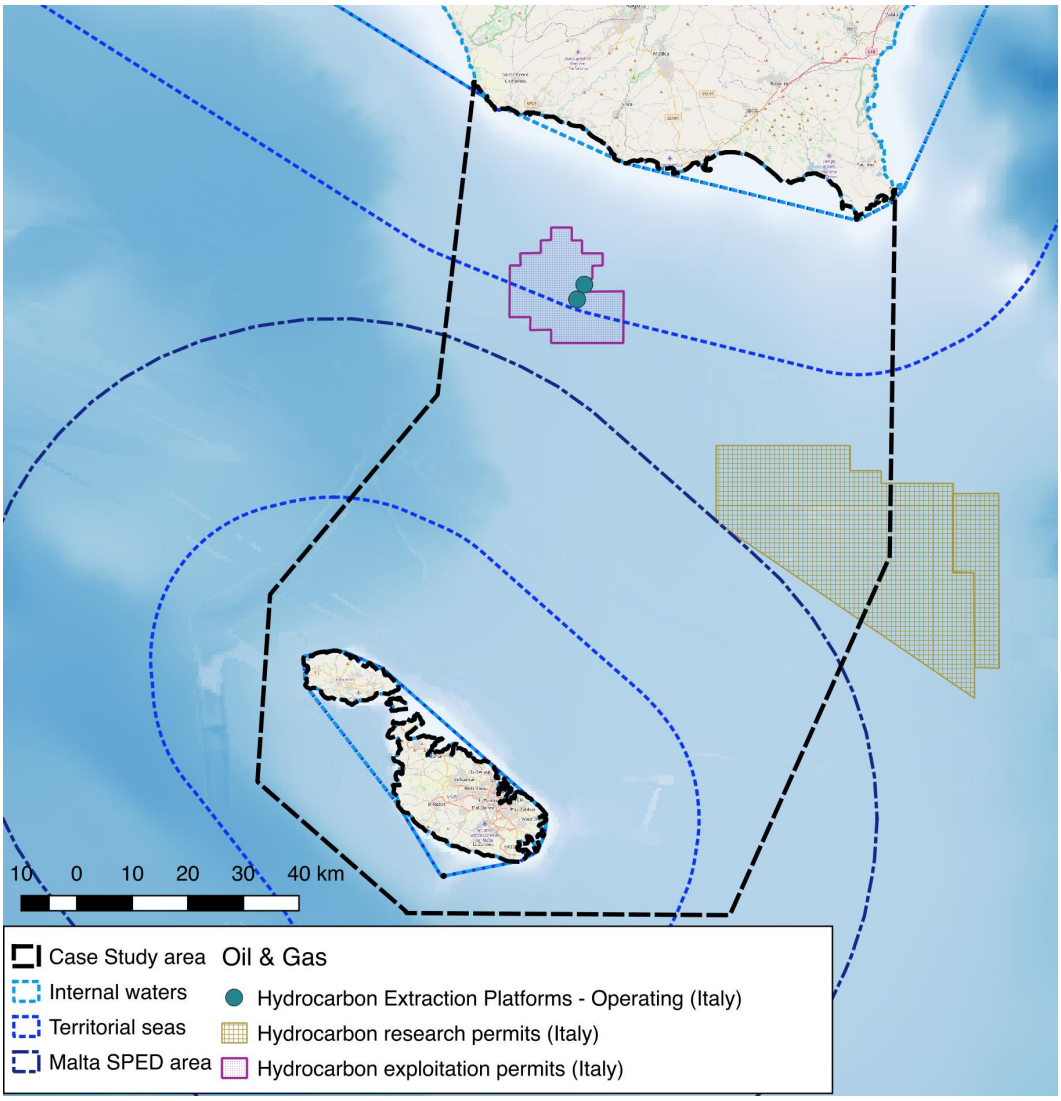


Figure 10 - Geographical distribution of hydrocarbons realted activities in CS waters

Malta introduced offshore oil exploration in the 1970s and 10 offshore wells were drilled. The area designated for hydrocarbon exploration and exploitation in Malta is made up of seven areas, two of which are further subdivided. Exploration activity is ongoing. The MSFD Initial assessment report indicates that the activity is bound to increase over the coming years. No exploitation activity has taken place to date. The MSFD Initial Assessment indicates that this sector is statistically considered together under NACE codes 8&9 that include other mining and quarrying, mining support services activities. According to the report, in total the sectors under these NACE codes generated an output of €48,300,000 in 2012. The proportion of these NACE code sectors depending on the marine environment and therefore relevant to oil exploration is estimated at 5.0%. This is equivalent to €2,415,000.

2.4 CABLES AND PIPELINES

In **Italy**, the actual state of gas infrastructures is regulated from the “Piano decennale di sviluppo delle reti di trasporto di gas naturale 2016-2025” made from SNAM RETE GAS. Gas Transport infrastructures end with four seaports connecting the underwater pipelines to the ground ones, and which are located at Mazara del Vallo (Trapani), Messina, Favazzina (Reggio Calabria) and Palmi (Reggio Calabria). Standing to European Commission, Italy has 6 PCI for gas networks, 5 of which have an offshore component.

Currently, in **Malta** there is one energy related offshore pipeline between Libya and Sicily. Other pipelines located inshore are related to the transfer of fuel from ship to land based installations. Fuel and Gas pipelines are located in Marsaxlokk harbour and are used to transfer fuel from designated points within the bay to a number of land based installations. The main companies who use these pipelines are Enemed Company Ltd. and San Lucian Oil Company Ltd. The Enemed Company Ltd. owns seven submarine pipelines linking its fuel storage facility in Ħas-Saptan to a dolphin (a platform on concrete pylons) in Marsaxlokk Bay. There are five pipelines for fuel (gas, oil, kerosene and petrol), one for fresh water and one for ballast water, although the latter is no longer in use. San Lucian Oil Company Ltd., operates three sub-aquatic pipelines (2 of which are looped in one pipeline) for transfer of fuel oil, light cycle oil and gas oil between vessels and its facility in the San Lucian area in Marsaxlokk. Liquefied Petroleum Gas (LPG) is also transferred via pipeline from supply vessels moored at designated buoys within Marsaxlokk Bay to the nearby plant located on the coast in Qajjenza, Birżebbuġa. The underwater pipelines in recent use comprise a twin pipeline – one for vapour, one for liquid - laid on the seabed and cast together in concrete. The Government of Malta intends to implement a connection to the trans-European Natural Gas Network to end Malta’s isolation. This will be achieved by connecting Malta via an approximately 155 kilometers pipeline to Sicily primarily for importation of gas from the Italian National Gas network. The project has been identified as a ‘Project of Common Interest’ (PCI) under priority corridor ‘North-South gas interconnections in Western Europe’ in 2013 and its PCI status has been reconfirmed in the 2nd PCI list adopted on the 18th November 2015 (refer to link http://europa.eu/rapid/press-release_IP-15-6107_en.htm). The pipelines for fuel transfer are within the Marsaxlokk harbour. The inter-connector landing area is along the north-east coast of mainland Malta.

Underwater cables are laid on the sea bottom to transmit electricity and carry telecommunication signals over long distances. Very often underwater cables provide communication and energy connection between shores of different countries. The service activity of cable laying and upkeep is performed by a small number of operators worldwide. Some of them are vertically integrated with cable manufacturing firms, others are part of telecommunications companies and still others have set up as independent enterprises. They may be specialised in laying and maintenance or

diversified over a large number of offshore services (oil installations, navy vessels, offshore energy installations, etc.).

In **Italy,** the Ministry of Economic Development (MISE) is responsible for policies regarding sectors of energy and telecommunications. By Decree of Minister for Economic Development (December 15, 2010), the activities of electricity transmission and dispatching in the national territory were granted under concession to Terna S.p.A. which has to develop a Development Plan every year, and such Plan has to provide guidance on the development of the sector to the medium and long-term vision. This, have to be in line with the SEN (National Energy Strategy).

In **Maltese** waters the Malta Communications Authority intends to carry out a feasibility study to examine the possibility of an additional submarine cable that would connect Malta to an Internet hub, either to mainland Europe (e.g. Marseilles) or to North Africa. However, no national strategy for the activity exists. The key areas for the telecommunication cables are located along the NE coast of Malta, within three different locations. Two of the areas are within a coastal designated Natura 2000 site. The other site is located within the main harbour area. Underwater cables for power transmission between Malta and mainland Europe, as well as within the Maltese islands are also present. Electricity generated by the power stations situated on the main island of Malta is distributed throughout the islands of the Maltese archipelago by underwater cables. Power cables are thus laid in each of the two channels between Malta and Comino, Comino and Gozo for electricity supply. The development of an interconnector between Malta and Sicily to connect the power grid of Malta with the European grid has been granted permission in 2012. The Malta-Italy Interconnector, inaugurated in April 2015, comprises a 120-kilometre high voltage alternating current (HVAC) system capable of bidirectional flow of electrical power, transferring 200MW of electricity. In Sicily, the Interconnector is linked to the Italian network at 230kV at the Terna substation in Ragusa. The submarine cable lands in Malta at Qalet Marku, Bahar ic-Caghaq and transmits electricity to the distribution network at 132kV through a nearby Enemed terminal station at Maghtab.

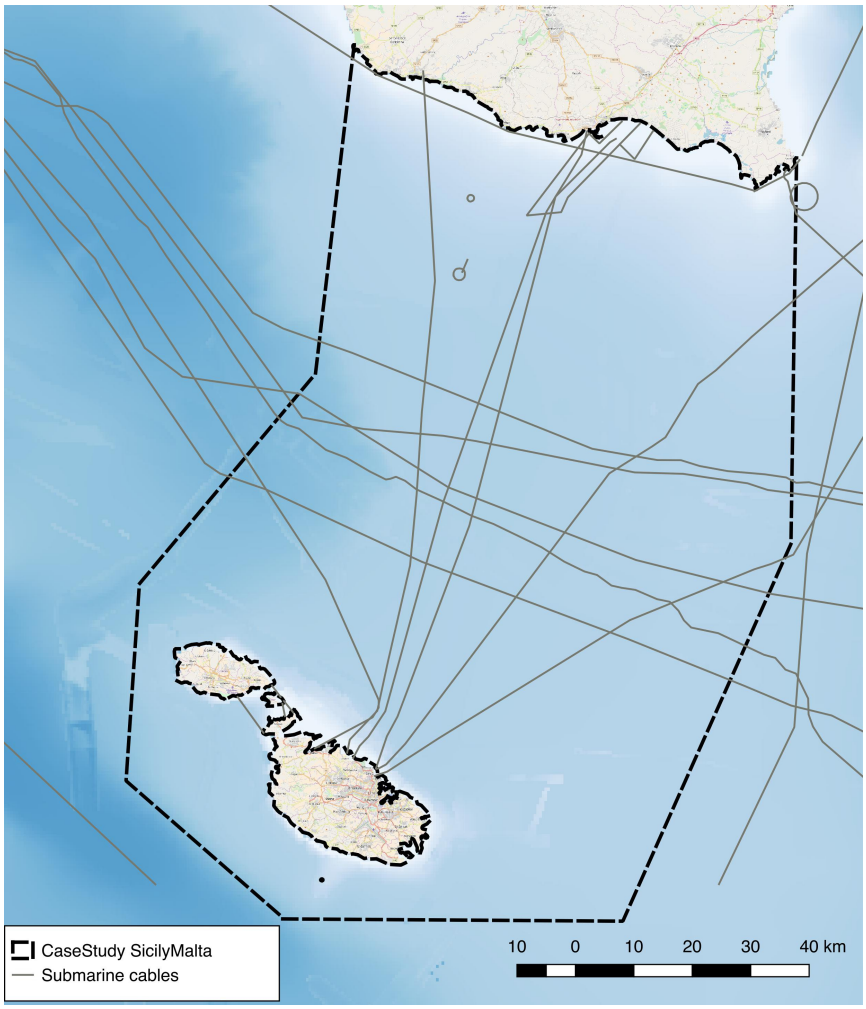


Figure 11 - Geographical localization of telecommunication cables in CS waters.

2.5 MARITIME TRAFFIC

Maritime transport in the CS area has grown during the past two decades, both in the number of routes and in traffic intensity, also due to the enlargement and deepening of the Suez Canal completed in 2015 (Fig. 12). The case study area is heavily interested by east-west traffic of commercial ships, which may not directly refer to the ports present in the area but due to the position crossing a high number of shipping lanes connecting the Easern and Western Mediterranean. Vessels arriving in the area are mainly cargo ships, followed by bunkers, conveyance and passenger vessels (i.e. cruise ships and ferries, leisure boats).

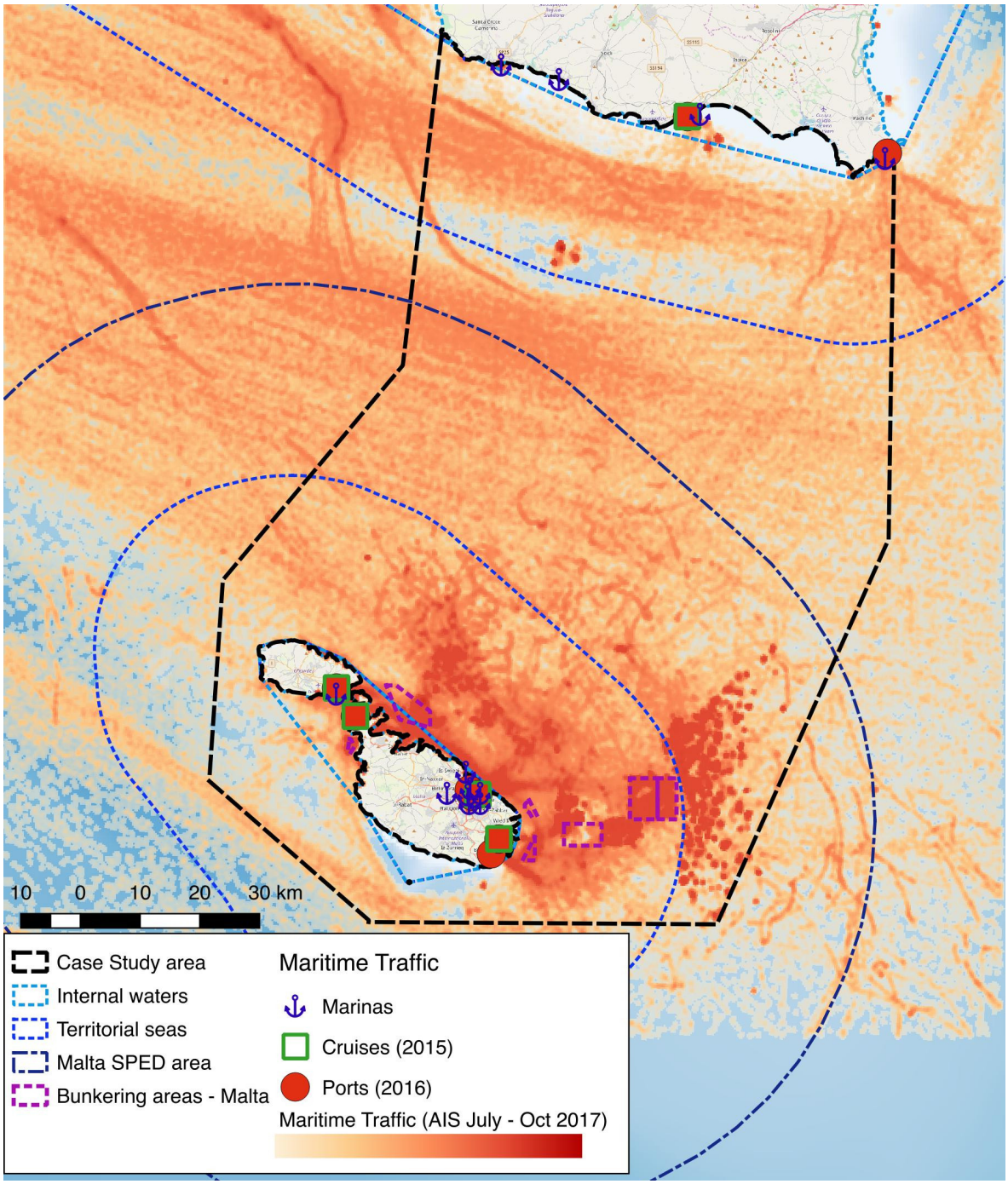


Figure 12 - Heatmap of aisdata position (JUL07-OCT10). Positions of vessels with all AIS type other than 'Manned VTS','OffShore Structure', 'SAR','SAR Aircraft' (Radius 500m; Cell 250m; CNR ISMAR own elaboration)

Shipping include all those activities that involve the transport of goods by ships typically through large distances. Maritime traffic of goods is one of the essential reasons for the existence of port facilities. From an economic point of view, it is an essential activity for ports because it involves activities linked to intermodality with a direct effect on employment and the development of services and industrial activity. Transit traffic is conditioned by the variations in world trade, since its movements are practically not dependent on variations on local national economies but rather are more concerned with business (and/or geostrategic) reasons of shipping companies or agents.

On the other hand, the traffic of goods in general and the so-called import/export in particular, are closely linked to the economic activity of a country, to greater volumes of traffic, greater intensity of the activity and vice versa. As indicated, these trades are mainly channelled through ports so that their activity can also be used as an indicator of the health of a country's economy. In this sense, the economic recovery of 2014 has been accompanied by a growth in traffic of goods.

The case study area is heavily interested by commercial traffic (fig. 13), which do not directly refer to the ports present in the area (Pozzallo, Valletta Grand Harbour, Marsaxlokk, Ċirkewwa and Marsamxett). However, commercial ships heavily use bunkering areas located north-east off the Maltese coast. Such intense east-west commercial traffic, mainly by container shipping, is accompained by local and north-south traffic, i.e. oil transportation, passengers (cruise ships and ferries), fishing boats, leisure boats (yachts and mega-yachts, mainly present around the Maltese coasts and ports).

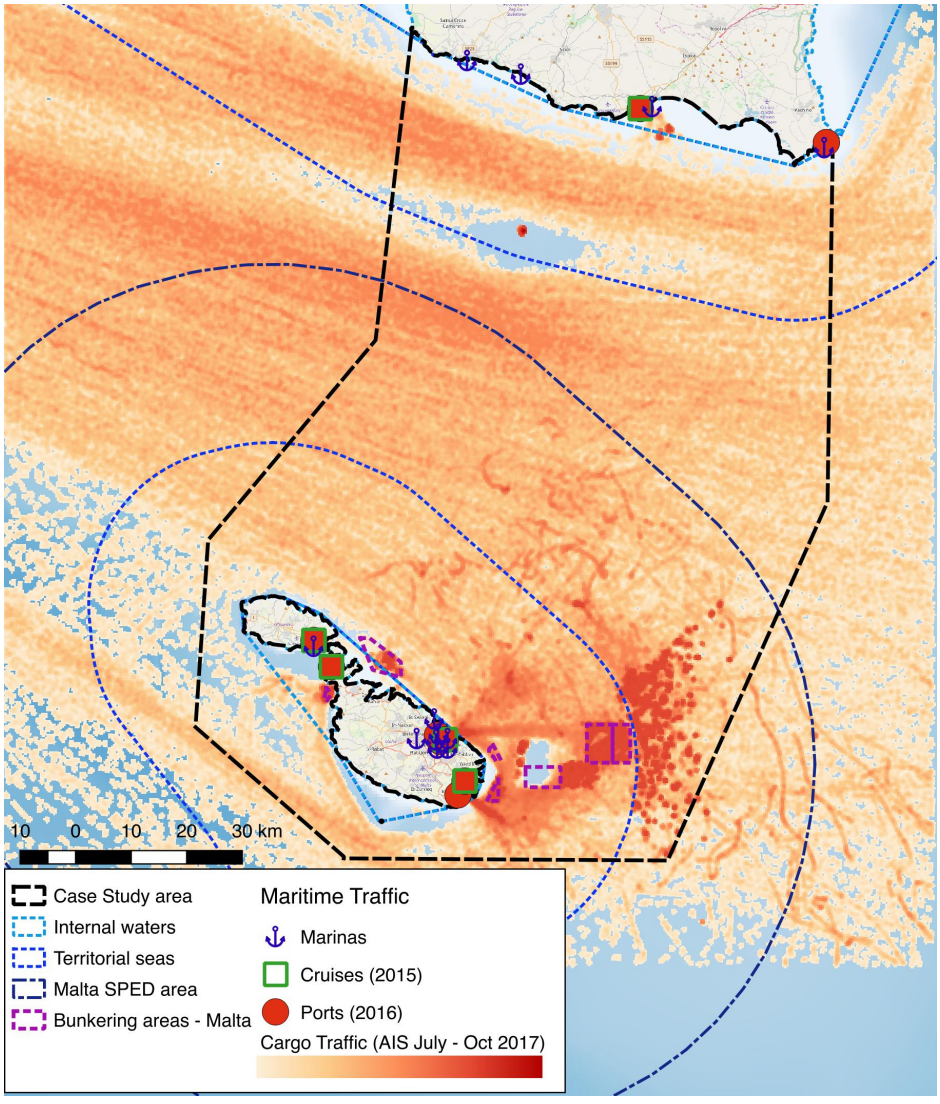


Figure 13 - Heatmap of aisdata position (JUL07-OCT10) filtered by AISVesselType “Cargo” and “Tanker” (Radius 500m; Cell 250m; CNR ISMAR own elaboration)

By the end December 2015, the number of ships registered under the Merchant Shipping Act had reached 7,249, for a total gross tonnage of 66.2 million. This signifies a steady increase over the previous years with Malta maintaining its position as the largest register in Europe and one of the 10 largest registers in the world in terms of gross tonnage. Vessels arriving in Malta mainly constitute cargo ships, followed by bunkers, conveyance and passenger vessels. Malta is situated along a number of main shipping lanes with over 65,000 vessels estimated to pass within 20 nautical miles of the Maltese Islands. Maritime transport is the main source of inter-island transport, which provides a life link to residents on the Island of Gozo particularly for employment and services from the mainland. The Transport Masterplan 2025 published in 2016 covers all transport within the Maltese Islands. It incorporates targets and measures related to internal and external maritime transport mainly related to improved governance and improvement of existing coastal/port infrastructure.

Most of the strategic objectives for this activity are related to governance with targets addressing ongoing and continuous improvement of operational activities. No further details are provided with the exception of the potential for alternative fuel infrastructure Maritime Transport supports the Maltese Islands through commercial trade. The movement of goods and passengers provides a life-link for the archipelago with the rest of the world. Malta constitutes an important hub for the shipping industry, as a result of its strategic location in the centre of the Mediterranean region. Within this context, Malta provides a comprehensive range of maritime services and facilities including a container transhipment terminal (Malta Freeport), oil bunkering facilities and a cruise passenger terminal. Malta is thus an international maritime centre providing the whole range of maritime services and the Maltese flag is a reputable flag of ship registration.

2.6 TOURISM AND LEISURE

Tourism is one of the most important economic activities in the coastal area, for this reason a large number of different services are provided to vacationers interested in leisure activities at beaches and on the coastal area in general. This type of tourism is generally described as “sun and beach tourism”. In the Mediterranean it is an activity characterized by strong seasonality.

The Mediterranean region is the main touristic destination in the world, accounting for one-third of tourism's total income. France, Spain and Italy are the top three Mediterranean holiday destinations (EUROSTAT, 2017). Seaside tourist flow has overall increased over the last 10 years in the CS area. The Sicilian coast remains an important tourist’s destination within the Mediterranean context in particular in summer period. Tourists both from Italy and foreign countries are attracted

by Sicilian coast natural and cultural heritage. Tourism sector in Sicily has great potential for further development. Still, tourism in the entire Sicily Region, although of great importance, represents only 4 % of the regional GDP (10,3 % of the total Italian GDP, 2013).

The tourism industry in the **Maltese** Islands was identified as an important economic sector post-independence in 1964. The main marketing strategy for decades was the sun, sand and sea model with hotel development taking place along coastal areas and parts of the littoral rented on long term leases for supporting activities particularly in bathing areas. Since the late 1990s, strategies to diversify the tourism product were still centred on the coastal and maritime area with increased development of yacht marinas and improved marketing on SCUBA diving. Additional development of appropriate infrastructure also paved the way for the introduction of the cruise liner industry in 2001, which has continually experienced growth. Additional activities related to coastal tourism include recreational activities such as bathing and boat trips along the shores. The creation and extension of sandy beaches and the scuttling of vessels for either bathing or diving purposes have been popular in the late 1990s and their implementation have introduced new regulatory regimes. Further opportunities for diversification of the coastal tourism product include the promotion of SCUBA diving near/in Tuna farms and recreational fishing. Most of the tourism related activities occur inshore and along the coast with marinas and cruise liner facilities concentrated within existing ports and harbours.

The evolution and overall results of the tourism sector will undoubtedly be determined by the ability to adapt coastal tourism to new demands and advance its sustainability. It is frequent to observe, in the Mediterranean a worse quality of the marine environment in the time of greater recreational use. If we add that the use of beaches and sport navigation also increase, and that the environmental awareness of users can still improve, it translates into a deterioration of the environment due to the greater presence of plastic and organic remains that sometimes end in the sea.

Maritime tourism refers to sea-based activities such as boating, yachting, cruising, nautical sports as well as their land-based services (Ecorys, 2013). According to CLIA (Cruise Lines International Association) **cruise tourism** is intended as a form of travelling, involving an all-inclusive holiday on a cruise ship of at least 48 hours, according to specific itinerary, in which the cruise ship calls at several ports or cities. Cruising is the form of tourism that has shown the highest growth curve in the past decade (fig. 14).

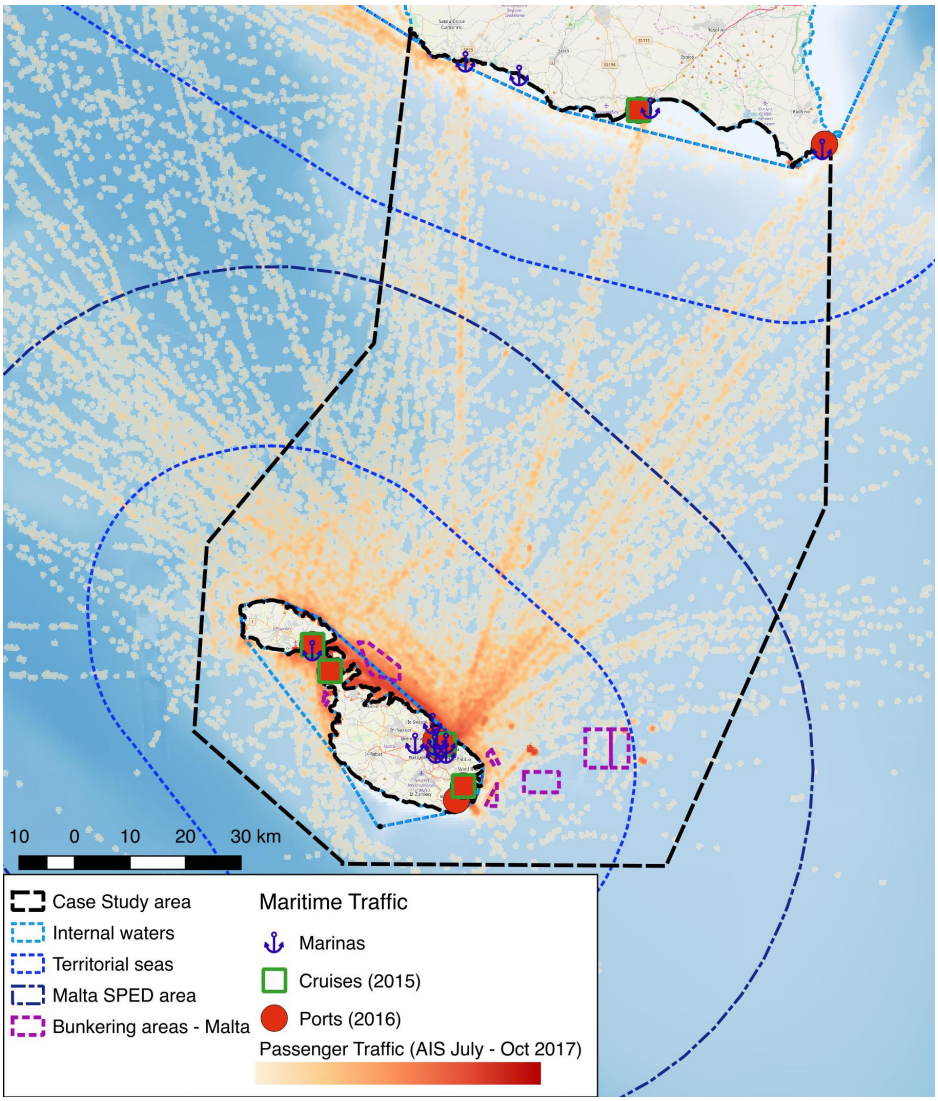


Figure 14 - Heatmap of aisdata position (JUL07-OCT10) filtered by AISVesselType “Dive Vessel”, “High Speed Craft”, “Local Vessel”, “Passenger”, “Pleasure Craft”, “Port tender”, "Sailing Vessel” (Radius 500m; Cell 250m; CNR ISMAR own elaboration)

2.7 ENVIRONMENTAL AND MARINE PROTECTION - MPAs

There are 14 Marine Protected Areas in the Maltese Islands. Management Plans for these Natura 2000 sites are currently being developed. The National Biodiversity Strategy and Action Plan (2012-2020) developed a specific target for MPAs: to improve sufficiency in the designation of key marine biodiversity areas through a representative network of marine protected areas. Since the adoption of the strategy, the number of MPAs covering Malta’s marine waters has increased significantly, with the designation of 9 sites in 2015. The geographical scope and areas of application of the Strategy is national. Along Sicilian coasts within the CS perimeter, 9 Natura 2000 sites have been established, 3 of them with portions at sea (Tab. 2, fig. 15).

Table 2 - MPAs and Natura 2000 sites in the CS area

Reference	MPA Name	Designation	Area (ha)
ITA080004	*Punta Braccetto, Contrada Cammarana*	SCI	476.8
ITA080005	*Isola dei Porri*	SCI	15.96
ITA080007	*Spiaggia Maganuco*	SCI	167.95
ITA080008	*Contrada Religione*	SCI	193.84
ITA080010	*Fondali Foce del Fiume Irminio*	SCI	387.45
ITA090003	*Pantani della Sicilia sud orientale*	SCI - SPA	1602.67
ITA090010	*Isola Correnti, Pantani di Punta Pilieri, chiusa dell'Alga e Parrino*	SCI - SPA	146.54
ITA090028	*Fondali dell'isola di Capo Passero*	SCI	5371.47
MT0000101	*Il-Bahar bejn Rdum Majjiesa u Ras ir-Raheb*	SCI	848.72
MT0000102	*Il-Bahar fl-inhawi ta' Ghar Lapsi u ta' Filfla*	SCI	2450.51
MT0000103	*Il-Bahar fl-inhawi tad-Dwejra (Ghawdex)*	SCI	228.61
MT0000104	*Il-Bahar fl-inhawi ta' Mgarr ix-Xini Ghawdex)*	SCI	30.56
MT0000105	*Il-Bahar fil-Grigal ta' Malta*	SCI	15519.4
MT0000106	*Il-Bahar tat-Tramuntana*	SPA &pSCI	31920.0
MT0000107	*Il-Bahar tal-Grigal*	SPA	35190.0
MT0000108	*Il-Bahar tal-Lvant*	SPA	62550.0
MT0000109	*Il-Bahar tax-Xlokk*	SPA	21930.0
MT0000110	*Il-Bahar tan-Nofsinhar*	SPA& pSCI	83540.0
MT0000111	*Il-Bahar tal-Lbic*	SPA	25630.0
MT0000112	*Il-Bahar ta' madwar Ghawdex*	SPA	55670.0
MT0000113	*Il-Bahar tal-Punent*	pSCI	23100.0
MT0000114	*Il-Bahar tal-Majjistral*	SPA	5592.0

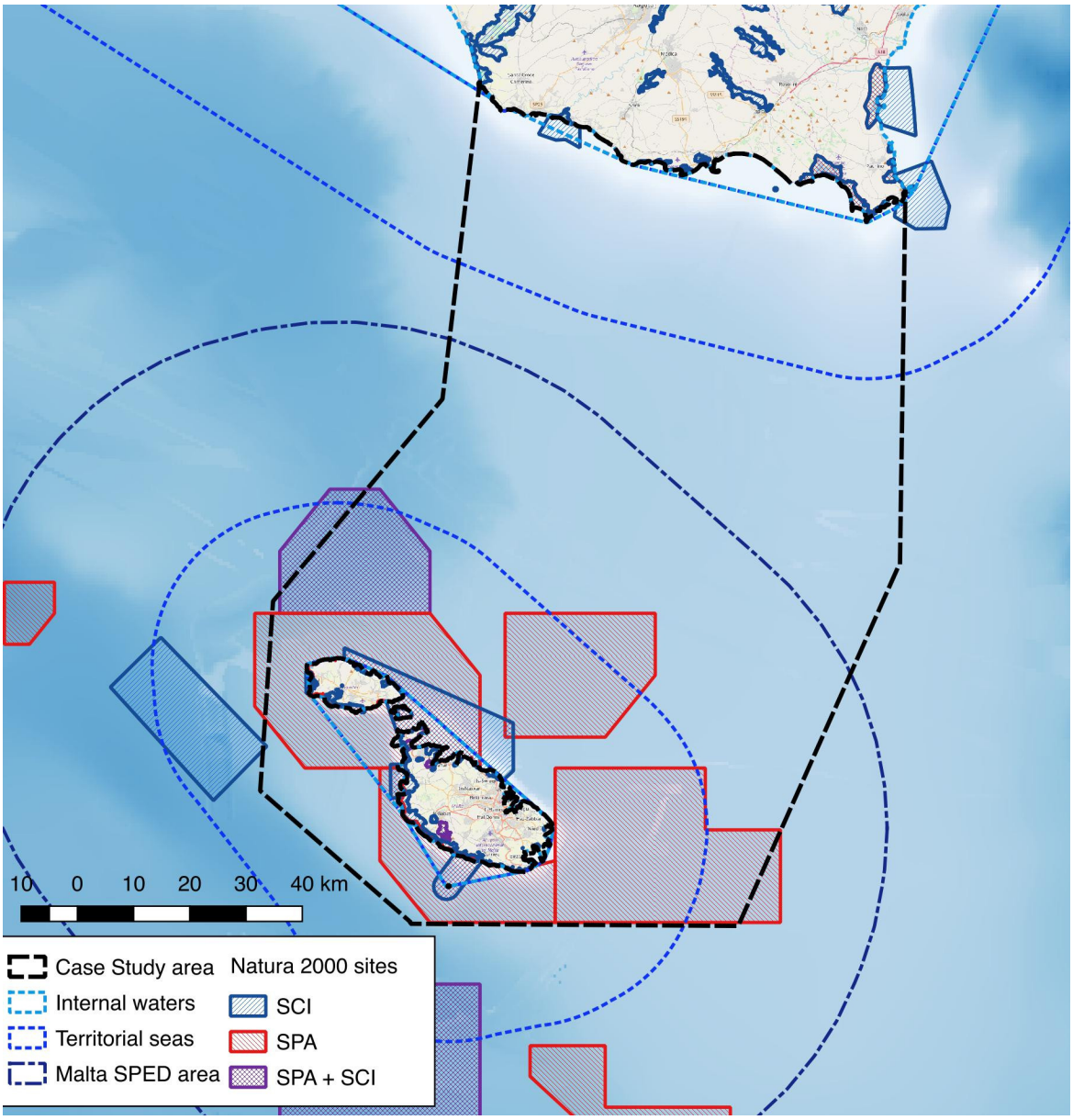


Figure 15 – Distribution of protected areas within the CS area

Monitoring programs to assess the environmental status of the Maltese MPAs are still to be implemented, and for this reason there are data limitations and gaps that create significant difficulties in establishing MPAs effectiveness. The designation of new protected areas should consider the strategic location of Malta in central Mediterranean, which can lead to potential threats from maritime transport and fisheries.

3. VISION, TRENDS AND OBJECTIVES

3.1 VISION

The area on which this MSP exercise is carried out is heavily anthropized and strongly interested by development trends related with several maritime sectors. Planning the future development of each maritime uses and activities should be done ensuring the compatibility of all the decisions taken and the plans should incorporate all the three pillars of sustainability: economy, society, environment. The remarkable transboundary context that characterizes the case study represents the opportunity to share a common view on the socio-economic development and environmental conservation priorities on which build the future of these coastal and marine areas. The vision thus foresees that socio-economic and conservation objectives in the area will be reached sustainably and in synergy, avoiding incompatibilities and with clear priorities which must answer to the needs and demands of the coastal and marine areas involved.

3.2 STAKEHOLDER ENGAGEMENT

The active participation and engagement of all relevant stakeholders is a critical element for the successful preparation and implementation of maritime spatial plans. These plans cannot only be based on a national level perspective but they should also take into considerations and balance the interests and demands of various stakeholder groups, regional and local authorities, economics entities from key maritime sectors, NGOs. The stakeholder consultation should cover the different phases of the MSP process (from the initial assessment phase to the analysis and planning phase). The duration of SIMWESTMED project, on the other end, did not allow for a large and comprehensive participatory process. Nevertheless, the project has undertaken a fruitful dialogue with key institutional stakeholders in order to identify the specific objectives and on-going initiatives in the study areas and to address the proposed planning measures. In addition, SIMWESTMED benefited of the stakeholder dialogue already undertaken in similar projects and initiatives, as for example the previous EU ADRIPLAN project and the national RITMARE Project.

In the framework of the Sicily-Malta case study, the stakeholder involvement process includes four steps, having in mind the 5 steps proposed in the deliverable C1.3.4 “Report on potential approaches for stakeholder engagement on MSP and the evaluation of the outcome of stakeholder involvement in the pilot areas”. For the above-mentioned reasons, the five steps were aggregated. This case study involves two Member States, Italy and Malta, and deals with different transnational issues. Therefore, the stakeholders debate involved several stakeholders from the two EU Member States and two workshops have been organized one in Sicily and one in Malta between June and

September 2018. In both these two events there was the involvement of both Maltese and Italian participants to ensure the consistency and the exchange between the two shore based interested parties.

3.2.1 Italy

Identify and map key relevant stakeholders

A preliminary list of key national stakeholders has been elaborated, starting from existing data bases of previous projects on MSP such as ADRIPLAN - ADRiatic Ionian maritime spatial PLANning. Stakeholders from different maritime sectors have been divided into three broad categories[1]: public institutions and relevant local authorities, economic entities of key sectors, Civil society organizations.

Table 3 - Key Stakeholders attending to Italy stakeholder workshop

STAKEHOLDER CATEGORY	ORGANISATION
Public Institutions and local authorities	Regione Sicilia
	Autorità di sistema portuale del mare di Sicilia orientale
	Autorità di sistema portuale del mare di Sicilia occidentale
	Autorità portuale di Messina
	Capitaneria di Porto di Pozzallo
	Comune di Modica
	Comune di Pozzallo
	Comune di Scicli
	Provincia di Siracusa
	Provincia di Ragusa
Economic operators	AMA Associazione Mediterranea Acquacoltori
	ALIS
	ARENARIA Srl
	Assoporti
	CONFITARMA
	Federcoopesca
	Legapesca
	Risposte & Turismo
	Fincantieri
	RINA
Research Sectors	CNR ISMAR of Venice
	CNR IAS Capo Granitola
	University IUAV of Venice
	University of Palermo
	University of Malta
Civil society organizations and projects	WWF Italia

1 ADRIPLAN project. Barbanti A., Campostrini P., Musco F., Sarretta A., Gissi E. (eds.) (2015). Developing a Maritime Spatial Plan for the Adriatic-Ionian Region. CNR-ISMAR, Venice, IT.

Fondazione Cetacea Onlus
Uomini delle navi
Projects:
COEXIST
MESMA
PERSEUS
MUSES
SUPREME
RITMARE
PORTODIMARE

Starting from this preliminary list, the lead partner in cooperation with all the national partners of the project, selected a first group of stakeholders with competences and role in maritime affairs. The lead partner established communication with this first group of stakeholders in order to inform them about the objectives of the project in relation to the national implementation process of MSP Directive.

Stakeholder Workshop in Sicily: "The Maritime Spatial Planning in the Sicily /Malta case study"

The workshop has been organized by Italian Ministry of Infrastructures and Transports and held in Sicily, at the Port of Pozzallo (in a ferry flying Maltese flag) the 12th of June 2018. In this first round of stakeholder involvement, participants (68 persons) included the following key stakeholders: the two ministries, partners of the project (the Ministry for Environment, Land and Sea and the Ministry of Infrastructures and Transport), the Port System Authority of the Eastern Sicilian Sea, the Port System Authority of the Western Sicilian Sea, the Port Authority of Messina, the Coast guard of Pozzallo, the municipalities of Scicli, Pozzallo and Modica, the provinces of Ragusa and Siracusa, Malta Environment and Planning Authority, CONFITARMA, RINA and ALIS as well as several researchers from Universities and research centers (e.g. CNR IAS). In addition, the meeting was attended also by a small group of students from the Istituto Superiore La Pira.

The meeting focused on three main objectives:

- Identify objectives, priorities, conflicts and synergies in the area
- Evaluate data and knowledge gaps in the study area for MSP purposes and the role of institutional stakeholders to fill in the gaps
- Identify the relevant stakeholders to engage in the following steps of MSP process and the best methodologies for facilitating a participatory approach.

A case study fiche summarizing the knowledge available in study areas as well as actions and outputs foreseen has been prepared and shared with the participants. The workshop was organized in two thematic round tables involving all participants. The discussion of the first round-table has been based on four major questions:

- Are there important additions to the knowledge framework aimed at MSP objectives?
- What are the expected trends for the various sectors?
- What are the existing conflicts and potential synergies?
- Which are the main drivers for MSP, with a strong and specific transnational connotation
- The second round-table dealt with the data and information required for an MSP process as well as an evaluation of relevant stakeholders to engage in the process.

A questionnaire has been elaborated and distributed during the workshop in order to collect stakeholders' priorities, to identify areas with high potential for maritime activities and areas with environmental vocation, to bring out criticalities and potential synergies among maritime uses, to obtain further contact of local stakeholders relevant for the MSP process in the area. Workshop and questionnaire results have been used as a basis for the formulation of the MSP objectives for the case study areas. Inputs provided by the stakeholders have been also useful for identifying the criticalities of the area and some of the planning measures. In addition, this first workshop has been very useful in order to establish contacts with local, regional and national stakeholders to assess data availability. Data collected have been integrated in the Adriplan data portal.

Workshop and questionnaire results

Key priorities outlined by stakeholders:

- Development of coastal tourism

- improvement of the portland infrastructures (Pozzallo – Marina di Ragusa – Scoglitti); improvement of road infrastructures (East-West axis with the SR-Gela highway and North-South axis with the doubling of the RG-CT)

-Finishing the passenger station of Pozzallo

- Enhance the co-operation Malta-Augusta-Catania

- Increasing of MPAs and other protection zones, especially on the South Eastern side between Siracusa and Capo Passero

- Protection of nursery areas of commercial species of high economic value to slow down the decrease of fish stocks

- Increase fishery to valorise local anthropological coastal traditions

- Installation of new aquaculture sites to compensate the eventual creation of new areas of total protection

- innovation in low-emission technology

Criticalities stressed by the stakeholders:

- Illegal fishing

- Costal erosion and draft of ports

- Cetaceans -vessel interactions

- Pollution from urban discharge

- Hydrocarbon pollution

3.2.2 Malta

A second workshop has been held in Malta, the 19th September 2018, for discussing with Maltese stakeholders the main issues of MSP process. The "MSP for Blue Growth: Stakeholder Conference" was organised to present the findings of the SIMWESTMED Case Study #4 within the context of implementation of MSP in Malta. The preparation of the meeting was co-ordinated by the Planning Authority in consultation with Malta Marittima Agency as the Government's delegated entity to promote the Integrated Maritime Policy, and is also a member of the MSP Technical Committee assisting the Planning Authority to implement the MSP Directive. For the Conference a total of 90 participants were invited from the private sector, research institutes and regulators. The MSP Technical Committee was also invited.

Participation for the conference was good, with around 50 persons responding to the circulated invites. A brief overview on MSP in Malta was provided during the first part of the meeting and this was followed by a brief presentation of the SIMWESTMED project and the Case study. The second part of the meeting was dedicated on the findings of the case study where the Corila Team Venice (CNR - Ismar and IUAV) provided detailed outputs from the analysis carried out to-date.

Invitations for participants to validate the data and findings were made. Whilst the audience responded positively to the presentations, not many interventions were made even though there were many opportunities for them to do so. However, positive response was confirmed during informal discussions.

Table 4 - Key Stakeholders attending to Malta stakeholder workshop

STAKEHOLDER CATEGORY	ORGANISATION
Research Sectors	University of Malta CNR ISMAR of Venice University IUAV of Venice

National Park Management	Majjistral Nature & History Park
Governmental Entities	Ministry for Transport, Infrastructure and Capital Projects Environment and Resources Authority Planning Authority Office of the Prime Minister – Continental Shelf Department Transport Malta Fisheries and Aquaculture Ministry for Tourism Ministry for Energy and Water Malta Marittima Agency
Private Sectors	Combined Maritime Services Projects Plus Ltd Abela Advocates Malta Freeport

3.3 PLANNING OBJECTIVES ANALYSIS IN THE CASE STUDY

The identification of the multilevel and multisectoral objectives, which reflect the needs and demands of the area and the expected trends, is imperative where the plan is on track of development and/or implementation, and it needs to be done at an early stage of the MSP process. The defined objectives drive the entire process orienting the plan proposal and underpinning its effectiveness.

The analysis of the existing national, international and European strategic documents highlights preferred future development trajectories as well as the objectives predisposed for the planning area. The vertical and multi-scale approach adopted in the analysis of the sectoral objectives and trends led to the identification of the common priorities that are present in the case study area between the Sicily and Malta. Scaling down the analysis at the national level, sectoral objectives characterizing both islands, on the base of their specific needs and expectation for their future economy, were even identified. After passing through the desk-analysis of the high-level objectives indicated in fundamental strategic documents, the local requests of the Sicilian area included in the pilot and the most specific and peculiar needs of the Maltese island were collected and specified. The identification of the local objectives reported for the Sicilian area was mainly framed by the stakeholders' engagement activity that was carried out in Pozzallo (see par. 2.2 above).

Thus, the “Specific objectives” reported in the table refer to objectives directly related to spatial management, some of them having a spatial content and relevance that were considered and incorporated during the planning phase. Main sectors were defined and recognized as pivotal for the case study area for their relevance in mobilizing interests and in eventually leading existing or potential conflicts in the area, which need to be managed and anticipated.

The results obtained from such analysis are the foundation for the subsequent phases of the MSP exercise. Moreover, this excerise favours the comparison among two neighbouring islands, Sicily and Malta, at different governance, policy and geographical scales, bringing to the emergence of both common and different needs and objectives as starting point to underpin cross-border dialogue and understanding in the view of trasnboundary MSP.

3.4 OBJECTIVES AND TRENDS ANALYSIS

Main sectors	Planning Objectives	Trends
Fishery	**International/EU Objectives** **WESTMED** - enhance maritime safety and assessment and response measures to marine pollution; - coordination of Vessel Traffic Services and traffic data sharing and developing a new generation of Decision Support System tools for emergency response. - optimize maritime data sharing across the two shores of the western Mediterranean region in order to improve situational awareness, ensure national funding is used effectively and improve cooperation on cross-border operations planning. - enhance sustainable consumption and production - promote strategies to ensure sustainable development of fisheries and coastal community. - enhance the production of harmonised and up-to-date marine and maritime data on areas such as investments, gross value added, employment, waste production and disposal, bathymetry, water quality and environmental monitoring. -Ensure biodiversity and marine habitat conservation **BARCELONA CONVENTION** -To prevent, reduce and control marine litter generation and its impact on the coastal and marine environment -Sea-floor integrity is maintained, especially in priority benthic habitats -Populations of selected commercially exploited fish and shellfish are within biologically safe limits, exhibiting a population age and size distribution that is indicative of a healthy stock -Alterations to components of marine food webs caused by resource extraction or human induced environmental changes do not have long-term adverse effects on food web dynamics and related viability -The sustainable use of natural resources is ensured, particularly with regard to water use **CFP** - fishing and aquaculture are sustainable in ecological, economic and social terms and provide a source of healthy food for EU citizens. - foster a dynamic fishing industry and ensure a fair standard of living for fishing communities and in the meantime achieve sustainable catch levels in the long term for all stocks by 2020; - minimize or avoid unwanted catches and harmful practices; **Marine Strategy Framework Directive - MSFD (2008/56/EC)** - Descriptor 3 requires that all populations of commercially exploited fishes and molluscs should remain within biologically safe limits - Descriptor 6 Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected. **National Objectives**	Increasing demand of fish products but fishery is decreasing. SSF: Italian fleet under reduction, with a stabilization of the declining flow of the number of vessels in the Sicilian fleet after a very strong decrease in the period between 2010 and 2013, and incentive of fishing tourism in the Sicilian CS marinas. Trawling fleet under constant reduction. Recreational fisheries in possible expansion, in connection with actions for the diversification of tourism offer. Maltese fleet in consolidation with strong connection with tourism STAKEHOLDERS Increase fishery to valorise local anthropological coastal traditions.

ITALY

General objectives

- [2]reach sustainable fishing levels, exploiting stocks below the maximum sustainable yield (MSY) by 2020
- significant reduction in fishing capacity, reducing/eliminating the most destructive fishing practices
- promote the role of small scale fisheries in the area, considering its important and peculiar socio- economic (and cultural) value for coastal communities, in synergy with ecotourism development.
- ensure interregional cooperation with the North Tyrrhenian area (Piano Regionale di Sviluppo)
- improving cooperation among fishermen and sustainable fisheries management.

Specific Objectives

[3]zoning of fisheries to reduce overfishing of pelagic and demersal species, with particular attention to fishery in nursery areas and coordinated management of stocks. Eventually denying fishing activity in certain areas and establishing Biological Protection Zones with specific general (e.g. no trawling, larger mesh for set nets), metier based and seasonal (e.g. temporary fishing bans) measures.

- monitoring of fishing effort and assisting the adoption of alternative (sustainable) fishing methods and metiers.
- Foster synergies between sustainable fishery cultural heritage and eco-tourism
- modernization of the fishing sector facilities through incentives; (Piano Regionale di Sviluppo)

Malta

General Objectives:

- infrastructure investment – upgrading of fishing ports
- Fishing within the management zone shall be limited to vessels smaller than 12 meters overall length
- The total fishing effort of those vessels, expressed in terms of the overall fishing capacity, shall not exceed the average level observed in 2000-2001 that corresponds to 1 950 vessels with an overall engine power and tonnage of 83 000 kW and 4 035 GT respectively
- The overall fishing capacity of the trawlers allowed to operate in the management zone must not exceed the ceiling of 4 800 kW
- Protecting juvenile fish, which are mostly concentrated in coastal zones
- Establishing maximum dimensions for certain fishing gears, to curb the fishing effort
- Preventing conflicts between fishermen, with special attention given to small-scale coastal fishermen. This is to be achieved by banning more active gears, such as trawlers and purse seines, from coastal areas
- Enlarging the network of marine protected areas
- Promoting environmentally sustainable, resource efficient, innovative, competitive and knowledge based fisheries

Specific Objectives:

- Reduction of the impact of fisheries on the marine environment, including the avoidance and reduction, as far as possible, of unwanted catches

2European Maritime and Fisheries Fund - Operational Program for Italy (FEAMP), 2004-2015/ 2014-2020

3 -Programma Nazionale Triennale della Pesca e dell'Acquacoltura 2017-2019

- Programma Operativo FEAMP, MIPAAF https://www.politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/8752

- Piano di Gestione GSA 16 (Stretto di Sicilia)(ex art.24 del Reg. (CE) n.1198/2006)

- RegioneSiciliana – Osservatorio della pesca del Mediterraneo – Rapportoannualesullapesca e sull'acquacolturainSicilia - 2017

- Adopting more fuel-efficient vessels, engines and practises, including the adoption of renewable energy resources, to reduce fuel consumption and emissions.
- Enhancement of the competitiveness and viability of fisheries enterprises, including of small scale coastal fleet, and the improvement of safety or working conditions
- Provision of support to strengthen technological development and innovation, including increasing energy efficiency, and knowledge transfer
- Provide capacity-building for fisheries related businesses to add value to products and market said products.
- Improved on-board handling and preservation of catches to maintain value thereby aiding in addressing the issue of persistent lack of prifitability for the sector with such a stance to alleviate the loss of knowledge and skills with individuals seeking more lucrative alternative careers.
- Greater knowledge and prepardness for the prevention of accidents, especially at sea and in harbour. This too is sought to alleviate local fishers' safety and the costs caused by accidents.
- Development of professional training, new professional skills and lifelong learning
- Enhancement of the competitiveness and viability of aquaculture enterprises, including improvement of safety or working conditions, in particular of SMEs

Sources:

European Maritime and Fishseries Fund – Operational Programme for Malta 2018
https://eufunds.gov.mt/en/EU%20Funds%20Programmes/Agricultural%20Fisheries%20Fund/Documents/EMFF%202014-2020/Revised%20EMFF%20OP%20version%204.0%20-%20draft%20140618.pdf

European Maritime and Fisheries Fund – Country fact Sheet
https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/op-malta-factsheet_en.pdf

COUNCIL REGULATION (EC) No 1626/94 As regards certain conservation measures relating to waters around Malta
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32004R0813&from=EN

Local/Case study Objectives

Sicilian strategic objectives are developed within national policies and the application of theEuropean Maritime and Fisheries Fund (EMFF) for the EU's maritime and fisheries policies for 2014-2020.
Local regulatory frameworks describe the status of fish resources and habitats, the existing fishing activities and identify the local objectives of biological and socio-economic sustainability and specific management measures for each *metier*. Within EMFF, the Regional authority promotes the implementation of investments aimed at reducing impacts and providing for the innovation of both structures and production processes.
General objectives:
- maximize the participation of the fisheries and aquaculture sectors in the sustainable development of fisheries areas;
- ensure that local communities make full use of and benefit from the opportunities offered by maritime and coastal development;
- range from needs and potentials of fisheries to broader strategies aimed at diversifying fishing areas.

Specific objectives within EMFF 2014-2020 regard:
- sustainable development of fisheries
- the development and modernization of ports, landing sites, auction halls and fishing shelters
- investment for fisheries products processing facilities and marketing
- increasing employment and territorial cohesion.

STAKEHOLDER OBJECTIVES
Protection of nursery areas of commercial species of high economic value to slow down the decrease of fish stocks
Increase fishery to valorise local anthropological coastal traditions

Aquaculture

International/EU Objectives

WESTMED
-support the effectiveness of marine clusters to contribute to creating innovation, jobs and growth
-promoting marine bio-based innovative industries (from food and pharmaceuticals to energy) and services developing new concepts and solutions
BARCELONA CONVENTION
-Human-induced eutrophication is prevented, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms, and oxygen deficiency in bottom waters
-To prevent, reduce and control marine litter generation and its impact on the coastal and marine environment
-Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem

Marine Strategy Framework Directive – MSFD (2008/56/EC)
- Descriptor 9: Contaminants in Seafood: “Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards”
Water Framework Directive – WFD (2000/60/EC)
- preventing the deterioration of the ecological and chemical status of all surface water bodies and achieving a satisfactory quality

CFP
- aquaculture activities are sustainable in ecological, economic and social terms and provide a source of healthy food for EU citizens.

National Objectives

[4]In regard of aquaculture in terms of future trends, the market is expected to keep increase, with a foreseen average growth in the range of 4%/year, leading to more than doubling themarket between 2010 and 2030, meaning that the target of 2 million tons/year will be reachedand overcome.
Until 2010, the aquaculture sector in Sicily guaranteed over 15% of national production; subsequently it suffered a sudden collapse, which led to the closure of more than 50% of the farming plants (2013 data). The mollusc farming in Sicily is represented exclusively by four plants only dedicated to the housing of mussels (none in the CS area).

4Italian Strategic Plan for Aquaculture 2014-2020

ITALY

General objectives

- improve productivity, quality and environmental sustainability of aquaculture through proper space planning for the development of new sites co-location with other activities and facilitation of permitting procedures
- introduction of new species with high commercial values
- strengthen technological development, innovation and knowledge transfer
- enhancement of the competitiveness and viability of aquaculture enterprises
- protection and restoration of aquatic biodiversity and the enhancement of ecosystems related to aquaculture and the promotion of resource-efficient aquaculture

Specific Objectives

- identification of new sites for the implementation of aquaculture
- explore the potential for marine fish farming in the area
- Reduction of marine litter production related to mussel farming

Potentials for new sites in Italian CS area is under analysis

Foreseen controlled expansion of farming in Malta with a focus on improved management practices and increase in research installations.

MALTA

General objectives

- Provide a structured path for sustainably developing aquaculture in Malta
- Identify the domains that are essential for a profitable and sustainable industry
- Clarity in Regulation
- New potential for growth
- Improved Environmental Management
- Competiveness through innovation

Specific Objectives

1. Constantly monitor the performance of the sector at regional and international level
2. actively promoting technological and research development in aquaculture
3. production target for closed cycle species of 5,000 tons yearly
4. development of a hatchery
5. enhance the administrative and regulatory capacity of the Fisheries and Aquaculture Department to reflect the added impetus for the sector
6. ensure proper co-ordination between the various regulators to establish effective implementation of the national aquaculture strategy
7. area management agreements shall be established between different operators sharing a common Aquaculture Zone
8. future farms for capture based species will need to be sited at water depths of 50 metres or more within areas identified as Aquaculture Zones
9. marine-based research installations should preferably be located off-shore: research installations closer to shore will be directed towards designated Aquaculture Zones
10. strengthening the monitoring and enforcement regime for permits and licences
11. improving the regulation of relevant farm operations including the disposal of tuna offal
12. establishing an effective mechanism with relevant stakeholders that ensures regular reviews of research priorities and funding
13. Protection and restoration of aquatic biodiversity and enhancement of ecosystems related to aquaculture and promotion of resource efficient

aquaculture

14. Actions to reduce the environmental impact of cage farming, in particular by promoting the use of lower-waste diets, better feeding practices & improved environmental monitoring practices

Sources:

AQUACULTURE STRATEGY FOR THE MALTESE ISLANDS Towards Sustainability 2014-2025
https://msdec.gov.mt/en/Document%20Repository/Aquaculture%20Strategy%202014-25.pdf

EMFF Operational Programme for Malta 2018:
https://eufunds.gov.mt/en/EU%20Funds%20Programmes/Agricultural%20Fisheries%20Fund/Documents/EMFF%202014-2020/Revised%20EMFF%20OP%20version%204.0%20-%20draft%20140618.pdf

Local Case study Objectives

Sicilian strategic objectives are developed within national policies and the application of theEuropean Maritime and Fisheries Fund (EMFF) for the EU's maritime and fisheries policies for 2014-2020. Within EMFF, Regional authorities' specific objectives regard:
- diversification of the production of aquaculture and of the farmed species;
- sustainable development of aquaculture and modernization of aquaculture facilities, including improvement of working and safety conditions for workers in the aquaculture sector
- investment for aquaculture products processing facilities and marketing
- increasing employment.

STAKEHOLDER OBJECTIVES
Installation of new aquaculture sites to compensate the eventual creation of new areas of total protection

International/EU Objectives

Maritime Transport

WESTMED
-Enhance cooperation between member states from the two shores of the West Med
- Optimize maritime data sharing across the two shores of the western Mediterranean region in order to improve situational awareness, ensure national funding is used effectively and improve cooperation on cross-border operations planning.
-Support the effectiveness of marine clusters to contribute to creating innovation, jobs and growth
-Enhance sustainable consumption and production (maritime transport, ports, maritime and coastal tourism, marine aqua-culture)
-enhance the production of harmonised and up-to-date marine and maritime data on areas such as investments, gross value added, employment, waste production and disposal, bathymetry, water quality and environmental monitoring.

BARCELONA CONVENTION
-Contaminants cause no significant impact on coastal and marine ecosystems and human health
-To prevent, reduce and control marine litter generation and its impact on the coastal and marine environment
-Noise from human activities causes no significant impact on marine and coastal ecosystems
-Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem
-The natural dynamics of coastal areas are maintained, and coastal ecosystems and landscapes are preserved
-The sustainable development of coastal zones is facilitated by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development

Maritime Policy (IMP)

- technological growth, research and innovation in the marine and maritime sector (C 1.3.6)

-a higher traffic density in the next years, due to the increasing importance of the Short-Sea Shipping and of the Mediterranean economic exchanges
- the traffic volume of non-containerized goods, including oil and other dangerous goods and liquefied natural gas (LNG), is also expected to increase significantly at the EU level but in Italy there is a decrease in LNG production, which is set to fall over the years, as the data for 2020 and 2030 also show a negative trend

-We can find estimate of increase in Ro-Ro traffic from the report (see below)
- Expected increase of north-south and short-range ferries.
- possible further expansion of

[5]**Maritime Transport Policy** (until 2018) and the following implementation report, published in September 2016 identify general objectives related to five thematic areas:
(i) Maritime Safety and Security;
(ii) Digitalisation and Administrative Simplification;
(iii) Environmental Sustainability and Decarbonisation;
(iv) Raising the Profile and Qualifications of Seafarers and Maritime Professions;
(v) EU Shipping: A stronger global player

National Objectives

ITALY
General objectives
(including European addresses)

- Simplifications and speeding up of administrative/bureaucratic procedures in order to reduce transit time and costs and optimize approval procedures and realization of works
- Improve the efficiency of technical and nautical services (pilotage, etc)
- Improvement of maritime and land accessibility through infrastructural interventions and through an upgrading of rail services.
- Improve the quality and competitiveness of logistic services to guarantee a functional integration of the port systems with the dry port and with the logistics platform
- Improving the infrastructural performance for any kind of traffic, from containers, to liquid and solid bulk, steel products, Ro-Ro/Ro-Pax, general and project cargo. Recovery and modernization of existing infrastructures (docks, terminals, seabed, etc)
- Enhance the innovation through the diffusion of ITS for the management of port operations
- Reduce the impact of ports on the environment at global and local scales promoting the use of technologies aimed at energy efficiency and environmental sustainability
- Centralized and multiannual planning of financial resources to be allocated to infrastructure, giving priority to maintenance and enhancement of the existing assets and avoiding overcapacity (already existing in many port areas especially in container terminals).

Specific Objectives

- Improve accessibility of ports and marinas
- Improving security of traffic management

present cruise traffic.
STAKEHOLDERS
It was measured an increase of 25% of traffic of container in Pozzallo Ships traffic inside the area of the ports decreased and -14% of unloaded products and -0.6% of loaded products, stable number of passengers and increase of number of vehicles (link with Malta). Increasednetworks with Malta with new catamaran.

MALTA
Strategic Objectives

- Ensure developments in ports are backed by long term planning to support long term mobility patterns, safety and security
- Improve operations and enforcement so that internal maritime transport is properly regulated and monitored
- Ensure users comply with conditions established for public accessible maritime facilities as specified in contracts for use of these infrastructures
- Removal of bottlenecks at TEN-T Comprehensive Ports
- Ensure contracted parties comply with conditions established for operation of maritime facilities, and as specified in contracts for use of these infrastructures
- Ensure development of ports and contiguous areas are backed up by long-term planning to support sustainable growth in long term

5https://ec.europa.eu/transport/modes/maritime_en

mobility patterns, resilience, safety and security

- Removal of bottlenecks in the TEN-T Core Port of Valletta
- Removal of bottlenecks in the TEN-T Core Port of Marsaxlokk
- Ensure equipment, tools and human resources for the use, monitoring and enforcement of maritime areas are updated and to improve safety and security
- Reduce environmental impact of ports on the nearby urban area
- Provide alternative fuel infrastructure to promote efficiency and competitiveness

Source:
Transport Malta (2016) – Transport Masterplan 2025
http://www.transport.gov.mt/admin/uploads/media-library/files/Transport%20Master%20Plan%20rev%202.0.pdf

Local/Case study Objectives

General objectives

- Improving waterway system

Specific Objectives

Infrastructural upgrading of the Port of Pozzallo: back-port connection, dredging, plant engineering and implementation of the passenger station.

STAKEHOLDER OBJECTIVES
-improvement of the port area (Pozzallo – Marina di Ragusa – Scoglitti); improvement of road infrastructures (East-West axis with the SR-Gela highway and North-South axis with the doubling of the RG-CT)
-Finishing the passenger station of Pozzallo
-MT Malta Transport
-co-operation Malta-Augusta-Catania

International/EU Objectives

Oil & Gas production/ Energy

WESTMED
-Foster partnerships between research and industry across the two shores.
-Support the effectiveness of marine clusters to contribute to creating innovation, jobs and growth
-Enhance the production of harmonised and up-to-date marine and maritime data on areas such as investments, gross value added, employment, waste production and disposal, bathymetry, water quality and environmental monitoring.
-Ensure biodiversity and marine habitat conservation

BARCELONA CONVENTION
-Contaminants cause no significant impact on coastal and marine ecosystems and human health
-Noise from human activities causes no significant impact on marine and coastal ecosystems
-To eliminate to the extent possible, prevent, reduce and control selected/regulated pollutant inputs, oil discharges and spills
-Alterations to components of marine food webs caused by resource extraction or human induced environmental changes do not have long-term adverse effects on food web dynamics and related viability
-Sea-floor integrity is maintained, especially in priority benthic habitats

The Renewable Energy Directive 2009/28/EC

For the year 2016, compared with the previous, hydrocarbon production decreased by -12.5%.
Recently, Italy is promoting the development of new oil & gas resources, focusing on new themes in the field of research and development, even in the deep offshore context.
Possible new search permits and exploration activities both on Italian and Maltese sides.
In the future trends of LNG use in transport and energy, particular attention should be given to the development of biomethane
Potential siting of Offshore wind

- Establish mandatory national targets consistent with a 20 % share of energy from renewable sources and a 10 % share of energy from renewable sources in transport in Community energy consumption by 2020

Marine Strategy Framework Directive – MSFD (2008/56/EC)

- Descriptor 6 Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.
- Descriptor 11 Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

National Objectives

ITALY

General objectives

-Improve national infrastructure flexibility with regard to supply sources, enhancing transport corridors and connecting infrastructures;
-manage fluctuations in gas flows and gas tips and diversify sources of supply;
-match European directive 1513/2015 purposes of promoting the transition to low carbon greenhouse gas emissions;
-promote the use of bio-methane in transport and energy applications;
-increase security of supply and diversification of sources and allow a reduction in gas prices
Maintain the contribution of the areas to the national energy policy, allowing the exploitation over time of the hydrocarbon fields already authorized in a safe way for the environment
promote the development of marine renewable energy sources
supporting sustainable development and proper transboundary cooperation with adequate planning and effectual governance system

Specific objectives

Promote the reuse, in synergy with other uses, of platforms to be decommissioned.
Prevent potential effects on protected and high valuable species with specific measure to avoid direct pressures from seismic surveys and all other sources of noise pollution
(iii) identify suitable areas and solutions to promote the generation of energy from renewable sources at sea

farms under study
Process for the deployment of an offshore gas pipeline between Malta and Sicily is currently ongoing under the Projects of Common Interest regime of the EU.

Local/Case study Objectives

Exploitation of resources in existing concessions will continue (Oil field Vega – RG), while new exploitation activities (e.g. Vega B) are under evaluation.
Further exploration activities foreseen in the whole CS area, both in Maltese and Italian waters.

High-Level Objectives

Coastal tourism

WESTMED

-Enhance sustainable consumption and production (maritime transport, ports, maritime and coastal tourism, marine aqua-culture)
-Ensure biodiversity and marine habitat conservation
-Promote strategies to ensure sustainable development of fisheries and coastal community

BARCELONA CONVENTION

-Human-induced eutrophication is prevented, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms, and oxygen deficiency in bottom waters
-Contaminants cause no significant impact on coastal and marine ecosystems and human health
-New and emerging land-based pollution related problems are identified and tackled, as appropriate
-To prevent, reduce and control marine litter generation and its impact on the coastal and marine environment
-Alterations to components of marine food webs caused by resource extraction or human induced environmental changes do not have long-term adverse effects on food web dynamics and related viability
-The natural dynamics of coastal areas are maintained, and coastal ecosystems and landscapes are preserved
-The sustainable development of coastal zones is facilitated by ensuring that the environment and landscapes are taken into account in harmony

Seaside tourist flow is steadily increasing over the last 20 years in the area. The tourism sector is characterised by highly positive dynamics at international level. In line with the international scenario, the tourism sector in Italy continued to register positive results, and 2015 was the sixth consecutive year of growth of international arrivals, up 4.4% on 2014. This significant growth also continued into the early months of 2016 (+5% on average) and it is estimated that this trend will remain globally positive –

with economic, social and cultural development
-The sustainable use of natural resources is ensured, particularly with regard to water use
-To ensure sustainable use of natural resources, in particular water, in order to prevent their pollution and degradation

Marine Strategy Framework Directive - MSFD (2008/56/EC)
- Descriptor 10 Properties and quantities of marine litter do not cause harm to the coastal and marine environment.

“Europe, the world's No. 1 tourist destination – a new political framework for tourism in Europe” (COM(2010) 352 final)
- To stimulate competitiveness in the European tourism sector
- To promote the development of sustainable, responsible, and high-quality tourism
- To consolidate Europe's image as a collection of sustainable, high-quality destinations
- To maximise the potential of EU financial policies for developing tourism.

National Objectives

ITALY
General objectives
- innovating, specialising and integrating the country’s amenities
- Boost the tourism system’s competitiveness
- development of an effective and innovative marketing
- achieve efficient and participatory governance in the process of drafting and establishing the plan and tourism policies
- foster the development of sustainable coastal and maritime tourism
- improve quality for sustainable tourism offer
- Diversification of the cruise and nautical sectors and enhancement of the yachting sector
- Sustainable and thematic tourist routes, in synergy with productive activities, fostering cultural heritage

Malta
General objectives
- Target different markets which deliver the highest return on investment and invest in attracting the most efficient aspects of the international tourism sector
- Guide the development of tourism on the basis of a controlled growth scenario
- Sustainable tourism activity by increasing benefits whilst minimizing adverse impacts
- Guide development of the industry by establishing tourism policies that support measures to bring socio-economic benefits and added value to our islands
- Promote the development of responsible and sustainable high-quality tourism over the coming years
- Monitoring and managing visitor numbers
- Reducing seasonality

Sources:
National Tourism Policy 2015-2020
http://mhra.org.mt/wp-content/uploads/2015/08/TOURISM-POLICY-2015-2020.pdf

Local/Case study Objectives

around 4% on average – up to 2030 (PST 2017-2022).
Sustainable tourism in systematic reinforcement, reducing the impacts of tourism related structures on the environment (e.g. land use, waste production, marine litter, energy and water consumption).
-According to the national strategic plan "Turismo Italia 2020: Leadership, Lavoro, Sud", the sector should lead to the creation of 500.000 new jobs with an increase of €30 billion in GDP by 2020 and it is expected to grow by 2.3% per year, up to €83.4 billion - 4.7% of GDP - in 2024.
- increasing hit- and- run tourism (decreased average length of stay) should be fought;sharing economy in private accommodation, private transport, and services is increasing and foster the need to comply with its regulations and taxation (PST 2017-2022)
STAKEHOLDERS
-The tourism and the institutes that work for the valorization of the territory are the main entities of future development

Tourism trends in Malta over the recent years have seen an increase in numbers with a strong push to reduce seasonality. Greater visitor numbers result in demands for more attractions: particularly the deployment of underwater wrecks as diving attraction and increase of beach space through artificial replenishment.

General objectives

- Governance models for sustainable use of high value sites (e.g. Unesco), which are subject to greater tourist pressure;
- safeguard the tourist use of the coasts (seaside tourism) through the defence against flooding and coastal erosion contrast
- improve nautical infrastructure (ports of nautical tourism, shipyards, ports open to public transport) and tourism services sustainability
- foster synergies between tourism, environmental protection and cultural heritage of historical maritime activities (e.g. artisanal fisheries and aquaculture)
- extent of coastal tourism offshore with the potential planning of artificial reefs (involving protection and scuba diving activities) and fostering the developing of Underwater Cultural Heritage tourism

Specific Objectives

Environmental Conservation

High-Level Objectives

WESTMED
-Ensure biodiversity and marine habitat conservation
BARCELONA CONVENTION
Overall, all the strategic objectives of Barcelona Convention tackle the Environmental Conservation theme

Marine Strategy Framework Directive – MSFD (2008/56/EC), Structure, functions and processes of marine ecosystems – Annex III, Table 1
achieving the Good Environmental Status (GES) of the EU's marine waters by 2020 and protect the resource base upon which marine-related economic and social activities depend.

NATURA 2000 (Birds & Habitat directives)
Avoid activities that could seriously disturb the species or damage the habitats for which the site is designated.
Take positive measures, if necessary, to maintain and restore these habitats and species to improve conservation.

National Objectives

ITALY
General objectives

- By 2020, ensure the conservation of biodiversity, or the variety of living organisms, their genetic diversity and the ecological complexes of which they are part, and ensure the protection and restoration of ecosystem services in order to guarantee their key role for life on Earth and human well-being.[6]
- By 2020, substantially reduce the nationwide impact of climate change on biodiversity, by defining the proper measures to adapt to climate changes and mitigate their effects ad increasing the resilience of natural and semi-natural ecosystems and habitats.
- By 2020, integrate biodiversity conservation into economic and sectoral policies, also as potential for new employment opportunities and social development, while improving the understanding of the benefits from ecosystem services derived from biodiversity and the awareness of the costs of losing them, [2]Safeguard and improve the conservation status of species and habitats in terrestrial and aquatic ecosystems
- Halt the spreading of invasive alien species[7]
- Increase terrestrial and maritime protected areas and ensure their effective management

<u>Reaching the 10% of the Aichi target 11.</u>
Starting from the report ETC/ICM Technical Report 4/2017 Spatial Analysis of MPA Networks in Europe's Seas II, Volume A, 2017:
In Ionian Sea and Central Med:
1.4% of increase percentage coverage of Natura 2000 sites since 2012 mainly in the territorial zone 1-12 nm
1.4% of increase percentage coverage of MPAs (Natura 2000 sites, National Designated sites (NDS) and Regional Sea Convention sites (RSC)) since 2012 mainly in the territorial zone 1-12 nm
2.8 % total surface area coverage of MPAs in Ionian Sea and Central Med. Then, 7% missing from the 10%
Posidoniaoceanica beds present no particular sign of stress. The trends of the habitat condition are stable (CF, IMELS)

The trends of *P. oceanica* extent are stable. Nevertheless coastal meadows are under human pressure influence, in particular

6Italian National Biodiversity Strategy 2010-2020

7National Sustainable Development Strategy 2017-2030

- Protect and restore genetic resources and natural ecosystems linked to farming, forestry and aquaculture
- Mainstream natural capital accounting in planning, programming and national accounting.
- Provide biological diverse and dynamic seas and prevent impacts on maritime and coastal environment
- Halt soil consumption and combat desertification
- Minimize pollutant loads in soils, water bodies and aquifers, considering the good ecological status of natural systems Implement integrated water resource management at all levels
- Maximize water efficiency and adjust withdrawals to water scarcity
- Minimize emissions and reduce air pollutants concentration
- Ensure sustainable forest management and combat forest abandonment and degradation
- Prevent anthropogenic and environmental risk and strengthen urban and territorial resilience
- Guarantee high environmental performances of buildings, infrastructures and open spaces
- Boost urban regeneration, ensure sustainable urban accessibility and mobility
- Ensure ecosystems restoration and defragmentation, strengthen ecological urban-rural connections
- Ensure the development of potential and the sustainable management of territories, landscapes and cultural heritage
- Conservation of the capacity of renewal of commercial stocks

near urban, touristic, industrialized and agricultural sites, where regression of meadows appears clear.

Specific Objectives

- Return of fishing activity by values compatible with levels of security of stocks, identified by Biological Limit Reference Points, and exploitation oriented towards the medium-long term sustainability, identified by Biological Target Reference Points.[8]
- implementation of the marine protected areas networks (e.g. Natura 2000 “Habitat Directive” sites and marine protected areas established according to the laws n. 979/1982 and n. 394/1991 with Decree of the Minister of the Environment)
- establishment of new Sites of Community Interest (SCIs) and/or adequate conservation measures for target habitats and species

Malta

General objectives

- Greening the economy (environmental taxation, eco-innovation jobs, environmental management in private sectors, green public procurement)
- Safeguarding environmental health in terms of air quality, noise chemicals and radiation
- Efficient and sustainable use of resources (freshwater, stone, coastal and marine areas, land and waste)
- Improving the local environment
- Long term issues (sustainability issues in terms of climate change, ecosystems)
- Protect and enhance the environment in rural areas
- Higher awareness about the environment
- Protect Malta’s built heritage and improve the environment in historic areas
- Halt the loss of biodiversity by 2020

8“The state of fishing and aquaculture in Italian seas” Ministry of Agricultural, Food and Forestry Policies, MIPAAF

- Improved research and information about the environment

Specific Objectives

Sustainable management of coastal and marine waters:
- Manage coastal areas on the basis of integrated coastal management to reduce conflicts, protect the environment, maximise access in line with conservation goals, improve appearance, monitor and reduce erosion and control development
- Ensure the protection of coastal areas from inappropriate development through spatial planning by 2012
- Set up integrated maritime information system in line with EU monitoring requirements, by 2015
- Implement Malta's Water Catchment Management Plan in line with its timeframes
- Prepare a maritime spatial plan in line with IMP by 2012
- Ensure that positive record with respect to bathing water quality is maintained

Better protection for marine areas of high ecological value:
Designate additional marine protected areas, including Special Protection Areas, and promote their management with a view to achieving the ecological and socio-economic goals set out for each area

Improved management of beaches:
Promote beach management with a view to increasing the number of beaches achieving Blue Flag status
Undertake study on coastal dynamics to address inter alia beach issues, in connection with climate change and other coastal processes causing erosion by 2014
Assess beach concessions currently granted, as well as the related management arrangements by 2014
Examine the economic and environmental feasibility of the replenishment of beaches as a means for improving the tourism product and relieving pressure from existing beaches by 2015
Formulate an integrated policy framework for beaches to address coastal quality, ecology, access, beach activities and replenishment in line with Malta's obligations by 2014

Control specific activities that put preasure on the marine environment:
Prepare an Aquaculture Strategy that takes environmental considerations on board by 2012
Undertake research and development in the aquaculture field
Draw up operational guidance for aquaculture activities by 2012
Review policy on dumping of waste at sea, based on an assessment of the current environmental impact of this activity by 2012

Sources:

National Environment Policy 2012

https://msdec.gov.mt/en/decc/Documents/environment/National%20Environment%20Policy.pdf

Local/Case study Objectives

General objectives

- implement the network of MPAs in the CS area (Marine Protected Areas, Natura 2000 sites and Biological Protection Zones) according to national and international conservation priorities (e.g. for the maintainment of biodiversity (MSFD descriptor 1), for the conservation of fish stocks full reproductive capacity (MSFD descriptor 3) and seafloor integrity (MSFD descriptor 6)
- evaluating the role of potential OECMs in the area as site favouring environmental conservation

Specific Objectives

- complete the designation of local SCIs in Special Areas of Conservation (SACs) with adequate management

- evaluate the potential implementation of the Habitat Directive with the proposal of new Sites of Community Importance (pSCI), according to the protection needs foreseen for habitat and species (Annexes II and IV) that insist in the area, with high priority for Sicilian *Carettacaretta* coastal nesting sites.
- The Case study area fell within a candidate IMMA that was proposed in 2016[9]

STAKEHOLDER OBJECTIVES

- Increasing of MPAs and other protection zones, especially on the South Eastern side between Siracusa and Capo Passero
- Protection of nursery habitats of fish species of high economic value to slow down the decrease in fosh stocks

Environmental components that are the object of conservation objectives provided from MSFD descriptors 1,3 and 6 regarding specific habitats and species that insist in the area (Chapter 2 of Italian Country Fiche):
- Posidonia Beds in Southern Sicily (IT-ISCMS-8A02- 0002)
- Maerl beds in Southern Sicily (IT-ISCMS-8A02- 0002)
- Coralligenousin Southern Sicily (IT-ISCMS-8A02- 0002)

Balaenoptera physalus(Fin whale), Natura 2000 species code 2621, this species is present in Central Mediterranean Sea (IT-IMS-8A04-1001). It is mentioned in the following directives/agreements:
- EU Habitat Directive Annex IV
- Bern Convention Revised Annex I
- Bonn Convention annex I
- CITES Annex I
- SPA/BD Protocol Annex II
- ACCOBAMS

Ziphius cavirostris(Cuvier's beaked whale), Natura 2000 species code 2035, this species is present in Central Mediterranean Sea (IT-IMS-8A04-1001). It is mentioned in the following directives/agreements:
- EU Habitat Directive Annex IV
- Bern Convention Revised Annex I
- Bonn Convention annex I
- CITES Annex I
- SPA/BD Protocol Annex II
- ACCOBAMS

Stenella coeruleoalba(Striped dolphin), Natura 2000 species code 2034, this species is present in Central Mediterranean Sea (IT-IMS-8A04-1001). It is mentioned in the following directives/agreements:
- EU Habitat Directive Annex IV [10]
- Bern Convention Revised Annex I
- Bonn Convention annex I
- CITES Annex I
- SPA/BD Protocol Annex II
- ACCOBAMS

9Towards a Transboundary managed area in the Strait of Sicily: Challenges and opportunities – Final Report, G.Notarbartolo Di Sciara, S. Panigada- 15 May 2017

10http://eunis.eea.europa.eu/species/1567

Tursiops truncatus(Common bottlenose dolphin), Natura 2000 species code 1349, this species is present in Central Mediterranean Sea (IT-IMS-8A04-1001). It is mentioned in the following directives/agreements:
- EU Habitat Directive Annex IV [11]
- Bern Convention Revised Annex I
- Bonn Convention annex I
- CITES Annex I
- SPA/BD Protocol Annex II
- ACCOBAMS

Caretta caretta(Loggerhead sea turtle), Natura 2000 species code 1224, this species is present in Central Mediterranean Sea (IT-IMS-8A04-1001)
It is mentioned in the following directives/agreements:
- EU Habitat Directive Annex II and Annex IV
- Bern Convention Revised Annex I
- Bonn Convention annex I
- CITES Annex I
- SPA/BD Protocol Annex II

lD.Dirett. N. 6 del 20 settembre 2011: Adozione piani di gestione

National Sustainable Development Strategy 2017-2030

11http://eunis.eea.europa.eu/species/1567

4. ANALYSIS

4.1 LAND-SEA INTERACTIONS

Land and sea are intrinsically connected via multiple, complex social-ecological interactions (Álvarez-Romero et al., 2011; Makino et al., 2013; Stoms et al., 2005). These interactions are important components of local ecology and represent major factors influencing people's livelihoods and wellbeing. Connections between land and marine ecosystems occurs through transport vectors, and the direction of influence is mainly, although not exclusively, from land to sea (Stoms et al., 2005). Indeed, land-based activities can alter the flow of material, energy or organism and affect the marine biota through impacts on ecological processes. Currently the concept of land-sea interactions is not yet well defined and its declination and analysis should take into account different levels of interactions such as economic, environmental, of governance, or of planning in the strict sense.

4.1.1 Italy

In the Sicilan case study area a test application of the methodology proposed by UNEP-PAP/RAC was developed. From the analysis of the critical issues identified during the case study development, different land-sea interactions have been identified. Starting from the recommendations developed within the activity C.1.3.1.4 "Land-Sea interaction and relationships with Integrated Coastal Zone Management (ICZM)", specifically starting from part B of the workflow proposed by the related report, the description and analysis of such interactions have been made as much as possible considering all the MSP spheres that these interactions affect. These are socio-economic, environmental and related with governance aspects. The LSI were described in relation with those maritime uses that emerged to be the one interacting through the land-sea boundary, both between each other and with the environment, in the case study area. For what concerns the application of this methodology different difficulties were found in its applicability to the case study and different constrains were revealed. As a general comment, the level of detail of the information required by the methodology was too high with respect to the case study context. In any case a preliminary application of the methodology and analysis of LSI was here developed.

PART B – LSI IN-DEPTH ANALYSIS

Oil and Gas

Step 9 - Pathways of interactions

For what concerns this activity, within the case study area is present the Vega field (permit C.C 6. EO), 22 km south of Pozzallo (RG). The marine area where the field site is located, is directly

affected by the contributions of disturbances and pollutants from the platforms and that can be distributed through the coastal strip. The crude oil is transported from the platforms to refineries in the nearby ports by tankers shuttles. The potential expansion of oil and gas operations, including proposed cable and pipelines, could lead to the increase of the intensity of interaction of this activity with other sectors. This could lead to conflicts with other human activities both for spatial competition and for a wide set of potential environmental pressure (e.g. possible direct pressures from seismic surveys and all other sources of noise pollution). Besides this, chemical pollutants and marine litter introduced at sea thought gas and oil platforms and related activities (maritime traffic, accidental dispersions, underwater pipelines, etc.) constitute the main interaction of this activity with environmental components and other uses even reaching the coastal areas. The socioeconomic system is affected by the potential risk that this activity poses for other uses in the area (e.g. fishing, tourism) and by the level of employment of local communities in such activity.

Step 10 - Spatialize interactions

The spatial characterization of LSI for oil and gas activities is related to the localization of the platforms and the traffic between the platforms and the ports of bunkering. For this reasons LSI due to oil and gas activities in the case study can be spatialized in the marine area within the Vega fields and the ports where land infrastructures are located.

Step 11 - Quantify interactions

With the actual knowledge and data, it is not possible to quantify the intensity of the interaction in relation with the socio-economic dimension. Regarding the input of pollutants and the level of disturbances in the environment due to O&G activities and affecting indirectly other sectors, the intensity of interaction can be considered medium-low.

Step 12 - Analyse temporal dimension

The temporal dimension does not present fluctuations since the extraction activities are constant as well as the production rate that feeds the economy of the case study area.

Fisheries

Step 9 - Pathways of interactions

The fisheries sector in the case study has great importance from an economic and social point of view for the region. The Strait of Sicily is one of the most important fishing areas in the Mediterranean Sea and the fleet, one of the largest operating in these areas, consists mainly of bottom trawlers, pelagic trawlers, purse-seiners, long-liners and small-scale boats distributed along

a widespread, historical system of fishing ports along the Sicilian coast and specifically in the case study among the fishing ports of Pozzallo and Portopalo.
Generally, LSI affecting fishery activities are related with the changes of environmental quality of coastal waters due to nutrients inputs. Such inputs can affect the fishery-based economic activities in the cities where major fishing ports insist and where fishery products are mainly consumed and used for restaurant purposes. Fishery can for this reason interacts with tourism sector. Moreover, the fishery activity can affect the coastal tourism due to the impact of fishery activity on marine habitats and species when fishery techniques are destructive and the activity is excessive overexploiting the natural resources. Moreover, fishing activities in the area are source of litter that is discharged in the marine environment. On the other side, good practices are present in the study area, with several examples of fisheries heritage tourism in Sicily and fishing tourism.

Step 10 - Spatialize interactions

For fisheries LSI can be spatialized between the coast and the 3 nm strip and the major fishing ports in the area (Pozzallo and Portopalo).

Step 11 - Quantify interactions

With the actual knowledge and data, it is not possible to quantify the intensity of the interactions reported above.

Step 12 - Analyse temporal dimension

Potential spatial and temporal variability are bound to the high seasonality of stocks life cycles and, as a consequence, of fishery activities.

Maritime transport

Step 9 - Pathways of interactions

Maritime transport in the case study area has grown during the past two decades, and it is expected to continue to increase in the coming years, both in the number of routes and in traffic intensity (Notarbartolo di Sciara et al. 2017). LSI due to this activity in the area can be mainly ascribed to the movement of goods and passengers in the port of Pozzallo. Potential interactions of maritime transport with other uses are presently limited in space and time. They regard basically the coexistence in the same areas of fishing, maritime transport and tourism activities. Moreover, the port of Pozzallo in the area features a strong and rising presence of passengers traffic connecting Sicily and Malta and an increasing demand for spaces dedicated to recreational boating and yachting. The actual level of maritime traffic congestion and the expected increasing intensity of the activity in the area may lead to environmental impacts (e.g. marine litter, water pollution,

introduction of non-indigenous species, hydrographical changes, underwater noise, oil spills from possible accidents). Moreover, maritime traffic and naval activities produce chronic acoustic pollution, which may affect the marine environment over large coastal and offshore areas, and cause physical and acoustic disturbance that may affect commercial fish stocks values, with potential conflict with fisheries, and target species for protection policies.

Step 10 - Spatialize interactions

For what concerns maritime transport LSI can be spatialized around the area of the port of Pozzallo.

Step 11 - Quantify interactions

With the actual knowledge and data, it is not possible to quantify the intensity of the interactions reported above.

Step 12 - Analyse temporal dimension

The temporal dimension does not present great fluctuations if not on goods differentiation since the shipping activities are almost always constant as well as the commercial activity that feeds the economy of the case study area.

Coastal and Maritime Tourism

Step 9 - Pathways of interactions

The Sicilian coast is an important touristic destination within the Mediterranean context in particular during the summer period. Moreover, within the CS Area tourism has a great potential to be developed in the near future, due to the good level of integrity of the coastal area, its landscape and natural resources. Tourism activities are strongly related to LSI concerning the quality state of the coastal and marine environments being at the same time affected by and cause of pollution. Rivers input of nutrients and contaminants in the bathing waters negatively interact with tourism activity, as well as tourism is source of pollution affecting the coastal waters. Fishing tourism is one of the activities with the higher development potential in an LSI perspective, to reduce negative interactions and underpin synergies. Development of itineraries involving sustainable and compatible activities at sea (e.g. diving) and on land (e.g. visit to museums, environmental research and marine species recovery centers, etc.), and touristic itineraries crossing the land-sea border could be supported. Governance in tourism sector is a major issue. The sector is characterized by a complex, interlinked and fragmented reality. In 2017 a Strategic Plan for Tourism in Italy has been developed to address a more consistent and coordinated approach, improving policies in terms of

both the demand and supply. It aims to provide a simple and clear framework to improve the decisions made in the sector and promote integration. Regions, in this case Sicily, also can adopt Regional Strategic Plan for tourism development, where general directives to the tourism operators are indicated. Within the CS Study area on Sicily Coast, there are three main ports: Pozzallo, Porto Palo and Marina di Ragusa. This last one is a port mainly dedicated to tourism activities where most recreational boats moor. Moreover, diving centers are present in the area and among their activities is included the visit of ship wrecks. One main ship wreck in the area is a byzantine ship recently found in front of Punta Secca (Ragusa Province).

Step 10 - Spatialize interactions

In the case study area tourism Is widely distributed along the coastline. Among the major tourism areas where LSI insist there are the area of the port of Marina di Ragusa, the port of Pozzallo and the area of Portopalo. However, generally, the entire coastline is interested by touristic activities and for such by its LSI.

Step 11 - Quantify interactions

Actually, there are not site-specific estimates of the socio-economic and environmental impact of the tourism sector. The country-wide analysis on WTTC 2018 data highlights that the economic impact of tourism on national markets is growing. Tourism generated 1.490.500 jobs directly in 2017 (6.5% of total employment). By 2028 is foreseen that tourism will account 1.783.000 jobs generated, an increase of 1.7% pa for the next 10 years (WTTC Economic Impact Italy report 2018). Also, due to lack of data, it is not possible to assess the impact of pollution and other LSI on and from tourism.

Step 12 - Analyse temporal dimension

Temporal dimension is relevant on the short term (e.g. on a cyclic base: daily, seasonal; on a non-cyclic base: inter-annual variability), due to the seasonality of the tourism activities.

PART C – INFORM THE PLAN ABOUT LSI ANALYSIS OUTCOMES

Step 13. Identify LSI hot-spot areas

In the case study some main hotspot areas of LSI have been identified based on the above analysis. The boundaries of the highlighted areas are approximated and absolutely not exhaustive in defining the LSI boundaries. To better define the localization of LSI a more in-depth analysis was needed and this resulted incompatible with the project timeframe.

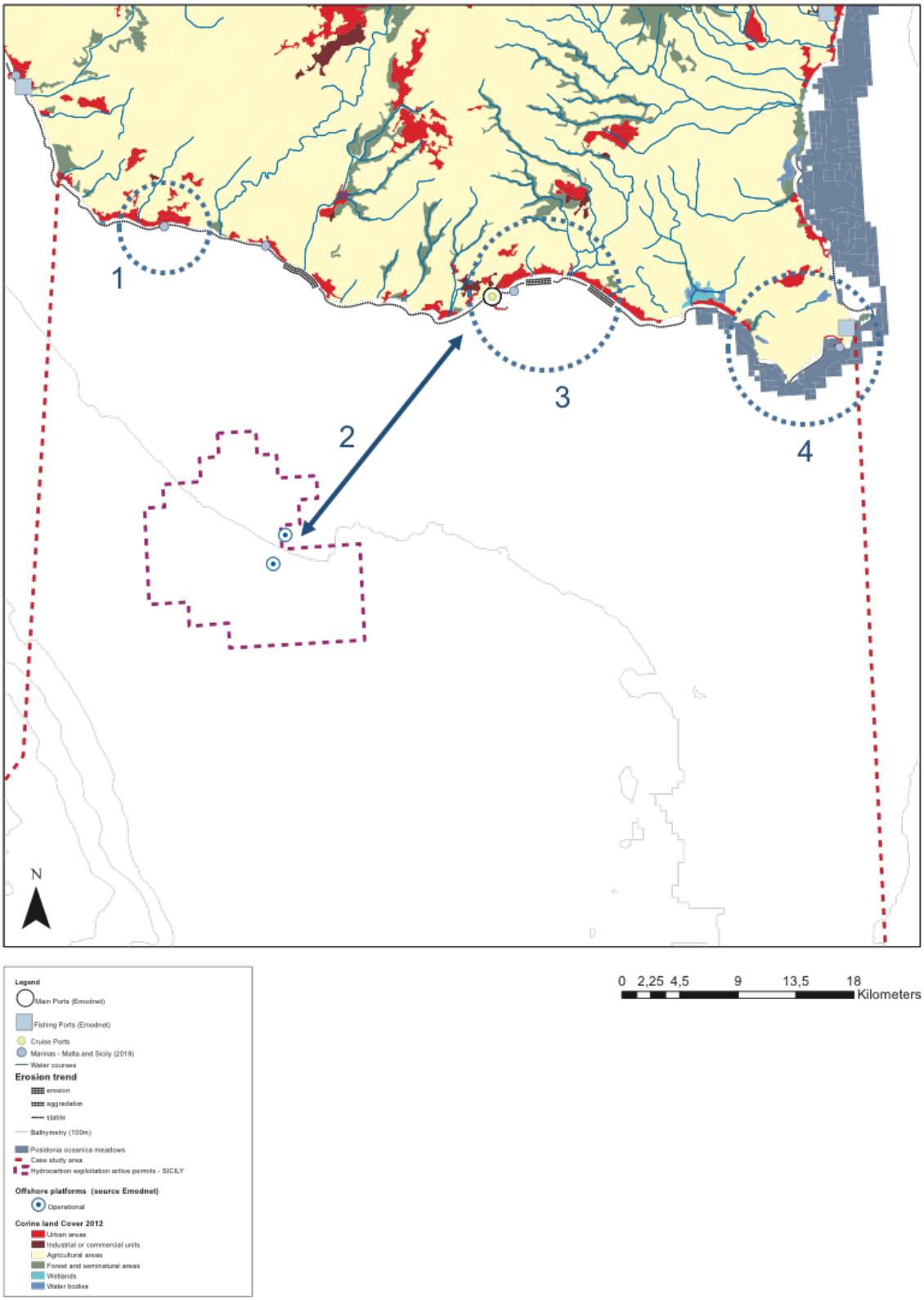


Figure 16 - LSI analysis on Sicilian CS area: Area 1: refers to the port of Marina di Ragasa and its surroundings, where the main touristic marina is located. Indeen it is related to the LSI of maritime toursm activities in the area. Area 2: is related to the LSI of Oil and Gas activities, particularly between platform and their connection with the port of Pozzallo. Area 3: refers to the LSI component of various activities, mainly commercial and passengers tranposrt in the port of Pozzallo. Area 4: this area refers to the interaction of land based activities and coastal tourism with the presence of *Posidonia* meadows on the coastline.

Step 14. Identify key messages from LSI analysis

The LSI analysis carried out in the Sicily-Malta case study was developed on the analysis of the critical issues identified in the area. The basis of such approach was motivated by the need of better focalizing the analysis toward what was already identified to be of priority concern in the case study and to support the planning process in trying to find solutions and favour the building of a future effective MSP.

The work was done putting into practice the LSI recommendations developed within the activity C.1.3.1.4 “Land-Sea interaction and relationships with Integrated Coastal Zone Management (ICZM)”, specifically from part B of the workflow proposed by the related report.

Some limitations in applying this methodology to the case study were found during the development of the analysis. For instance, following the requirements of the proposal, the analysis was little oriented due to the generality of the requirements per se. However, the level of vagueness of certain guidelines is not strictly responsibility of the proposal, but should be mainly ascribed to the actual status of the art on the LSI topic. On the other hand, the level of detail of the information required in the proposal was found to be too high with respect to the scale on which the analysis has to be developed and for all the possible sectors, which implies high effort in doing the analysis without selection of information based on the case study needs. This resulted incompatible with the projects resources and timeframes.

For what concerns the localization of LSI, it was difficult to localize the interactions (in or outside the planning area) since there is no defined boundary landwards that establishes what is the area to be considered for the LSI analysis. Indeed, depending on the sector/use of attention the correct and ideal boundary to consider can change even widely (i.e. agricultural use can affect a wide area starting from land territory; ports are more locally focused but the need of developing land infrastructures has to be considered even if it is not part of the MSP plan). Especially there is a matter of competencies and integration of different levels and typologies of “planning” (sectorial, land use). Supposedly, natural processes affecting the coast are present in the CS area; however, at this point of the planning process there is no exhaustive information to assess their effects on maritime activities, scale and spatial allocation. A specific assessment to fill this knowledge gap should have been developed, targeting relevant interactions of natural processes in the coastal area. Besides all this, along with the LSI analysis, confusion was often found in distinguishing the interactions between uses that cross the land-sea interface from what has been already defined conflicts and synergies between uses. It should be better to define the level of distinction and of coincidence (if any) of these analyses to avoid confusion and overlap of non-well addressed information. Clearly suitable planning guidance for land and sea systems is needed alongside

significant capacity building efforts to provide terrestrial planners with sufficient knowledge and understanding of marine and maritime matters and inter-linkages as well as training marine planners to understand land-based implications of marine planning. In the context of the land-sea division, there are a number of mechanisms and approaches which may facilitate integration (including ICZM, MSP and SEA). Adherence to other European environmental directives will also demand cross-coast planning, as well as improved guidance and capacity building to encourage greater awareness and understanding of the needs of both marine and terrestrial components. This will require good relationships between the people involved in developing the different plans. It may also require the use of strong and appropriate planning 'guidance' and associated support so that maritime based and terrestrial planning communities can adjust their professional practice to the needs of each other. However, this exercise, carried out in the context of the Sicily-Malta case study and in the framework of SIMWESTMED project, helped to make a first LSI analysis to localize the main areas and activities involved in the land-sea interactions and dynamics identified along with the previous analytical phase. Several limitations and constraints in the proposed approach and in general in the application of the LSI analysis emerged. Such results are also fundamental to guide future ameliorations of the analytical method and to help more in-depth studies on LSI definition and determination.

GENERAL CONCLUSIONS

Overall, the synthesis of the main key messages emerged from the LSI analysis exercise is the following:

1. A better understanding and definition of what LSI are, even considering all the different spheres that they affect (environmental, socio-economic, administrative), it is necessary in order to overcome the generality and vagueness that limited the effectiveness of the LSI analysis and to orient the gathering of the best information needed;

2. The geographical scale at which the analysis is carried out is fundamental and can strongly influence the LSI analysis in terms of choice of the relevant information, depth of the analysis, type and entity of the interactions identified, and all in relation with all the spheres, socio-economic, administrative and environmental. The methodology of LSI analysis to be effective, should take into account such aspects in order to be contextualized in different analytical conditions;

3. It is necessary having indications on how to identify possible boundaries of LSI since interactions can be very different in intensity and influence in the analysed area, both on land and sea space, and also depending on the sectors involved;

4. More information on the effects of natural processes affecting the maritime activities along the coastline is needed to better identify compensations measures or even anticipate negative interactions;

5. More clarity in distinguishing LSI from conflicts and synergies among uses and uses and environment is needed to better focalize the analysis on the land-sea interface, avoiding confusion and having well established the information needed for the analysis and it final aim.

6. Collaboration, co-production of knowledge and sharing of needs and priorities between maritime based and terrestrial planning communities are fundamental to pave the way toward the best practice of planning.

4.1.2 Malta

An attempt to apply the methodological tool proposed by UNEP – MAP's PAP/RAC for LSI analysis, for the case study area covering the Maltese marine waters was undertaken. The analysis was based on the issues identified within the case study. An attempt was also made to compare the proposed methodology with the steps taken to prepare the Strategic Plan for Environment and Development which covers both the terrestrial and parts of the marine waters under its jurisdiction and essentially constitutes Malta's first MSP plan.

It is to be noted that not enough time was available to truly apply the proposed methodology since the Case Study is not intended to prepare an MSP plan, and secondly it must be acknowledged that a more comprehensive data set and a dedicated multidisciplinary team assigned to undertake this specific task would be necessary. For the purpose of the SIMWESTMED project the PA team grouped certain steps within the proposed LIS stocktaking and in-depth analyses and focused on the significance of these two parts to inform the MSP plan as proposed in part C in the methodology.

Step1: Define the spatial extent

Although arguments may be made to consider the whole archipelago of the Maltese islands as influenced by the sea, in view of their insularity and size, for the purpose of incorporating an Integrated Coastal Zone Management (ICZM) approach to spatial planning, a specific coastal zone boundary was established through the SPED. Taking into account ecological, physical and administrative criteria, a landward boundary was identified in 2002 to assist the development of policies within the spatial planning system that reflects the dynamic nature of coastal zones. The seaward extent of the coastal zone is 12nm, the same as adopted within the ICZM Protocol. For the

purpose of the SPED as Malta's first MSP plan, the marine extent covered by the Plan is 25nm. Malta's marine waters extend to include the continental shelf however given the limited jurisdictional extent attributed through the UNCLOS the SPED does not cover this extent. Within the scope of the Case Study area, and in accordance with the provisions of the MSP Directive, the spatial domain that can be covered for an analysis of LSI therefore includes the landward boundary of the coastal zone, the marine waters up to 25nm under Malta's jurisdiction. These are the areas that have been considered within the existing MSP plan and are likely to be considered again in future revisions of the plan.

<u>Steps2, 3, 4, 9 and 10: LSI identification and localisation</u>

An attempt was made to identify the types of LSIs. The data available has not been sufficient to enable a comprehensive identification and analysis. All interactions identified are within the plan area and the main sea-land interactions are mainly located along the 'coastal land' or 'internal waters', roughly speaking within the immediate vicinity of the coastline where main coastal habitats and concentrations of urban development are located. These would be affected by storms, seiches and oceanographic phenomena, marine flooding and saline intrusion. For land to sea interactions the main areas affected are 'internal waters' affected by soil erosion and sedimentation. The resulting draft outcome to identify LSIs between natural processes is presented below to illustrate the preliminary attempt made.

TYPE OF PROCESS		LOCALISING INTERACTIONS (Incorporating elements from Steps 1-3)				QUALIFICATION OF INTERACTION ** (Incorporating step 4)									
		LOCATION OF LSI	COASTAL/MARINE ZONE*	DEFINITION OF GEOGRAPHICAL AREA	THE SPACE OF INTERACTION*	ON ENVIRONMENT	ON SOCIETY	ECONOMIC (ON USES AND ACTIVITIES)							
								Professional fishery	Recreational fishery	Aquaculture	Maritime transport	Energy	Coastal tourism	Maritime tourism	Protected areas
SEA TO LAND	Extreme events														
	Storms	Inside the Plan area	Coastal land	low lying areas particularly NE coast; sandy beaches	Surface	loss of dunes	damage to surface infrastructure; higher risk of maritime accidents; loss of life								
	seiches/natural oceanographic phenomena	Inside the Plan area	Coastal land	localised low lying areas in Marsamxett Harbour and Marsaxlokk Harbour	Surface	not identified	damage to property cars; basement development; infrastructure								
	Heavy tides														
	Tsunami														
	Sea-level rise														
	Marine flooding	Inside the Plan area	Coastal land	low lying areas particularly NE coast	Surface	loss of habitats	infrastructure damage; loss of								
	Coastal erosion	Inside the Plan area	Coastal land	sandy beaches; vulnerable rocky areas along South eastern coast of Malta; Grand Harbour; Marsamxett	Surface	loss of habitats	damage to property; damage to critical infrastructure and roads; accidental loss of life								
	Saline intrusion	Inside the Plan area	Coastal land	mean sea level aquifer on Malta and Gozo	Water column	ground water quality	ground water quality; impact on potable water availability								
	Algae bloom (underwater)														
	Tectonic activities														
LAND TO SEA															
	Soil erosion	Inside the Plan area	Internal waters	embayments along NE and West Coast Malta and Gozo in line with natural drainage patterns	Water column	increased turbulence in water column;	not identified								
	Sedimentation	Inside the Plan area	Internal waters	embayments along NE and West Coast Malta and Gozo in line with natural drainage patterns	Water column	increased turbulence in water column; if contaminated from urban areas, potential increase in pollution levels	impact on aquaculture; fisheries and possibly damage to RO processes if interaction is in close proximity								
	Natural subsidence														
	Hydrogeological instability														
	Volcanic activities														
	Tectonic activities														

* Choose from drop-down menu
** Identify interaction with few words only; with respective coulour indicate impact

	positive impact
	negative impact
	neutral impact

The LSI identification and localisation with regards to uses and activities could not be effectively carried out in a similar manner since not all maritime activities were covered. Section 2 of this report outlines the major uses that were covered by this Case Study following the approach adopted by the SIMWESTMED project. These include:

- Fisheries
- Aquaculture
- Extraction of Water
- Oil & Gas research and extraction
- Cables and pipelines
- Maritime traffic
- Tourism and leisure

It is interesting to note that there are certain land activities that may influence the scope of MSP plans and that need to be considered in-depth which are not included in this list. The LSI methodology enables a planner to consider in more depth how proposals for marine development can relate to coastal areas.

Taking note of the work carried out for the preparation of the SPED, the importance of urban development and associated infrastructure including road networks would be considered as highly relevant for any MSP plan, since the concentration of human settlements provide the demand and services to support various maritime activities. In a similar manner, the presence of agriculture and rural areas on the coast, particularly extents with natural areas providing an important habitat for the life cycle of species dependent on the marine environment (e.g. nesting grounds for seabirds and seaturtles) would also need to be considered. The concentration of maritime activities may generate noise and light pollution affecting the breeding patterns of such species.

In Malta, it is evident that from the data available, the highest concentration of interactions occurs within the vicinity of the major urban conurbation around the Grand Harbour, Marsaxlokk Harbour and the embayments along the low lying north facing coast, which have been developed for tourism over the last 50 years and have gradually changed to support urban settlements as fall. To a lesser extent, LSI hotspots incorporate also the main inter-island ferry terminals. In general, it can be deduced that the extent of LSIs decreases with distance from the coast. This low intensity of LSIs is also observed along the southern shores of mainland Malta and most of the island of Gozo, where access to the sea is very limited the extent of LSI is relatively minimal.

The intensity of uses leads to other LSIs with potential implications on the quality of the marine environment that still need to be assessed, particularly non-point sources of pollution from road transport either after rainfall or aerial deposition. Similarly, the potential impacts from the expected climate change impacts, such as storm surges and associated marine inundations may have significant implications on current coastal infrastructure serving maritime activities, particularly within ports and harbours.

The approach adopted for the SPED required the identification of all coastal uses, their extent and locations to enable a better understanding of how the coastal zone was being utilised, and whether

any issues in terms of environmental impacts and user conflicts could be addressed and needed attention. The primary purpose essentially is comparable with these LSI analytical steps and therefore from a strategic planning perspective, one can consider that these particular steps in the methodology are considered fundamental for the preparation of an MSP plan especially since it enables MSP planners to identify connectivity with what is happening in the adjacent coastal area.

Steps 5, 6 and 7: LSI policy/legal and governance elements; LSI stakeholders

Section 3.4 of this document outlines the policy framework governing the different maritime sectors and activities covered by the Case Study. In many instances, sectoral plans and corresponding regulations are already in place and through their implementation may work towards securing positive LSIs particularly concerning uses and activities, and minimise negative impacts as much as possible. From Malta's context, the SPED provides the first comprehensive policy framework that addresses the relationships between coastal and maritime activities. Furthermore, it is built on other sectoral plans, such as the Energy Plan, the Aquaculture Strategy, whose preparation was subjected to stakeholder consultations and where relevant, even Strategic Environment Assessments. Therefore there is a considerable degree of confidence that the MSP plan in Malta is based on an integrated policy framework. Furthermore, the SPED policies call for planned maritime activities to support the national objectives linked with the implementation of the Water Framework Directive and the Marine Strategy Framework Directive. For both instances, the required Program of Measures respectively seek to regulate pressures on the marine environment.

Given the insular context of the Maltese islands, and the fact that their economic growth and social well being are dependent on various maritime activities it can be concluded that various LSIs are being addressed within the existing policy framework. However, further in-depth analysis is required to ascertain the degree of integration and attention given to ensure that all measures are actually in place. Monitoring not only of environmental quality but of policy implementation would provide information on the effectiveness of the governance mechanisms in place.

For this exercise to be as accurate as possible, it is recommended that the work is carried out with relevant updated information and preferably supported by stakeholder input that truly reflects the degree of interaction.

Steps 11 and 12: LSI quantification and temporal dimension

The data available for the case study does not allow for a proper evaluation of the degree of interactions indentified. Moreover, the degree of information on the natural systems and processes was based on 2010 and 2012 reporting for the WFD and MSFD respectively. Given that

comprehensive environmental monitoring in Malta does not have a long history, conclusions on LSI quantifications cannot be reached at this stage. What may be stated is that the policy framework adopted in the SPED already guides development to reduce urban sprawl along the coast, and therefore guiding multiple use in existing areas, particularly the ports and harbours. Should demands for maritime activities requiring services and infrastructure on the coast increase, the challenge to manage the already high intensity areas within the coast and resulting pressures to open up new areas to accommodate such development could be significant.

A preliminary description on the temporal dimension of the LSIs resulting from the activities identified above can be determined to a certain extent. Certain LSIs whether arising from natural processes such as storms, or activities, such as tourism, can be seasonal. Fisheries and aquaculture particularly tuna penning also incorporate a degree of seasonality. Other LSIs, such as cargo handling and port activities and the resulting direct impacts on transport management occur throughout the year. An understanding of the temporal aspect of LSIs would enable planners to determine the appropriate policy framework to adopt, such as whether or not the same maritime space can accommodate different uses through different periods in the year. For example, one may consider fisheries and yachting activities within a certain area if activities are determined by different seasons, however, locations where salt water is extracted to provide potable water would require restrictions on other activities throughout the year, possibly defining water protection zones at sea. The SPED as a high level strategic document does not provide for this level of detail, however at the regulatory aspect, in view of other detailed sectoral plans, such as the Programme of Measures in the Water Catchment Management Plan under the WFD, such measures are already addressed.

Step 13: LSI hotspot areas

From this case study, and on the basis of the information available, the LSI hotspot areas in Malta consist of those areas that are influenced by ports, harbours and urban development with high concentration of tourism activity. The figure below is an indicative illustration of these areas: the greatest intensity that exists all year round includes the areas around Marsaxlokk Harbour and Grand Harbour, coloured in dark red which include also the highest concentration of urban development. The dark orange areas correspond to the inter-island ferry terminals and the main seasonal touristic sites. No comparable exercise was carried out for the preparation of the SPED.

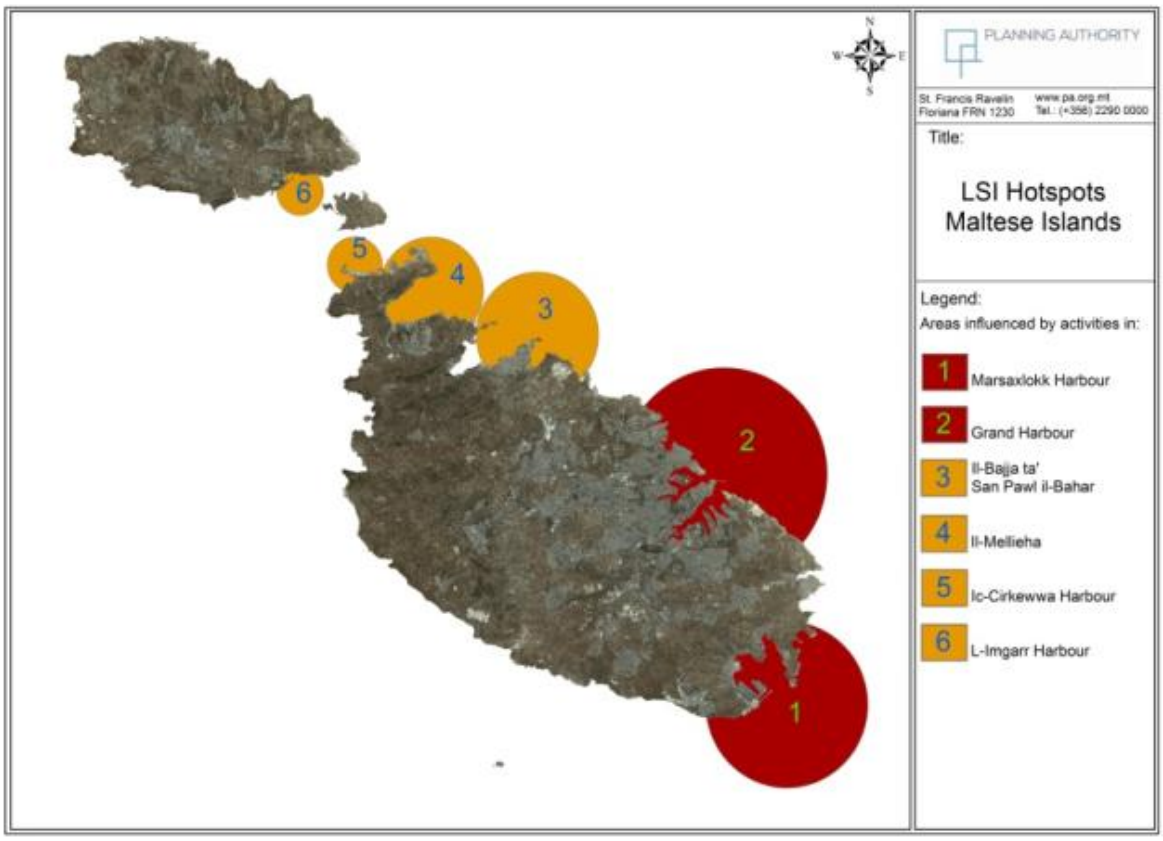


Figure 17 - LSI analysis on Malta CS area

Step 14: LSI key messages

This preliminary attempt to apply the proposed methodology for LSI analysis presents some key messages that could assist the preparation of an MSP plan in accordance with the requirements of the MSP Directive. For Malta's marine waters, the main messages that can be extracted from this exercise include the following:

(i) The list of uses to be considered in an MSP plan should not only refer to marine uses: the focused approach to determine the typology and location of LSIs broadens the perspective of the MSP plan to ensure an integrated approach on social, economic and environmental aspects that may not always be considered if the focus is purely on determining the allocation of maritime space for uses and activities;

(ii) The step concerning governance and legal aspects further assists towards an integrated policy approach and moreover to determine which aspects need to be covered by an MSP plan and which aspects are already covered by other plans and simply need to be supported by the MSP plan;

(iii) The identification of LSI hotspots should help MSP planners to determine where attention is actually needed, and where issues may require specific policy measures or not.

GENERAL CONCLUSIONS

This case study helps to validate the conceptual approach of the proposed methodology in that it follows the main procedural steps for the formulation of strategic policy making. The proposed methodology may be adopted in a flexible manner to reflect the state of MSP development in a country. The application of the methodology for a review of the SPED would determine its applicability as a tool that supports adaptive management for MSP.

The practicality of the tool requires dedicated efforts for its adequate testing, in terms of data availability, resources and time. However from this preliminary attempt there is an initial input towards future improvement of this analytical tool.

Additional work to improve wider understanding of LSIs within the MSP process may be required. However, there is a significant parallelism between the concept of LSIs and the ICZM approach that experience in ICZM may provide opportunities for further refinement on the methodology to be applied in those areas where countries opt to utilise the LSI approach instead.

4.2 CUMULATIVE IMPACTS, CONFLICTS AND SYNERGIES

The Tools4MSP Modelling Framework is a regularly updated open source software suite (Menegon et al., 2016) providing multi-objective toolsets for maritime spatial planning (Depellegrin et al., 2017; Menegon et al., 2018b). The framework supports the development of spatially explicit results, graphics, tables and multi-dimensional grid dataset that can be utilized for more detailed spatial investigations. Currently the framework implements a Cumulative Effect assessment (CEA) and a Maritime use conflict (MUC) analysis model. Tools4MSP can be flexibly deployed to different geospatial contexts ranging from macro-regional (Gissi et al., 2017; Menegon et al., 2018a; Menegon et al. 2018b) to local/regional level (Barbanti et al., 2017).

The tools CEA and MUC models implemented can support the development of maritime spatial plans within the implementation process of the MSP Directive (2014/89/CE) in various case study areas and marine waters in the Mediterranean Sea and beyond. The package is regularly upgraded within the Tools4MSP Geoplatform (data.tools4MSP.eu). The Tools4MSP Geoplatform (former ADRIPLAN Portal) is a community-based, open source portal based on GeoNode, a web-based Content Management System (CMS) for developing geospatial information systems (GIS) and for deploying spatial data infrastructure (SDI).

It includes over 700 geospatial datasets, organised in the following categories: coastal defence and sand extraction, energy, environmental protection, environment and ecosystem, fisheries and aquaculture, maritime transport and tourism, miscellanea. The Geoplatform capitalizes data from other projects (e.g. Shape, CocoNet) and enables access to standard services from other geoportals (e.g. EMODnet, EU Sea Atlas).. The original version was developed in the context of the ADRIPLAN Project (MARE/2012/25; 2013-2015) and has been consolidated within the Italian RITMARE Flagship Project and by ongoing projects such as SUPREME. Core functionalities of CEA/MUC have been supported by an MSP pilot study in marine waters facing the Emilia-Romagna Region (Italy), and incorporated as case studies analyses within the SUPREME (Supporting maritime spatial Planning in the Eastern Mediterranean) and SIMWESTMED (Supporting Maritime Spatial Planning in the Western Mediterranean region) projects. Currently the web-tools are providing core functionalities for ADRION-PORTODIMARE (geoPortal of Tools & Data for sustainable Management of coAstal and maRine Environment; 2018-2020) Project.

4.2.1 Material and methods

The Tools4MSP Geoplatform implements a **Cumulative Effects Assessment (CEA)** for the analysis of cumulative effects generated by anthropogenic activities on marine environmental components. Its implementation is based on archetypical CEA implementations proposed on various geographical

scales (Halpern et al., 2008; Andersen et al., 2013). In detail, we define CEA as a systematic procedure for identifying and evaluating the significance of effects from multiple pressures and/or activities on single or multiple receptors (Judd et al., 2015). CEA provides management options by quantifying the overall expected effect caused by multiple pressures and by identifying critical pressures or pressure combinations and vulnerable receptors. The analysis of the causes (source of pressures), pathways, interactions and consequences of these effects on receptors is an essential and integral part of the process. Moreover, we use the terms “human activity”, “uses” and “source” as synonyms and define “pressure” (Judd et al., 2015) as “an event or agent (biological, chemical, or physical) exerted by the source to elicit an effect”.

The CEA algorithm implemented in the Geoplatform is described by Menegon et al. (2018a; 2018b). The inputs of the Tools4MSP CEA tool are: (i) the area of analysis; (ii) the grid cell resolution; (iii) layers representing intensity or presence/absence of human uses (e.g., intensity of fishery and maritime transport, presence of aquacultures and oil & gas platforms); (iv) layers representing intensity or presence/absence of environmental components (e.g., seabed habitats, probability of presence of nursery habitats, probability of presence of marine mammals); (v) use-specific relative pressure weights and distances of pressure propagation; (vi) environmental component sensitivities related to specific pressures or more general ecological models that describe the response of the environmental components to a specific pressure.

The CEA model implements 15 MSFD pressures out of 18 provided by the MSFD (EC, 2008). Pressures are described according to MSFD amended version (EC, 2017, Annex 4, Table 2). The three pressures related to significant changes in salinity regime, introduction of radio-nuclides and introduction of microbial pathogens were omitted from the pressure dataset due to lack of reference and expert judgement (Menegon et al., 2018b). Finally, the geospatial distribution of single and cumulative effects and impacts are estimated combining together the pressure layers and the environmental components layers through a sensitivity score.

The geospatial dataset implemented for the study features 41 layers: 9 human uses (U) and 32 environmental components (E). Tabs 5 and 6 present a detailed overview of the geospatial dataset implemented. The chosen grid cell resolution was 500 meters. The units of the spatial indicators U and E are presence/ absence, weighted dummy and intensity indicators. For intensity indicators a log[x + 1] transformation and a rescaling from 0 to 1 was applied.

Maritime Use Conflict (MUC) analysis is based on a methodology developed within the COEXIST Project (COEXIST, 2013). In particular, the methodology presented by Gramolini et al. (2010) enables the identification of current/potential human uses and assesses their interaction in terms of conflicts. The algorithm implemented for the MUC score on a single grid is presented by

Menegon et al. (2018a; 2018b). The inputs of the tool are: (i) the area of analysis; (ii) the grid cell resolution; (iii) layers of presence/absence for each human use present in the area; (iv) an expert based characterization for each human use through four attributes (vertical scale, spatial domain, temporal domain and mobility). According to the attributes of each use, the potential conflict score for each pair of uses, varying from 0 (no conflict) to 6 (very high conflict) is estimated. Finally, on each cell of the selected grid the total MUC score is calculated summarizing the potential conflict score for each pair of overlapping uses. The main output is a geospatial distribution of MUC score over the entire area of analysis. In total 10 layers of human uses were used by the MUC webtool (Tab. 5, taking in account also the protected areas and Sites of Community Importance).

Table 5 - human uses

USE	***SPATIAL DATA***	***Url***
Aquaculture	Aquaculture facilities (Malta)	http://data.tools4msp.eu/layers/geonode%3Appp
Cables and Pipelines	Submarine cables and pipelines	http://data.tools4msp.eu/layers/geonode%3Asubmarine_cables
Coastal and Maritime Tourism	Marinas - Nr of berths - Malta and Sicily (2018)	http://data.tools4msp.eu/layers/geonode%3Amarinas_maltasicily
Land based activities	Desalination plants - Malta	http://data.tools4msp.eu/layers/geonode %3Alocation_of_desalination_plants_on_the_island_of_malta_lines
Maritime Transport	Positions of vessels – ais data heatmap (JUL-OCT 2018)	http://data.tools4msp.eu/layers/geonode%3Amalta_aisdata_hm250_r500
Naval base activities	Main Ports Stats 2015-2016	http://data.tools4msp.eu/layers/geonode%3Aports_stats_201516
Oil & Gas extraction	Operating oil rigs - Sicily	http://data.tools4msp.eu/layers/geonode%3Asicily_operating_oil_rigs
Trawling	Trawling fisheries effort (VMS 2013-14-15)	http://data.tools4msp.eu/layers/geonode%3Avms_average2013_14_15
Trawling	Malta Trawling areas	http://data.tools4msp.eu/layers/geonode%3Acommercial_fisheries_trawling_areas_4326

Table 6 – Environmental components

ENVIRONMENTAL COMPONENT	**SPATIAL DATA**	**Url**
A3 - Infralittoral rock and other hard substrata	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode %3Aeunismedscale_4326_a3
A4.26 - Mediterranean coralligenous	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode %3Aeunismedscale_4326_a4_26_or_a4_32

communities		
A5.13 - Infralittoral coarse sediment	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode%3Aeunismedscale_4326_a5_13
A5.23 - Infralittoral fine sands	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode%3Aeunismedscale_4326_a5_23
A5.33 - Infralittoral sandy mud	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode%3Aeunismedscale_4326_a5_33
A5.38 - Mediterranean biocenosis of muddy detritic bottoms	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode%3Aeunismedscale_4326_a5_38
A5.46 - Mediterranean biocenosis of coastal detritic bottoms	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode%3Aeunismedscale_4326_a5_46
A5.47 - Mediterranean biocenosis of shelf-edge detritic bottoms	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode%3Aeunismedscale_4326_a5_47
A5.531 - Cymodocea beds	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode%3Aeunismedscale_4326_a5_531
A5.535 - Posidonia beds	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode%3Aeunismedscale_4326_a5_535
A6.2 - Deep-sea mixed substrata	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode%3Aeunismedscale_4326_a6_2
A6.3 - Deep-sea sand	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode%3Aeunismedscale_4326_a6_3
A6.4 - Deep-sea muddy sand	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode%3Aeunismedscale_4326_a6_4
A6.511 - Facies of sandy muds with Thenea muricata	Emodnet Seabed Habitats eunismedscale	http://data.tools4msp.eu/layers/geonode%3Aeunismedscale_4326_a6_511
NH - Nursery habitats	*Parapenaeus longirostris* (Deep-water rose shrimp) - recruits - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Apapelon_recruits_persistence
NH - Nursery habitats	*Merluccius merluccius* (European hake) - recruits - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Amerlmer_recruits_persistence
NH - Nursery habitats	*Mullus surmuletus* (striped red mullet) - spawners - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Amullsur_spawners_persistence
NH - Nursery habitats	*Mullus barbatus* (Red mullet) - spawners - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Amullbar_spawners_persistence
NH - Nursery habitats	*Galeus melastomus* (Blackmouth catshark) - spawners - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Agalumel_spawners_persistence
NH - Nursery	*Illex coindetii*	http://data.tools4msp.eu/layers/geonode

habitats	(Broadtail shortfin squid) - recruits - MEDISEH	%3Aillecoi_recruits_persistence
NH - Nursery habitats	*Nephrops norvegicus* (Norway lobster) - recruits - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Aneprnor_recruits_persistence
NH - Nursery habitats	*Illex coindetii* (Broadtail shortfin squid) - spawners - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Aillecoi_spawners_persistence
NH - Nursery habitats	*Pagellus erythrinus* (Common Pandora) - spawners - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Apageery_spawners_persistence
NH - Nursery habitats	*Raja clavata* (Thornback ray) - spawners - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Arajacla_spawners_persistence_1
NH - Nursery habitats	*Parapenaeus longirostris* (Deep-water rose shrimp) - spawners - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Apapelon_spawners_persistence
NH - Nursery habitats	*Aristaeomorpha foliacea* (Giant red shrimp) - recruits - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Aarisfol_recruits_persistence
NH - Nursery habitats	*Aristaeomorpha foliacea* (Giant red shrimp) - spawners - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Aarisfol_spawners_persistence
NH - Nursery habitats	*Galeus melastomus* (Blackmouth catshark) - recruits - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Agalumel_recruits_persistence
NH - Nursery habitats	*Raja clavata* (Thornback ray) - recruits - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Arajacla_recruits_persistence
NH - Nursery habitats	*Nephrops norvegicus* (Norway lobster) - spawners - MEDISEH	http://data.tools4msp.eu/layers/geonode%3Aneprnor_spawners_persistence
MM - Marine mammals	DISCLAIMER: no density map available. Uniform presence hypothesized for the whole CS area	
TU - Turtles	DISCLAIMER: no density map available. Uniform presence hypothesized for the whole CS area	

4.2.2 Results

Cumulative effects assessment (CEA)

In Figure 18 geospatial results from CEA modelling are presented, representing the expected value of the cumulative effect for each cell.

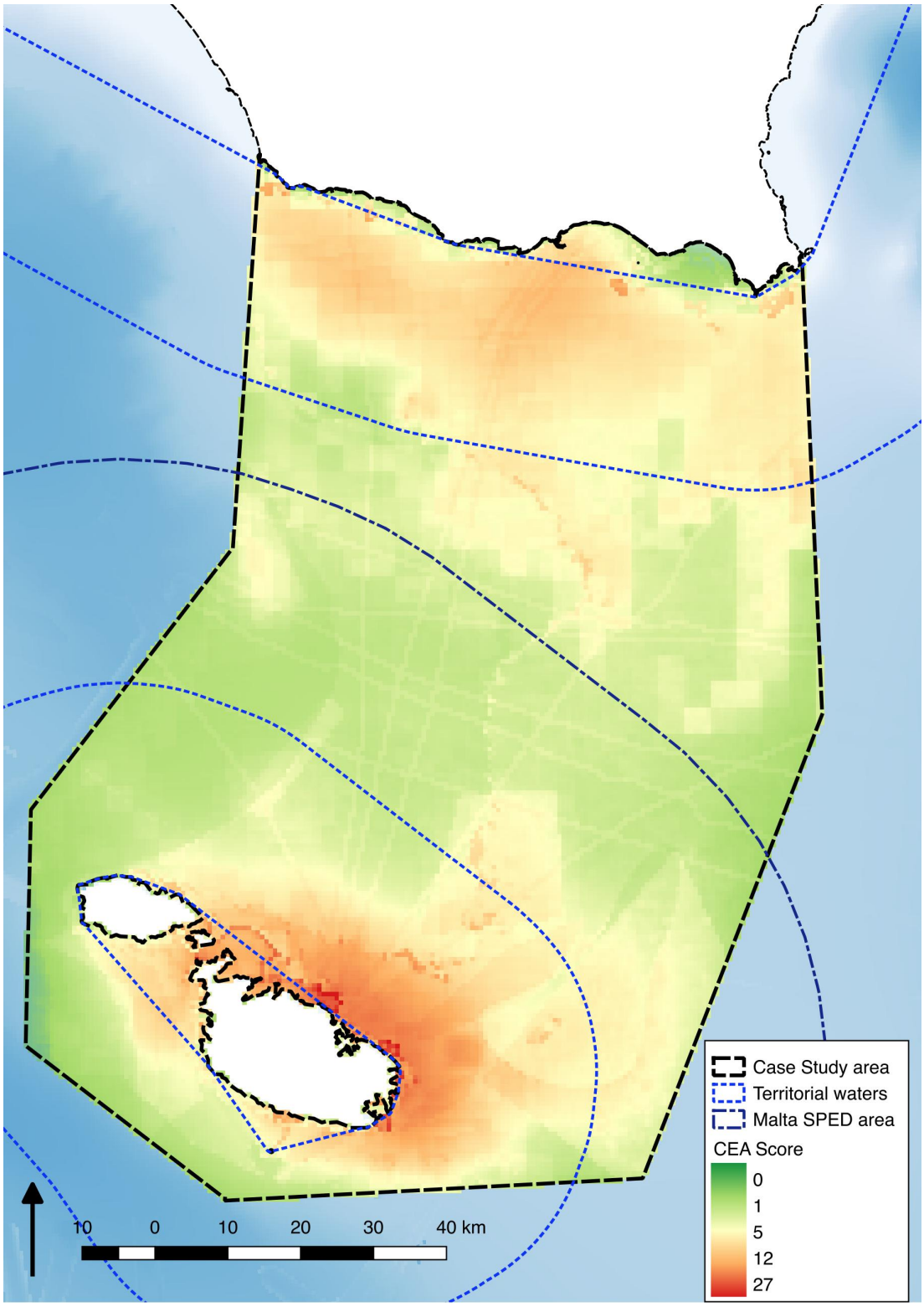


Figure 18- Spatial distribution of the CEA scores within the CS area

Figure 19a and 19b represents the distribution of each environmental component (a) and maritime use (b) and the relative contribution to the CEA score.

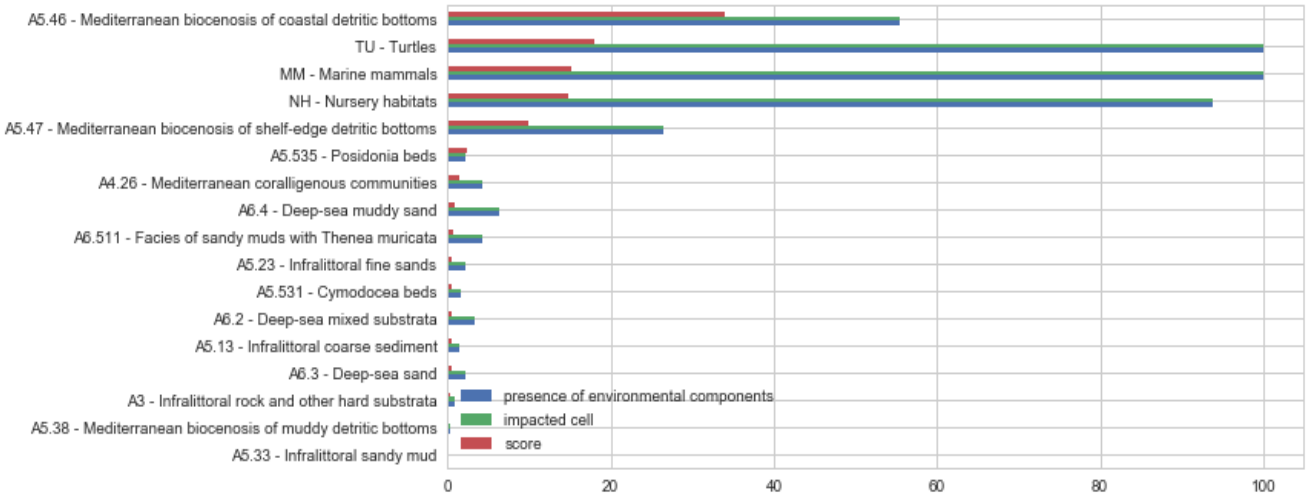


Figure 19a - Red: percent contribution to the total CEA score of each environmental component; Blue: cells with presence of each environmental component (in % of the total CS area cells); Green: cells featuring each environmental component impacted by human activities (in % of the total CS area cells).

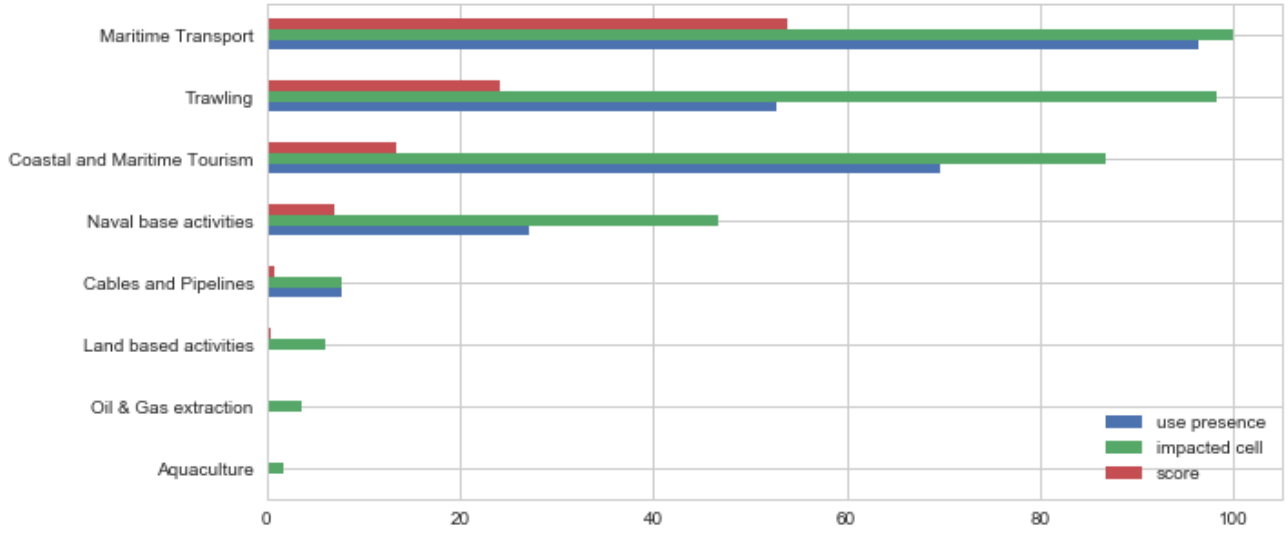


Figure 19b - Red: percent contribution to the total CEA score of each activity; Blue: cells on which each activity is exerted (in % of the total CS area cells); Green: cells impacted by each activity (in % of the total CS area cells).

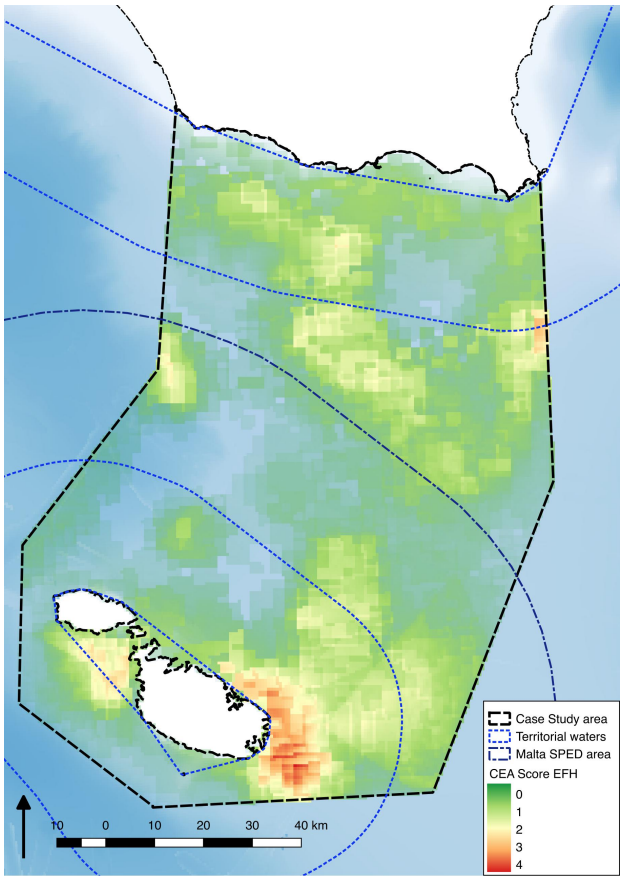


Figure 20 – CEA score distribution on cells featuring Essential Fish Habitats (7 recruitment areas and 10 spawning grounds)

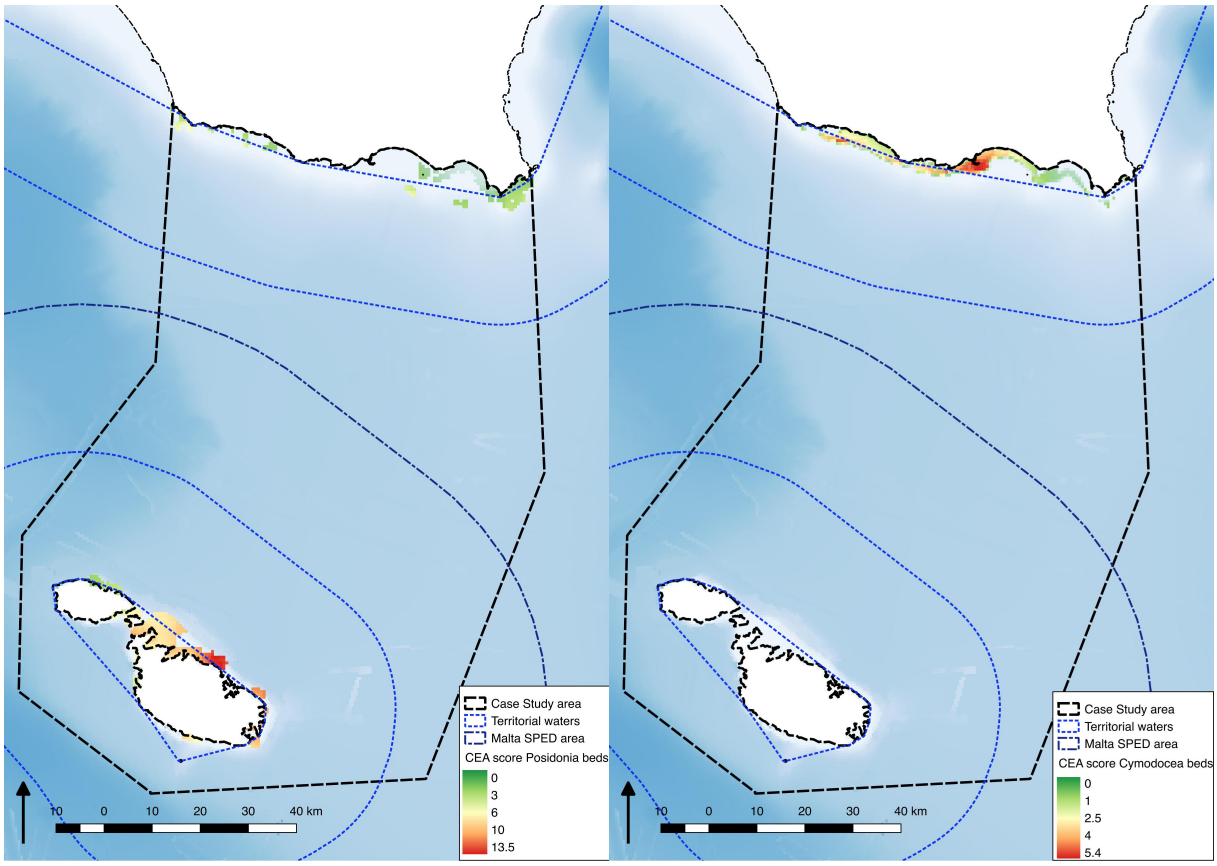


Figure 21a and b - CEA score distribution on cells featuring Posidonia and Cymodocea beds.

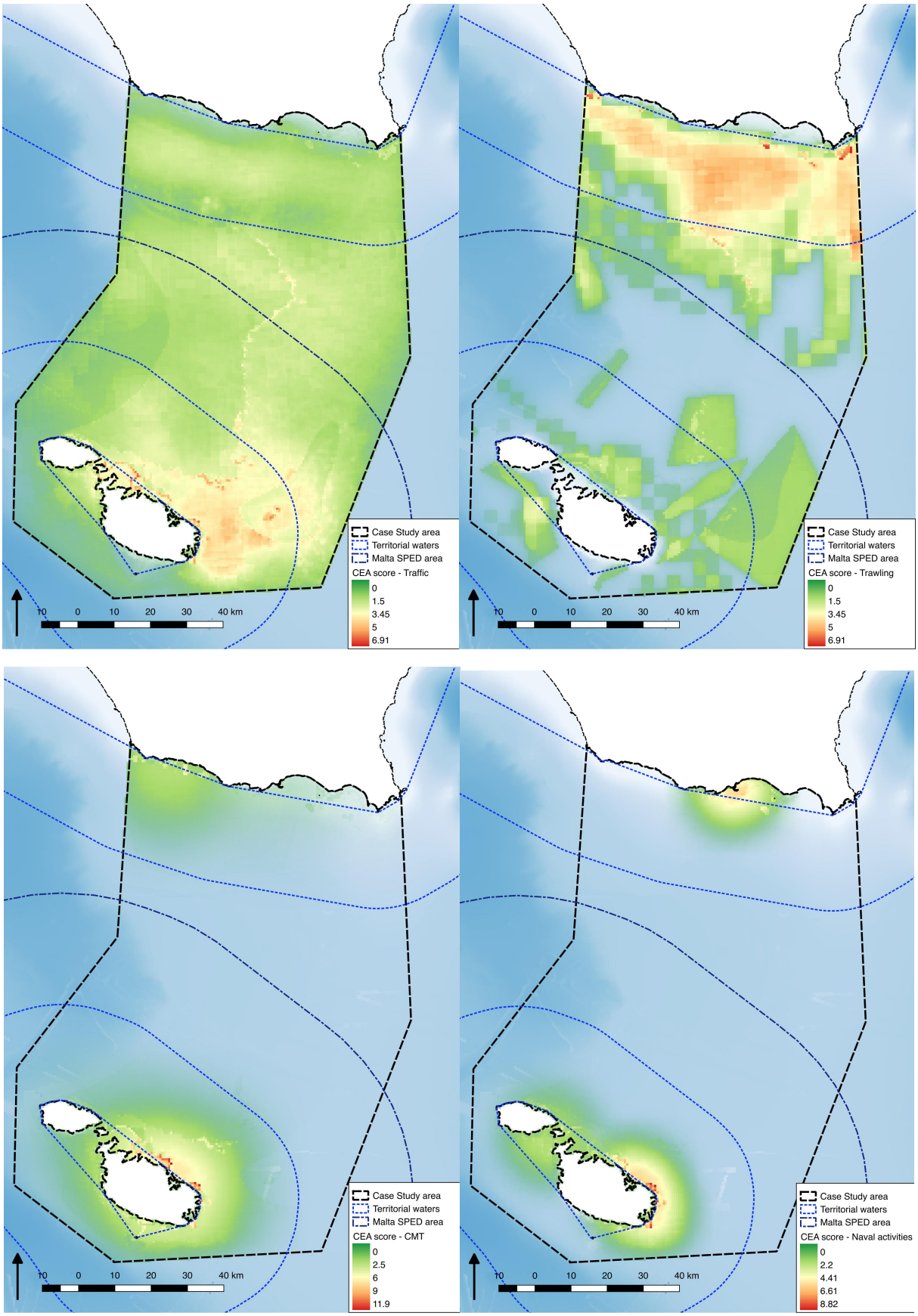


Figure 22 a – b – c – d – Relative contributions to the CEA score from maritime traffic, trawling, coastal and maritime tourism and naval based activities

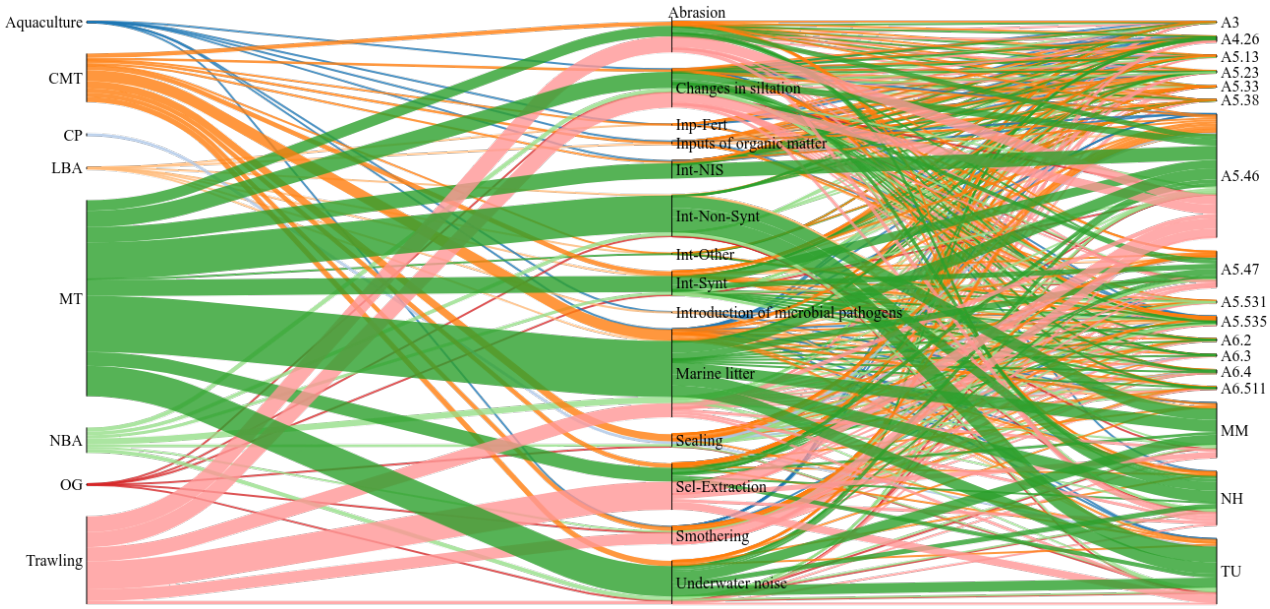


Figure 23 - CEA impact chain visualization. Sankey diagrams that identifies the interactions and the flow of impacts generated by the Human uses (left axes) through the Pressures (mid-axes) on the Environmental Components (right axes). The width of the bands is directly proportional to CEA score and each colour identifies a specific Human use. Human uses: aquaculture, coastal and maritime tourism, cables and pipelines, land based activities, maritime traffic, naval based activities, oil and gas, trawling.
Environmental components: NH - Nursery habitats; TU - Turtles; MM - Marine Mammals; A3 - Infralittoral rock and other hard substrata; A4.26 - Mediterranean coralligenous communities; A5.13 - Infralittoral coarse sediment; A5.23 - Infralittoral fine sands; A5.33 - Infralittoral sandy mud; A5.38 - Mediterranean biocenosis of muddy detritic bottoms; A5.46 - Mediterranean biocenosis of coastal detritic bottoms; A5.47 - Mediterranean biocenosis of shelf-edge detritic bottoms; A5.531 - Cymodocea beds; A5.535 - Posidonia beds.

High CEA scores are located along Northern Maltese coasts and in proximity of Sicilian ports, in presence of highly sensitive habitats. A diffuse medium-high score is present in Italian waters, mainly due to intense trawling activities. Medium CEA scores are distributed in coastal and offshore areas of the entire continental shelf, while low CEA scores cover the offshore, deeper waters and residual coastal areas far from port and marinas.

Results indicated that coastal and shelf-edge detritic bottoms are the environmental components most exposed to anthropogenic pressures in the area. Several studies have shown a high diversity and biomass of demersal communities over the offshore detritic bottoms (Gristina et al., 2006; Garofalo et al., 2007). Such high diversity is also linked to key spawning and nursery grounds for demersal and large pelagic species of commercial interest for fisheries. CEA scores on known nursery habitats account for more than the 15% of the total (fig. 20), with a pattern clearly linked to trawling pressures, especially in the northern portion of the CS area, and higher values along North-Eastern Maltese coasts, even in presence of less intense trawling activities, where important essential fish habitats coexist with high traffic densities, naval activities, bunkering areas and aquaculture.

The CS area represents an important area of migration passage for marine mammals and one of the most important areas for the loggerhead turtle (*Caretta caretta*) with important turtles nesting sites. No comprehensive spatial mapping to estimate abundance, density and hot-spots currently exists for the area (Notarbartolo di Sciara et al., 2017), so a uniform presence in the whole area was included in the model. Given this, the whole set of human activities generate a high potential cumulative effect on both turtles (18% of the total score) and marine mammals (16% of the total score).

Posidonia beds and, in lesser extent, other seagrasses (*Cymodocea* beds) highly contribute to CEA score despite their limited spatial distribution (Fig 21a and 21b). Rocky bottoms communities (e.g. infralittoral rock and coralligenous communities) are also affected by several activities exerting numerous pressures. However, the knowledge on their spatial distribution is still partial and needs finer mapping efforts in order to properly assess the potential effects of anthropogenic activities on their assemblages. In the CS area the complex systems of marine transportation (maritime transport density, touristic marinas tourism and commercial ports) constitute the main source of human disturbance, followed by trawling activities (Fig. 20 a-d).

Figure 21 illustrates a Sankey diagram to represent the CEA impact chain. The chain represents the flow of impact, with the band width directly proportional to total CEA score. Results show that highest impacting uses are maritime transport and trawling. The Sankey diagram (Fig. 23) also illustrates how a single use impacts an environmental component through its pressures: e.g. high

quotas of CEA score on nursery habitats are generated by selective extraction of species and abrasion caused by trawling.

Maritime transport may exert a wide suite of pressures (marine litter, underwater noise, introduction of substances and non-indigenous species, collisions with pelagic species and, in shallower waters, changes in siltation and abrasion) on the environment in the whole CS area, including both territorial and international waters, and fostering the needs of a transboundary surveillance, monitoring and application of precautionary mitigation measures to reduce its potential impacts. Nautical tourism and port activities influence only coastal areas within the 10 nm offshore but may contribute to CEA with higher scores, due to the presence of highly sensitive coastal habitats. The main trawling activities are concentrated within the Italian national waters, and, with lower intensities, in the Maltese Fisheries Conservation Management Zone, but they are also exerted in international waters, suggesting that planning efforts should be addressed to foster a transboundary effort for stocks management.

Little knowledge is given for spatial distribution and intensities of other important human activities (e.g. bathing tourism, land-based pollution sources, small scale fisheries), potentially leading to underestimations of the total CEA score, especially in coastal areas. This highlights the role of data accessibility, quality and interoperability for a fruitful MSP, particularly at transboundary level.

Maritime use conflict (MUC)

In Figure 24 the results from marine use conflict analysis.

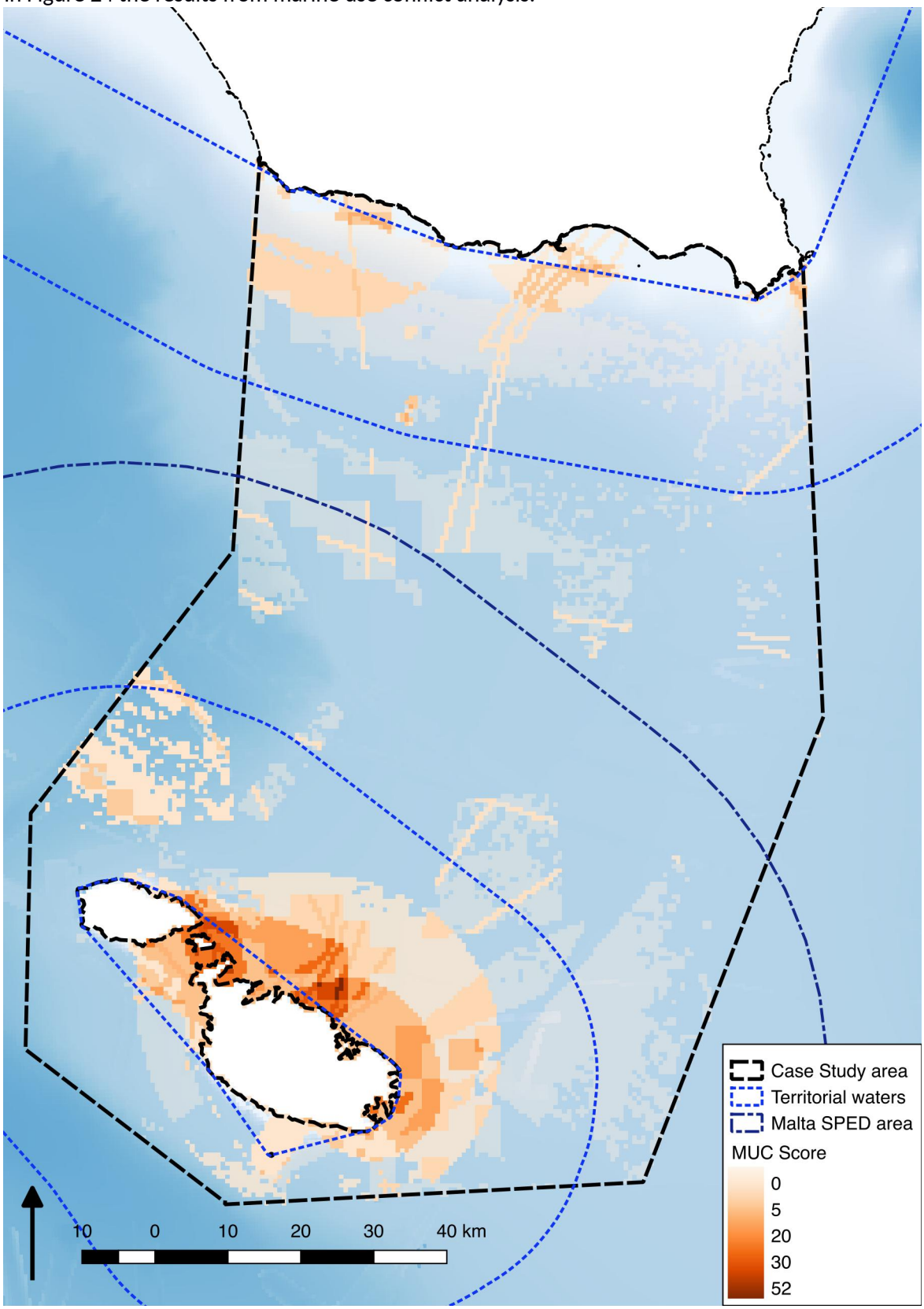


Figure 24 - Spatial distribution of the MUC scores within the CS area

Detailed analysis of the interactions between uses that generate the MUC scores are shown in figure 25.

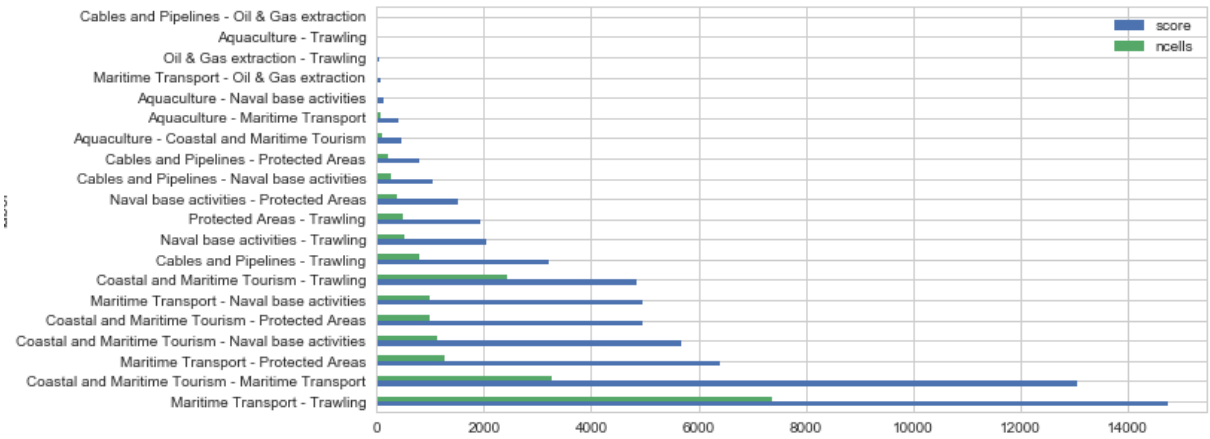


Figure 25 - blue: contribution to the total Muc score of each interaction; green: cells with presence of each interaction).

The analysis show that the Maltese national waters have the highest MUC scores, especially in the Northern coastal areas, due to a high concentration of uses and in presence of large protected areas, while in Italian waters conflicts are mainly concentrated close to port areas and around the oil fields. The main interactions potentially generating conflicts in the Maltese area are those between maritime transport, maritime tourism and protected areas, while the conflicts between commercial and touristic transport and trawling activities are important in both Italian and Maltese national waters.

It is pertinent to point out that due to the lack of proper spatial data, the model could not take in account potential intra-sectoral conflicts. In particular, we refer to potential conflicts between small scale and trawling fisheries and between different typologies of maritime traffic (e.g. passenger vs commercial vessels), that may occur in crowded environment such as the Strait of Sicily-Malta.

4.2.3 GAPS

The type of analyses resulting from these data models may constitute a solid base for planning, in order to identify how pressures on the environment interact and to determine potential conflicts between anthropogenic activities. This information can be crucial to foster proper planning decisions by directing activities to maritime areas in a manner that supports rather than interferes with management and conservation actions of environmental components. However the effectiveness of the results as always is dependent of the quality of the available data. Therefore it is considered necessary for the purpose of the maritime space within the case study area to improve upon the quality of the data used and the assumptions made for the assessment of both the cumulative effects and multiple use conflicts.

The difficulties encountered for the preparation of the initial assessment of local marine waters reflect the level of available knowledge where the predominant activities, pressures and environmental components have been poorly surveyed as a whole, thus limiting the availability of accurate geo-referenced maps and detailed quantitative data. Consequently, main cumulative effects cannot be adequately assessed in the case study.

Several species of marine mammals (*Stenella coeruleoalba*, *Tursiops truncatus*, *Delphinus delphis*, *Grampus griseus*, *Globicephala melas*, *Ziphius cavirostris*, *Physeter macrocephalus* and *Balaenoptera physalus*) and turtles (mainly *Caretta caretta*) have been regularly observed in the area. However, no systematic monitoring activities have been conducted in the waters of the Strait of Sicily and, in consequence, spatial information on their spatial distribution with estimates of their abundances and densities in the Strait of Sicily are not available. Similarly, the fine scale distribution of high value benthic habitats (e.g. coralligenous formations, rocky bottom assemblages, deep corals) at a proper resolution for planning purposes is still lacking.

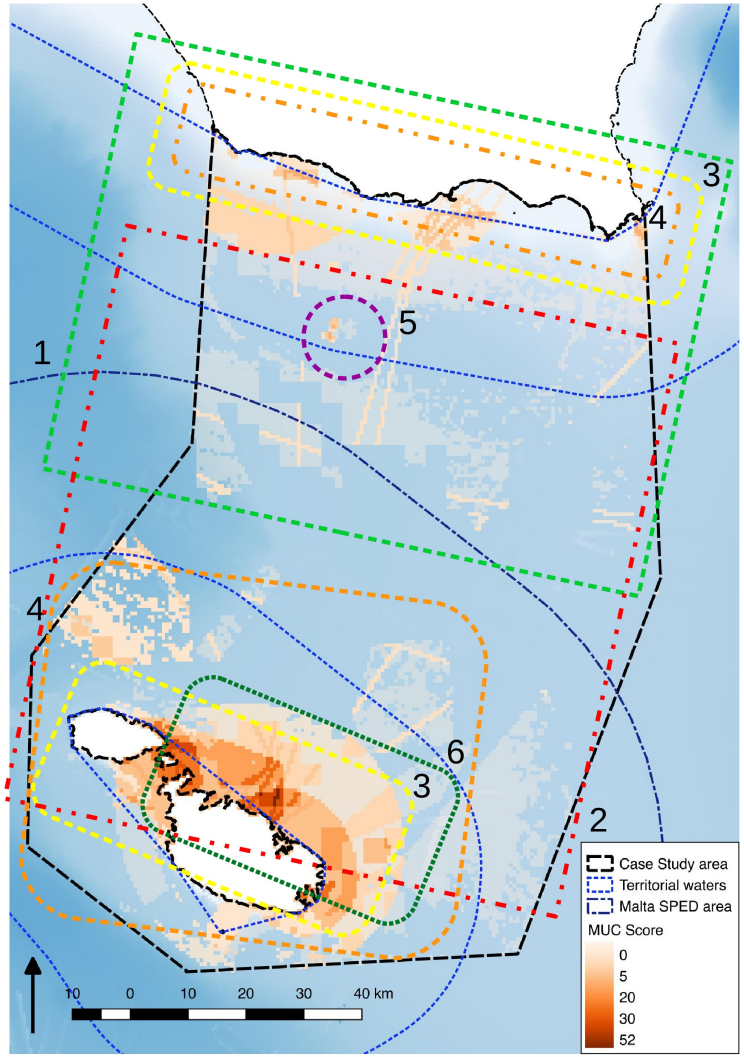
Quantitative information on human activities needs to be used as a source of pressures on coastal habitats. Still, the substantial lack of quantitative information on the intensity of the different threats can surely represent a limit for deriving cumulative effect assessments. The effects of overfishing on coastal areas may affect population abundances. In fact, fishing leads to a significant decrease in mean specific number of fish species, producing changes in the composition of the community. However, analysis on small scale and recreational fisheries proved to be very difficult because of critical information gaps about their intensities in the CS area, with no information available about the distribution of exploited areas, leading to an underestimation of real fisheries impacts, especially in a region where small marinas and unprofessional fishing are heavily widespread.

Similarly, fine scale maps of maritime traffic using satellite vessel tracking could be improved with modelled average routes intensities for each vessel type, to integrate the full set of proxies (e.g. total shipping goods, number of berths) of threat given by naval activities and maritime traffic.

Improvement and integration of land-sea interactions (LSI) models could allow the inclusion of land-based sources and pollutant loads in the analyses. Land-based human activities alter flow of material, energy or organism and affect the marine biota through effects on ecological processes (reproduction, mortality, growth etc.). The interactions between the terrestrial and marine areas may include, for example, the outflow of contaminants from a terrestrial agricultural area to a freshwater body, as well as land-sea ecological processes, in particularly related to the flow of water and movement of organisms between terrestrial, freshwater and marine ecosystems. For example, some of the most sensitive and valuable habitats such as seagrass meadows and salt marshes are cross-system impacted areas, both by the coastal and the marine activities in the whole region. Some uses, mostly on the ground (for example, tourism, recreational activities, ports), extend their activities to the sea. These interactions should be accurately taken in account, in order to assess their cumulative impacts and potential conflicts and synergies.

4.3 KEY ISSUES

Taking into consideration the vision, trends and objectives for the CS area, the outcomes of the analyses allowed to identify the priority issues for an appropriate maritime spatial planning for the area. The key issues are summarized in the figure 26.



1 - FISHERIES: Competition for resources and/or space generating conflicts among fleets/metiers (e.g. between trawlers and small scale fisheries) and with other uses.
Impacts of trawling on protected/sensitive habitats and overfishing of main commercial fish stocks, require a shared transboundary cooperative management of fish resources and the enforcement of well-established protected areas for Essential Fish Habitats. Promotion of synergies with tourism and protection, fostering a proper zoning of fishing activities.
2 – MARITIME TRAFFIC: intense and potentially increasing east-west commercial traffic, mainly by container shipping, with limited conflicts with other local and north-south traffic and several environmental concerns (e.g. marine litter, water pollution, introduction of non-indigenous species, underwater noise, oil spills from possible accidents). Present and future demand for bunkering areas in Maltese waters may generate conflicts with other uses.
3 - COASTAL AND MARITIME TOURISM: Potentials for further development of C&MT are high both in Malta and in Sicily, with different characteristics and challenges for sustainability. synergies with with heritage and naturalistic tourism, enhancement of protected areas, with reduction of trawling efforts fostering small scale fisheries (e.g. pescaturism).
4 – ENVIRONMENTAL PROTECTION: conservation actions on the high heterogeneity in benthic communities that are the object of specific conservation policies (e.g. *Posidonia oceanica* meadows). A wide and transboundary managed area should be taken in account to protect high valuable species such as cetaceans and sea turtles. Potential conflicts for space could arise with several activities.
5 - OIL & GAS: possible expansion of operations could lead to serious conflicts with other sectors for space competition and environmental impacts on ecosystems and protected species. Any further expansion needs specific analyses and an adequate planning in a transboundary context.
6 – AQUACULTURE: careful identification of new zones for aquaculture is needed, considering potential conflicts with other uses (e.g. tourism, fishery, navigation), environmental impacts and synergies.

Figure 26 - synthesis of the key issues for the CS area.

4.3.1 FISHERIES

The fisheries sector has fundamental importance for the blue growth of the region, aiming to promote both sustainable growth and to achieve long-term sustainable fisheries management through the implementation of the principles of the Common Fishery Policy. The Strait of Sicily is one of the most important fishing areas in the Mediterranean Sea. According to the General Fisheries Commission for the Mediterranean (GFCM), the CS area falls into two Geographical Subareas (GSA): GSA 15 (Malta Island) and GSA 16 (Southern Sicily).

The Italian fishing fleet, one of the largest operating in these areas, consists mainly of bottom trawlers, pelagic trawlers, purse-seiners, long-liners and small-scale boats distributed along a widespread, historical system of fishing ports along the Sicilian coast.

Maltese fisheries are mainly of artisanal type, multi-species and multi-gear. About 88 percent of the professional vessels are less than 10 m in length overall and more than half are of a traditional design, namely ‘Luzzu’ and ‘Kajjik’, operating mainly in coastal waters. The main exploited species include mackerels, swordfish, dolphinfish (with typical artisanal FADs), bluefin tuna, and demersal species, with a total capture fishery production that shows an increasing trend since 2007 and in 2015. The Maltese recreational fishing sector is also significant and constantly increasing, with 1 929 vessels registered in this activity in 2012 (Fao, 2018, www.fao.org/fishery/facp/MLT/en). In contrast to the recreational segment, the number of commercial small-scale vessels has been constantly declining, in favour of the enlargement of commercial large-scale vessels, predominantly linked to the corporate growth of fishing companies that have started appearing post-EU accession (Said et al. 2018). The main landing sites are Marsaxlokk harbour and the wholesale fish-market in Valletta. There are however a high number of very small ports around the Maltese islands (Malta and Gozo). The fleet allocation for fishery sector, based on the frequency of use of the fishing gears, confirms the prevalence of small-scale fisheries in the fishing ports included in the CS area. However, the importance of this sector results in a low representation in terms of general effort, considering that vessels operating with trawl nets, mainly from extra-area fleets, prevails.

Conflicts in fisheries arise usually when different fleets and métiers are in competition for the resources and/or for space. The main commercial fish stocks in the area are generally in a condition of overfishing (Di Lorenzo et al., 2016). This condition is leading to heavy risks of collapse of the stocks, urging the needs of proper regulation of the exploitation of the resources and sustainability of the used gears. In particular, the occurrence of shared stocks between international fleets may lead to possible transboundary conflicts for fish resources (i.e. between Italian and Maltese fleets and/or between Italian fleets from different fishing ports), especially

when common stocks in the Strait of Sicily became overexploited and in absence of an adequate protection of recruitment and spawning areas of target species.

Council Regulation (EC) No 1967/2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea, relates to the conservation, management and exploitation of living aquatic resources in the Mediterranean. The regulation adopts the 25-mile Fisheries Management Zone around the Maltese Islands, stipulates provisions regulating fishing within this zone and prohibits fishing for dolphinfish within the 25Nm Fisheries Management Zone by FAD from 1 January to 5 August each year. It further stipulates that the number of vessels for dolphinfish fishery shall not exceed 130. The regulation also sets the authorized trawlable areas within the 25 nautical mile Fisheries Management Zone, with geographical co-ordinates identified in Annex V. Malta's Fisheries Management Plans however indicate that the Maltese authorities are currently studying the possibility of relocating part of these authorized trawlable areas due to a rationalization exercise that has led to the closure of parts of the areas due to protected habitats present in the zones. Specifically, the management plans point out that the authorized trawling zones as per Annex V of regulation 1967 of 2006 include areas which are found within the 3 nautical mile zone, which areas should be reconsidered to protect coastal resources from trawling activities and to give priority to artisanal fisheries.

The disturbance caused by trawling can be classified as one of the most important sources of anthropogenic impact of the area. Analysis of the cumulative effects on the bottoms of territorial and offshore waters of the CS area clearly indicates bottom trawling as one of the most influencing anthropic activity in the considered area. Trawling related pressures are almost widespread in the CS territorial areas, and show hotspots of contribution to the CEA scores from 3 to 15 nautical miles offshore the Sicilian coasts (Fig. 20b). The long-term effect of bottom trawling has repercussions both on the structure and functions of the demersal communities, putting at risk some critical/vulnerable life stages such as reproduction and recruitment. This places the serious priority of the protection of the Essential Fish Habitats, which is fundamental for the correct planning of conservation measures.

The Strait of Sicily can be considered an important spawning and nursery ground for a wide number of commercial pelagic fish species, including bluefin tuna, swordfish and anchovy, as well as a number of demersal fish species (Garofalo et al. 2011; Ragonese et al., 2013) and species of sharks (e.g. the Critically Endangered Mediterranean subpopulation of white shark *Carcharodon carcharias*) and rays (e.g. the Maltese skate *Leucoraja melitensis*) included under some conservation regimes and whose conservation status is at risk (Lauria et al., 2015). The CEA analysis on environmental components shows the overall CEA score on EFH (fig. 18).

According to Russo et al. (2014), a series of strategically designed areas of fishery bans could significantly improve trawl fisheries resource conditions in the Strait of Sicily.

The enforcement of cooperative management and planning of well-established protected areas for Essential Fish Habitats (EFH), especially in open sea and deep sea habitats, is a critical priority for the area, because of the threats to high-sea resources posed by fishing and other human activities (Garofalo et al. 2011). The protection of EFH would favour the achievement of the MSFD objectives of safeguarding and recovering fish stocks of particular commercial interest, with a close connection between this descriptor (No. 3, The population of commercial fish species is healthy) and Descriptors 1 (Biodiversity is maintained), 4 (Marine trophic food webs) and 6 (Sea floor integrity), due to the complex ecosystem effects of the fishing-related use of destructive gears. Measure to promote the role of sustainable small-scale fisheries in the area, given its important and peculiar socio-economic value for coastal communities, and to reduce the impacts of destructive industrial fishing techniques are foreseen, together with a further reduction in industrial fishing capacity. Promoting tourism-fisheries and fisheries cultural heritage could be an important economic resource for the territories. Good practices are present in the study area, with several examples of fisheries heritage tourism in Sicily (Vademecum sul Pescaturismo, Sicily Region).

By-catch in the area poses the greatest threat to many species. A key concern is the by-catch from the long line fishery of loggerhead sea turtles (*C. caretta*) (Báez et al., 2007) and the vulnerability observed for shearwaters. Measures to Minimize Cetacean-Fishery Conflicts in the Mediterranean and Black Seas" (ACCOBAMS, 2004) and the "Sea Turtle Handling Guidebook for Fishermen" (2001, RAC / SPA), together with the Maritime Strategy for the Adriatic and Ionian Seas (EU COM(2012) 713 final) aim to the mitigation of conflicts between professional fisheries and the environmental protection trough the adoption of specific measures to protect habitats and species sensitive to fishing activities, especially sea turtles and cetaceans. In general, the measures for the mitigation of accidental catches of cetaceans and sea turtles are:

- spatial identification of the most exploited areas by trawling; definition of species aggregation areas with relative seasonal differences in distribution;

- monitoring and application of measures and good practices to reduce accidental catches;

- reduction of fishing pressure.

4.3.2 MARITIME TRAFFIC

In 2015 over 80% of the volume of the international trade was transported by sea and 20% of the total world's maritime transport (and 30% of the oil trades) moved through the Mediterranean Basin. Maritime transport in the Mediterranean Sea has grown during the past two decades, and it is expected to continue to increase in coming years, both in the number of routes and in traffic intensity (Notarbartolo di Sciara et al. 2017), also due to the enlargement and deepening of the Suez Canal completed in 2015. This increase will mainly regard container ships, including megaships of 18-21 TEU (Baccelli et al., 2015). The case study area is heavily interested by east-west traffic of commercial ships , which do not directly refer to the ports present in the area (Pozzallo, Valletta Grand Harbour, Marsaxlokk, Ċirkewwa and Marsamxett). However, commercial ships heavily use bunkering areas located north-east off the Maltese coast. Such intense east-west commercial traffic, mainly by container shipping, shows as a whole limited conflicts with other local and north-south traffic, i.e. oil transportation, passengers (cruise ships and ferries), fishing boats, leisure boats (yachts and mega-yachts, mainly present around the Maltese coasts and ports).

Presently, the most important action to carry out is a careful traffic safety and surveillance monitoring activity through VTMIS and similar systems and a precise respect of the safety rules established by national and international authorities. As far as potential conflicts of maritime transport with other uses, they are presently limited in space and time. They regard basically the coexistence in the same areas of fishing and maritime transport, according to navigation rule, safety areas around O&G infrastructures and limitation to other uses posed by existing bunkering areas. Furthermore, ports in the CS area feature a strong and rising presence of passengers traffic connecting Sicily and Malta and an increasing demand for spaces dedicated to recreational boating and yachting.

If this can be considered as valid today, the same could not apply in future, with the foreseen scenarios of traffic increase. Maritime authorities will need to carefully monitor such trends and their distribution in space (routes and flows), in order to eventually propose and apply new navigation rules. Maritime traffic in such a crowded area poses legitimately also a number of environmental concerns, that must be carefully analyzed, in order to mitigate impacts and prevent damages. Actual level of maritime traffic congestion and its expected expansion of passenger traffic between Sicily and Malta may cause environmental impacts (e.g. marine litter, water pollution, introduction of non-indigenous species, hydrographical changes, underwater noise, oil spills from possible accidents).

CEA analysis on the CS area show the complex system of shipping traffic (commercial, passenger and leisure boating), port activities and bunkering area in coastal activities exert a potentially high risk of direct and indirect impact to important coastal marine habitat (figs 20a and 20d).

Marine litter, underwater noise, organic and inorganic pollution, transportation of non-indigenous species (NIS), changes in siltation and abrasion in shallow waters, and potential collision result as the main impacts produced by maritime traffic in the marine environment. Maritime traffic and naval activities produce chronic acoustic pollution, which may affect the marine environment over large coastal and offshore areas, and cause physical and acoustic disturbance that may affect commercial fish stocks values, with potential conflict with fisheries, and target species for protection policies. Many marine mammals, as well as other marine animals (e.g. turtles, fishes), are particularly sensitive to impacts from continuous and/or impulsive of shipping noise that could mask biologic low-frequency sounds (i.e., sound used for communication, mating, reproduction or foraging activities) or limit their capability to detect hazards (IUCN, 2008; Notarbartolo di Sciara et al., 2017). Coastal regions are generally the areas where anthropogenic noise reaches the highest levels (e.g., Dos Santos et al., 1995), due to continuous, intense and heterogeneous maritime traffic (from commercial, passenger, fishing, touristic, etc. vessels) (Roussel, 2002).

All the above claims for a constant environmental monitoring, also aimed at filling existing knowledge gaps (e.g. distribution and behaviour of turtles and marine mammals), improving systems for maritime safety and response to marine pollution, fully implement existing international regulations (MARPOL Convention, Prevention and Emergency Protocol (2002) under Barcelona Convention and related Regional Strategy).

4.3.3 COASTAL AND MARITIME TOURISM

Sicilian coast

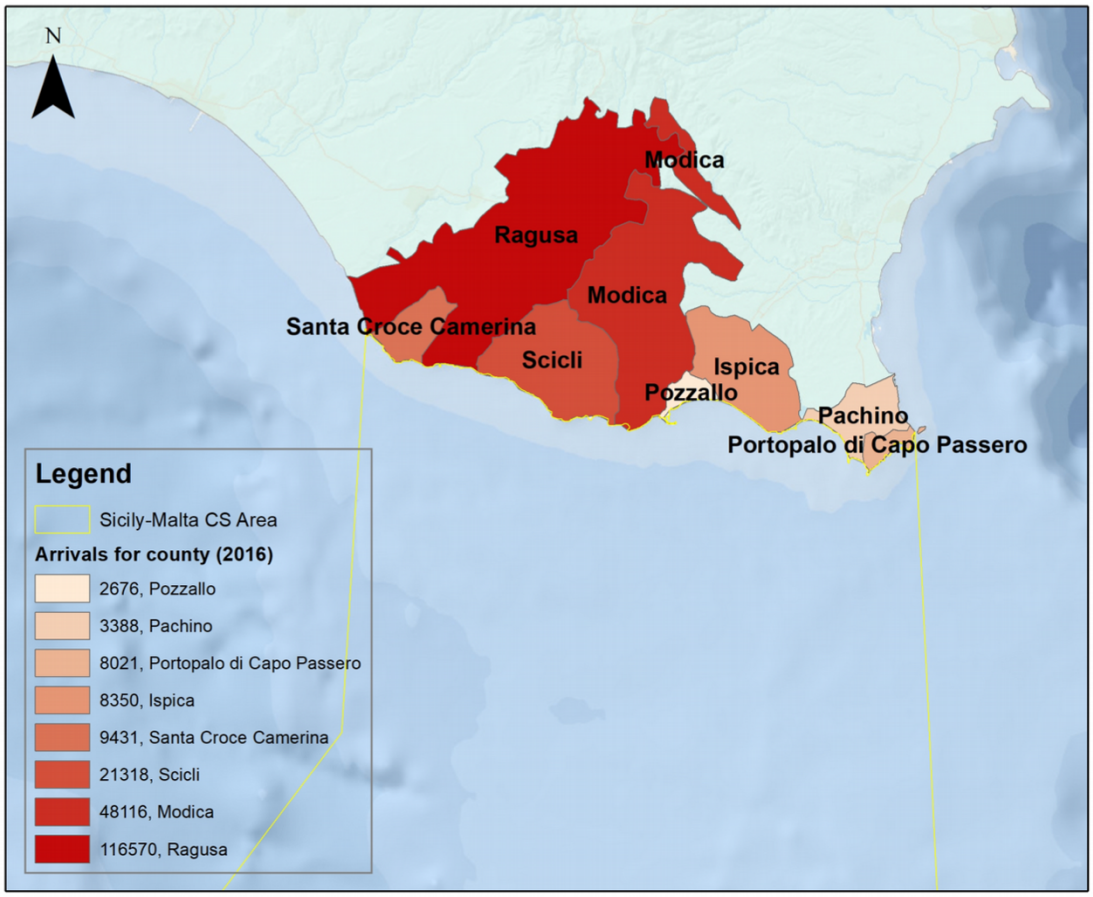
Seaside tourist flow has overall increased over the last 10 years in the CS area (fig. 24) after the economic crisis of 2008.
Sicily coast remains an important tourist's destination within the Mediterranean context in particular in summer period. Tourists both from Italy and foreign countries are attracted by Sicilian coast natural and cultural heritage. Tourism sector in Sicily has great potential for further development. Still, tourism in the entire Sicily Region, although of great importance, represents only 4 % of the regional GDP (10,3 % of the total Italian GDP, 2013).[12]

For these reasons the Sicilian region has promoted a Strategic Plan for Touristic Development 2014-2020[13] recognizing the economic and development potential of tourism in the region. The plan is divided in two triennial programmes (2014-2017; 2018-2020) which draw the necessary steps and interventions needed to promote tourism in the area. It states clearly which are the shared objectives, the system of indicators to evaluate and measure the achievement of such objectives and a list of needed interventions. The general objective of the Strategic Plan is to set the conditions necessary for tourism development in order to make a contribution to the regional economy similar to pre-crisis levels and to ensure that the economic impact (direct, indirect and induced) of tourism at the end of the period considered (2020), will increase between 6% and 7% of the regional added value.

The three Axis of intervention are:
1. AXIS 1 – Marketing actions (place branding), aimed at strengthening the tourist reputation of the region, to bring the tourist experience to expectations (quality) and to define an image of diversified offer.
2. AXIS 2 - Actions on the touristic offer (place making), finalized to the realization of touristic infrastructures that private companies are not able to offer and, above all, to improve the quality of the landscape intended as "setting" where the tourist experiences are carried out.
3. AXIS 3 - Measures to improve the competitiveness of companies, aimed at removing obstacles to dimensional growth and innovation.
The plan recognizes that coastal areas of the region as the main touristic hot-spots in the region attracting different "touristic typologies" as: coastal and maritime tourism; wellness tourism; conference tourism; natural tourism; and enogastronomic tourism.

12 ECONOMIC, SOCIAL AND TERRITORIAL SITUATION OF SICILY. DIRECTORATE-GENERAL FOR INTERNAL POLICIES; POLICY DEPARTMENT STRUCTURAL AND COHESION POLICIES.
13 PIANO STRATEGICO DI SVILUPPO TURISTICO 2014-2020

In the Sicily Coast within the CS Area tourism has a great potential to be developed in the near future, due to the good level of integrity of the coastal area, its landscape and natural resources; in this perspective enhance the development of sustainable ecotourism should be the best option to ensure sustainable development of the territory in the short and long term both from an ecologic and socio-economic point of view in line with the Strategic Plan promoted by the Region.
In the entire Sicily Region there are 48 ports (18.2 % of all Italian ports, 2013) and the main airports are situated in Catania, Comiso, Palermo and Trapani.



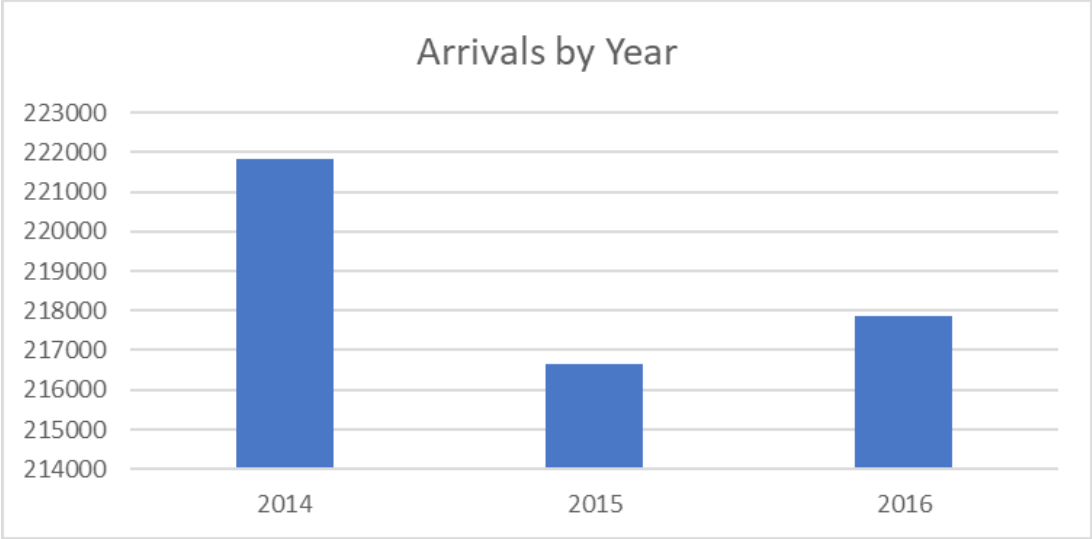


Figure 27 - The map shows the relative amount of arrivals for each county within the CS area on the Sicilian Coast. The graph shows the annual number of arrivals registered between 2014 and 2016 for all the coastal counties included within the CS Area on the Sicilian Coast. Source: Istat, 2016

The study area is compromised in the Touristic District of the Iblei[14] (fig. 28), a consortium which promotes the visibility and attractiveness of the area through specific projects. The area is also part of three touristic thematic districts: the South-Est district, the Fishing Tourism and Culture of the Sea district and the Maritime Villages district underlining the strong maritime identity of the area (fig. 29).

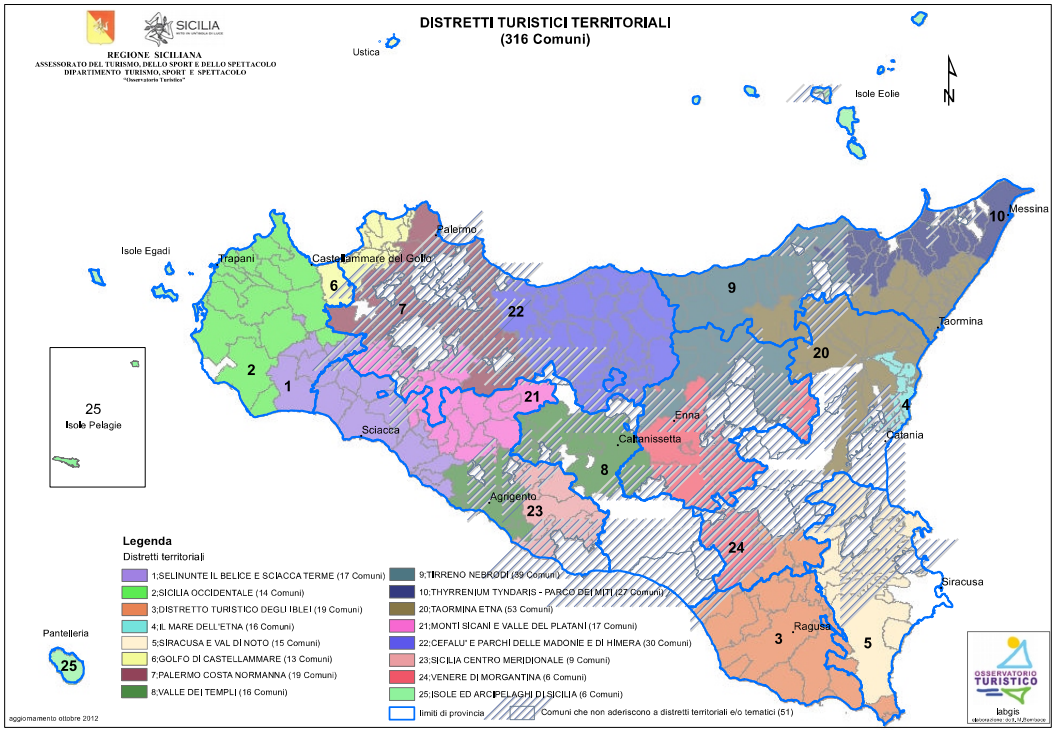


Figure 28 - Territorial touristic districts of Sicily

14 DESTINATION MANAGEMENT ORGANIZATION, Regione Sicilia

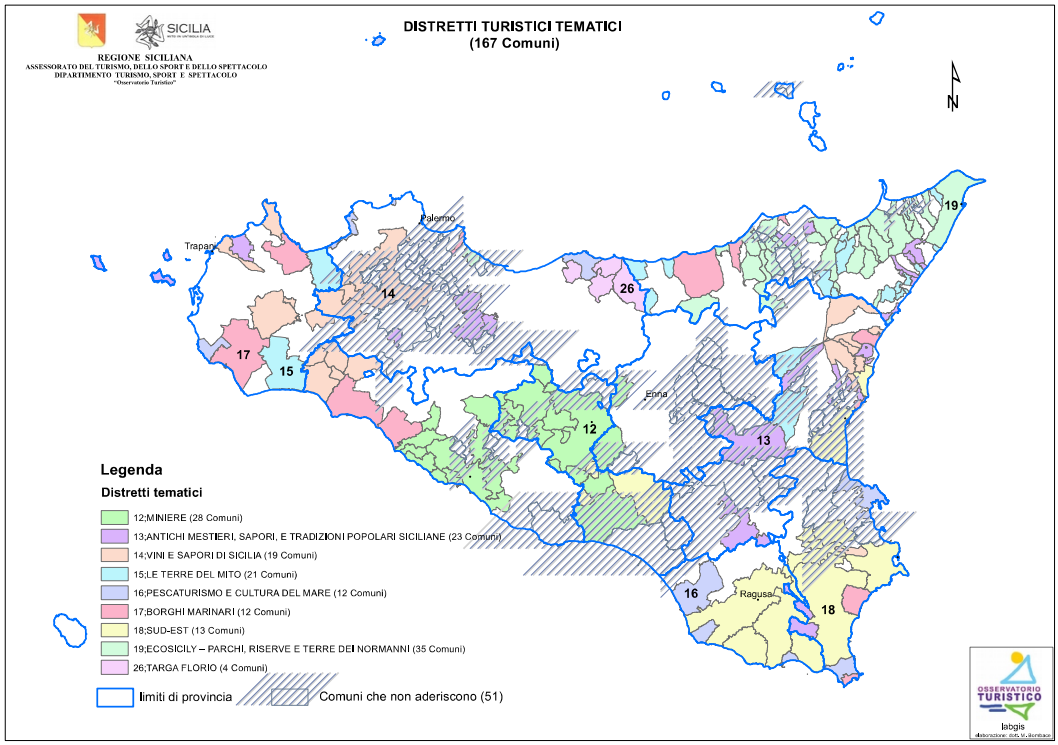


Figure 29 - Touristic thematic districts of Sicily

The Case Study coastal area is typically composed by sandy beaches alternated to rocky headlands. Small urbanized areas are found on the coast which correspond to minor ports; agriculture is the main activity that extends landwards from the coastline (fig. 30).

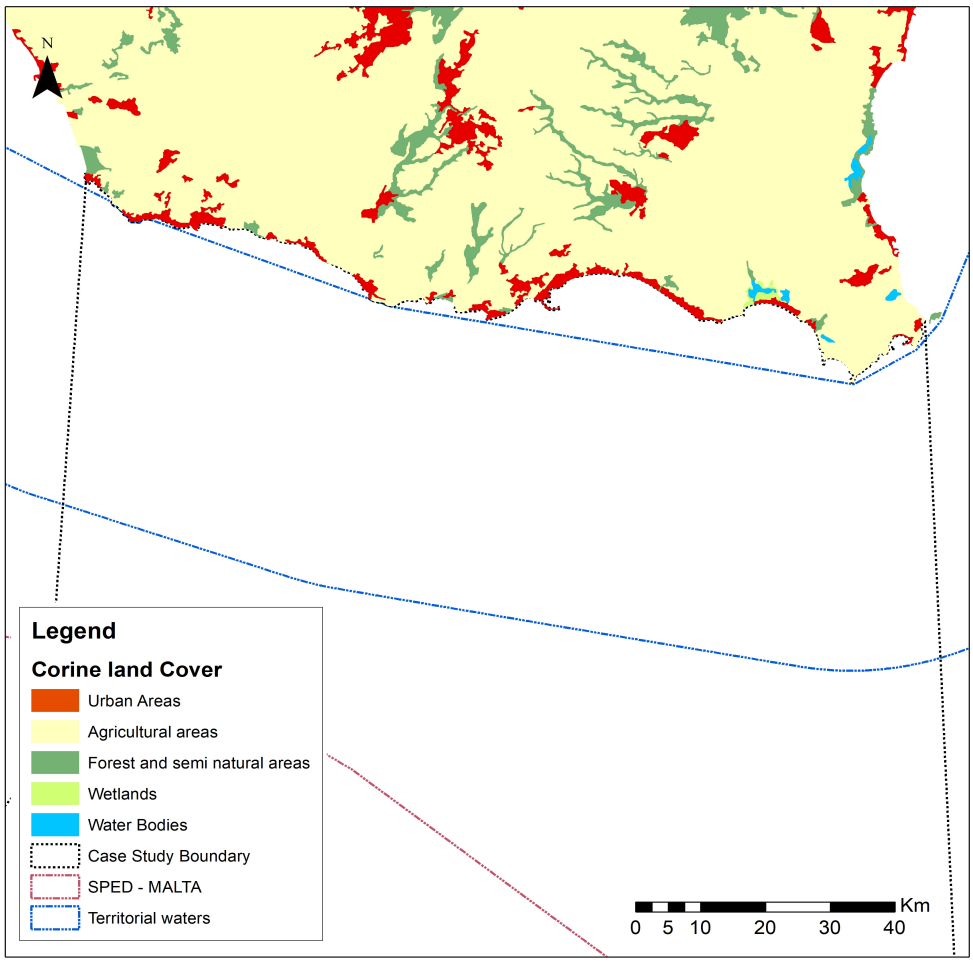


Figure 30 - Land cover of the Sicilian Coast within the CS Area

Within the CS Study area on Sicily Coast, there are three ports: Pozzallo, Porto Palo and Marina di Ragusa ports. In these ports the main problem is due to the shallow bottom of the port which should be constantly dragged to ensure the passage of ships; the renovation of docking facilities should also be improved in order to enhance the transport sector in the area in particular concerning transport of people. Pozzallo is the main port and includes both a commercial area and an area specific for fishing. From Pozzallo, regular connection with Malta are ensured through passenger ferries and new passenger station is expected to be completed in 2018, together with further interventions that are expected in the future to increase the operability of the port and to limit the sediment import. These interventions should allow an increase of the container traffic by 25%. A second ferry should be made accessible for passenger transport in order to allow a more frequent connection between Sicily and Malta, this should support the expected increase in transport of vehicles between the two islands.

Marina di Ragusa is a port mainly dedicated to tourism activities where most recreational boats moor. However, the formation of a sandy dock, due to sediment import from currents, at the entrance of the port caused the interruption of ships passage. Porto Palo is mainly a fishing port.

Diving centre are present in the area. Among their activities is included the visit of ship wrecks, one main ship wreck in the area is a byzantine ship recently found in front of Punta Secca (Ragusa Province)[15]. While fishing is a main activity along the Sicily Coast, fishing tourism is a marginal activity and have large potential to be further developed. Pozzallo is a landing spot for swordfish, a species with a high commercial interest that also represents an attraction for gastronomic tourism.[16] Tourism and local development agencies are considered to be the major drivers of future development. Ecotourism should be enhanced together with preservation of the environment and local traditions (e.g. artisanal fishery), mitigation of erosion risk and burial of ports, enhancement of natural protected areas implementation and their effective management.[17] This should be achieved through an effective management of the coast and the sea in conditions of compatibility with the potential development of coastal sustainable tourism. Coastal management actions in the area should focus on specific objectives such as: order and cleanliness, reduction of coastal pollution due to anthropogenic drivers, careful assessment of the environmental impact of off-shore extraction activities, etc.).[18]

Synergies

Among the main potential synergies identified between tourism and other activities there are:

- Tourism with traditional fishery and aquaculture (fishing tourism);
- Tourism and marine traffic through the improvement of the sea-based connections to allow tourism flow between South-Est Sicily and Malta;
- Tourism and coastal and marine protected areas, by effectively managing and valorising the local natural heritage;
- Tourism and underwater cultural heritage, fostering the sustainable management of diving activities in underwater areas with archaeological importance.

Conflicts/Criticalities

Among the main potential conflicts identified between tourism and other activities there are:

- Tourism with hydrocarbons extraction, which may have negative impact on the natural integrity of coastal area;

15 https://qui.uniud.it/notizieEventi/ricerca-e-innovazione/prima-campagna-di-archeologia-subacquea-in-sicilia

16 Stakeholder meeting (Ufficiale della Capitaneria di porto)

17 Stakeholder meeting (Giuseppe Ciraolo; Università di Palermo)

18 Stakeholder meeting (anonimous questionary)

- Tourism and waste management, since inappropriate management of urban waste and waste produced by touristic activities themselves (e.g. litter) can impact on the coastal and natural environment both in ecological and aesthetic terms;
- Tourism and overfishing; the relation of fishing and tourism is important in the area which has a high gastronomic attractiveness for its fish products, thus effective management of fishing resources should be ensured by, for example, protecting the main breeding areas of overfished species of high commercial value;[19]

Main criticalities in the area for the development of touristic activities can be ascribed to the poor competitiveness of the touristic enterprises in the area; the need of touristic infrastructures and the poor governance.

Tourism in Malta

The tourism industry in Malta is one of the major economic sectors. Leisure and recreation in Malta include free of charge activities such as bathing sites and also other touristic activities. A substantial part of tourism activity in Malta entails sea-based entertainment, however tourists make use of the sea both directly, in the activities they engage in, as well as indirectly, since the pleasure reaped in consuming certain goods and services are greater when the sea is accessible and visible.

Cruise Liners

Cruise liner and ferry passenger terminal in Valletta started to operate in 2001. The number of cruise liner calls and cruise passengers is increasing as years pass which is also why the terminal needed to be extended. The extension resulted in a continuous 308m berth with a total quay length of 1,383 metres. The quay can accommodate larger vessels thus catering for the demand of the industry.

Yachting

Malta is a famous spot for yachting since it is located in the central Mediterranean, a location en-route to the main cruising grounds, and also provides a number of high end marinas. Yachting also contributes to the economy since it brings benefits to a range of economic sectors, particularly the tourism sector. The number of requests for local berthing has also been increasing during the past years, as a result of which there is growing demand for additional berthing spaces, which need to cater for both locally registered and visiting yachts. Malta currently has six permanent marinas which are at Msida, Ta' Xbiex, Mgarr (Gozo), Portomaso, Manoel Island and the Grand Harbour. Two types of marinas have been identified: (1) temporary marinas, which would consist of

19 Stakeholder meeting (Giovanni Grimaldi; Libero Consorzio comunale Siracusa (ex provincia))

temporary pontoons accommodating between 50-100 boats in the summer period, which pontoons would be stored away on land during the winter months, and (2) permanent (all weather) marinas which are able to offer the usual, high standard berthing amenities. Such a development may potentially lead to negative impacts on the marine environment in terms of increased scope for recreational fishing, and contamination of the marine environment connected to these new berthing facilities unless properly regulated.

Scuba Diving

Scuba diving consists of both market and non-market recreational use. It is famous with both local and foreign divers due to warm waters, good visibility and underwater scenery, leading to an increase in dive schools across Malta and Gozo. Scuba diving also attracts tourists to Malta with the sole purpose of scuba diving. The Diving Master Plan of the Malta Tourism Authority, one of the aims of which was to develop a strategy for the diving sector for mainland Malta, describes the dive sites on the island. This Master Plan states that there are 29 popular shore dives spread throughout the island, served by 21 access points and 15 popular boat dives. Shore dive attractions vary from wrecks to unusual and spectacular features of the marine topography. Boat dives are still located close to shore with main attractions constituting specific morphological features, such as overhangs and arches, and boat wrecks, which have either been scuttled in recent years for diving purposes or constitute historic wrecks. Scuba diving is however considered to be the main source of pressures on the submerged portion of emergent sea caves and underwater caves. Diving may cause both mechanical damage to erect sessile forms growing in caves, and death of the biota on the ceiling due to trapped air bubbles from diving cylinders.

Recreational Boating

Recreational boating is quite intense for the Maltese islands, particularly in the summer in enclosed bays. In view of potential conflicts between the use of bays by bathers and boaters, swimming zones are designated on an annual basis. With the exception of one anchoring zone designated on a yearly basis in Comino, there are no other anchoring zones or no-anchoring zones in the Maltese islands. Anchoring may also lead to certain pressures on the seabed. Such impact would generally affect enclosed inlets and bays.

Recreational Fishing

A large percentage of registered fishing vessels are recreational or non-commercial vessels (Registration C). Recreational fishing practices include coastal fishing such as bottom lining, surface trolling and jigging from small boats, as well as shore fishing. Offshore recreational fishing generally targets fish such as albacore, swordfish, sailfish and amberjack.

Bathing

Swimming zones in Malta are designated yearly by Transport Malta and are delineated by a marker buoys and ropes. Nothing that endangers bathers' safety is allowed within these delineated areas such as boats and sea craft. Also, other coastal bathing waters are monitored as part of the requirements of the Bathing Waters Directive. However, recreational activities constitute the major threat to sandy beaches in Malta, although the effects of anthropogenic disturbance on beaches are unknown at this stage. In view of their recreational use, beaches are regularly cleaned. Although the degree of impact of such activity is largely dependent on the mechanisms used, it is considered to be a potential source of disturbance to the beach fauna.

Potential synergies and conflicts

The development of harbours and port areas to accommodate most of the infrastructure for the major maritime transport activities has provided scope for improved management of port facilities thus reducing the potential environmental impacts arising mainly from waste management and potential contamination through fuel supply operations.

The main conflict that can potentially arise at the coastal level is the intensification of uses within the coastal areas and increased traffic particularly with increased berthing spaces of temporary marinas.

4.3.4 ENVIRONMENTAL PROTECTION

The ecological importance of the Strait of Sicily, both for the high level of biodiversity and the geographic location – combined with its vulnerability to human pressures – underpins the considerable awareness for its conservation and sustainable management (Notarbartolo di Sciara et al., 2017).

The Case study area fall within the Strait of Sicily and Tunisian Plateau complex, recognised with the identification of the Ecologically or Biologically Significant Area (EBSA, Convention on Biological Diversity) “Sicilian Channel”, ranking high for the criteria “special importance for life-history stages of species”, and as Cetacean Critical Habitat (CCH) by the countries of the Mediterranean within the Convention on Migratory Species (CMS). The area is of primary importance for marine mammals as a winter feeding ground for fin (Balaenoptera physalus) and sperm (Physeter macrocephalus) whales and there are resident populations of bottlenose (Tursiops truncatus), striped (Stenella coeruleoalba) and common (Delphinus delphis) dolphins. One candidate Important Marine Mammal Area (cIMMA) has been identified in the waters surrounding the Maltese Islands for dolphins (Regional IMMA Workshop, Crete, October 2016), and together with one of the important cetacean areas agreed by ACCOBAMS Parties in 2007, are partially overlapping the CS area and indicating a high frequency of common dolphin sightings. The CS area fully fall within one of the eight proposed MPAs recommended by the ACCOBAMS Scientific Committee as part of the Mediterranean Common Dolphin Conservation Plan.

Caretta caretta (Loggerhead sea turtle), is a priority species within the EU Habitat Directive (Annex II and Annex IV). The Strait of Sicily appears to represent one of the oldest known nesting sites in the Mediterranean, with important nesting sites along the Sicilian coast (Mingozzi et al., 2007; Casale et al., 2014). The area has great ecological importance for loggerhead turtle feeding and breeding in the Mediterranean region, yet it is also an area where serious threats to this species exist, mostly from fishing activities (Ullman and Stachowitsch, 2015). Within the CS area is the Important Bird and Biodiversity Area (IBA) of the Malta-Gozo channel (https://maps.birdlife.org/marineIBAs/default.html). Considering the area also important for many elements of biodiversity, a proper marine conservation plan should be enhanced to ensure the protection of the structure and functions of the supporting ecosystems.

A wide and transboundary managed area should be taken in account to reduce the full set of pressures on high valuable species such as cetaceans and with wide distribution in the whole Strait of Sicily, including national and international waters. Protection needs should foster conservation measures including strong sectoral regulations to reduce impacts on marine mammals and turtles

(e.g. on maritime traffic, fisheries, hydrocarbons search and exploitation, sources of pollution and marine litter; Fortuna et al., 2015) and with a proper spatial planning aimed to reduce the spatial interactions between human activities and the considered species.

Italian sub-area

The analyses on the Sicilian coastal areas show how Italian CS waters, as the whole Southern coasts of Sicily, are characterized by a high heterogeneity in benthic communities along the continental shelf (Di Lorenzo et al., 2016), featuring environmental components that are the object of specific conservation policies provided from MSFD descriptors 1,3 and 6). *Posidonia oceanica* meadows and other seagrasses (e.g. *Cymodocea* beds) along the south west coasts are considered among the largest of the Mediterranean (Badalamenti et al., 2011). CEA analysis shows that seagrasses in Italy are affected by lower cumulative impacts than those along Maltese coasts. Thus, these results could be underestimated because of the lack of spatial data on other potential sources of pressures on seagrasses, such as artisanal fisheries efforts and potential land-sea interaction derived from coastal activities (e.g. pollutant run-offs, changing in thermal and sedimentary regimes). In particular, the increasing coastal urbanization is causing rising impacts on fragile coastal habitats such as P. oceanica meadows (Di Lorenzo et al., 2016).

Coralligenous communities, made up by complex assemblages of algal and animal constructors, characterize the circalittoral habitats along both the Sicilian and Maltese coasts. Spatial data on coralligenous have become increasingly available, but the lack of fine scale, observed and homogeneous data (Martin et al., 2014) for the CS area probably caused an underestimation of the potential cumulative pressure in the CEA model on rocky bottom and coralligenous assemblages. Still, coralligenous assemblages highly contribute to the structure of the circalittoral and bathyal rocky bottoms in the area, enhancing biodiversity and providing important ecosystem services including ecological niches, nursery areas, food and substrate for a variety of organisms.

The known presence of such valuable habitats underpins the lack of protection measures in the Italian CS waters. The national and international strategies require the implementation of the protected areas network in the CS area (Marine Protected Areas, Natura 2000 sites and Biological Protection Zones) according to national and international conservation priorities (e.g. for the maintenance of biodiversity, MSFD descriptor 1), according to the protection needs foreseen for habitat and species that insist in the area. The objective of fulfilling the MSFD Good Environmental Status (GES) for descriptor 1 includes the need of moving towards protecting the 10% surface coverage by 2020 implementing the network of representative marine protected areas. The enhancement of the Natura 2000 Sites of Community Interest (SCIs) network and the completion of the designation of local SCIs in Special Areas of Conservation (SACs) with adequate

management, with a strong connection between land and marine sites, represent a critical opportunity for a proper protection of habitats according to the Habitat directive (e.g. *Posidonia* beds, coralligenous) and *C. caretta* nesting and breeding areas, severely endangered by increasing urbanization and touristic presence.

Several activities, such as fisheries and coastal tourism may result subjected to limitation (e.g. reduce/eliminate the most destructive fishing practices, reduce accesses to high valuable areas) within the boundaries of new protected areas. However, marine protected areas are widely recognized as fundamental regulative and planning tools that, in presence of proper planning options, may pursue goals of environmental protection (e.g. protect target habitat or species) and cultural and historical conservation while fostering the sustainable uses in the area (e.g. ecotourism, historical artisanal fisheries, recreational diving and fishing).

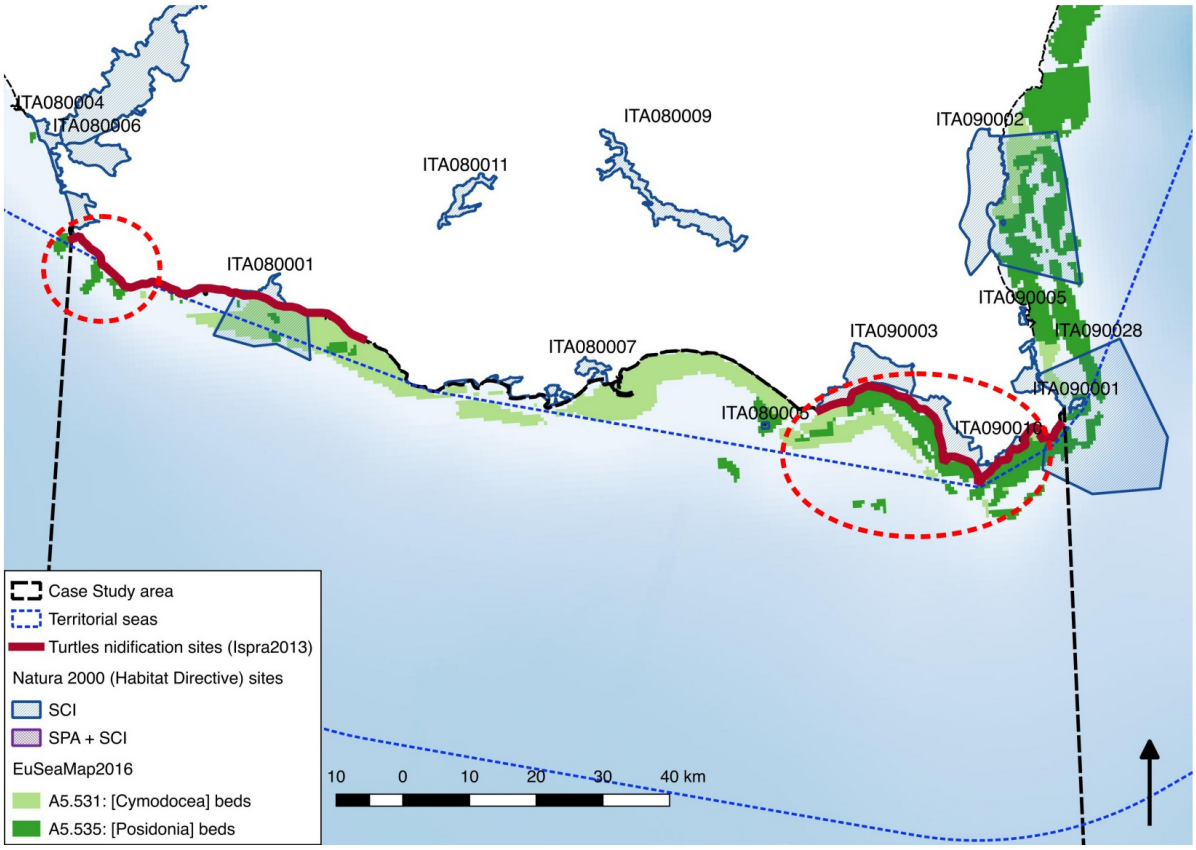


Figure 31 – areas for potential expansion of SCIs network along Sicilia coasts.

Malta sub-area

Malta has 14 designated Marine Protected Areas, and six of these areas are located within the case study area. These six marine protected areas, found on the North East part of Malta, include the protection of seabirds, benthic habitats, turtles and dolphins.

Action towards the development of Management plans for these MPAs is currently ongoing. Such plans are expected to address pressures from fisheries, chemical contamination, accidental collision with marine mammals, underwater noise and marine litter.

4.3.5 OIL & GAS

The potential expansion of oil and gas operations, including proposed cable and pipelines, could lead to serious conflicts with other sectors. Conflicts with other human activities may arise both for spatial competition and for a wide set of potential environmental pressure (e.g. possible direct pressures from seismic surveys and all other sources of noise pollution). In consequence, any further expansion needs an adequate planning and effectual governance system, supporting sustainable development and proper transboundary cooperation.

The Italian portion of the CS area falls within the marine zone C defined by Law No. 613/67 for the licenses of exploration and exploitation of hydrocarbons in the offshore, granted by the Ministry of Economic Development. The C area feature a total of 30 producing wells and 5 platforms. Within the area is present the Vega field (permit C.C 6.EO), 22 km south of Pozzallo (RG), in production since 1987. Two adjacent research permits granted to Northern Petroleum insist in the area, C.R146.NP (suspended until the finding and availability of a suitable drilling rig) and C.R149.NP (see CS Initial assessment sez. 3.4).

South-Western Sicily may host further hydrocarbons research and exploitation activities during the next years. The Decree Law 12 September 2014, n. 133 (known as “Sblocca Italia” decree), converted with amendments from Law 11 November 2014 n.164, define the exploration, research and cultivation of hydrocarbons and underground storage of natural gas as activities of "strategic interest and public utility”. The possible expansion of oil research and exploitation operations in the CS and in neighboring areas (Italian zones C and G; Maltese waters) could lead to increasing conflicts with other sectors, such as maritime transport, commercial fishing and environmental protection.

An important conflict may arise for space competition with fisheries and maritime transport. According to the Legislative decree 145/2015, transposing Directive 2013/30/EU on maritime safety in the hydrocarbons sector, a "safety zone" with a radius of 500 meters from the facility is established, which prohibits the entry and holding of ships. In order to reduce conflicts with coastal activities and protected areas, article 35 within the Decree 83 (22/06/2012) sets the prohibition of research, prospecting and cultivation "within the boundaries of marine and coastal areas under any form of environmental protection under regional, national or international laws and conventions". This prohibition also applies in maritime areas within 12 nm from the coastline and from the outer boundaries of the said protected marine and coastal areas. Potential effects on protected species, such as sea turtles and cetacean, may be observed in presence of hydrocarbons research and exploitation activities. Considering the known presence of marine mammals and turtles, as one of the main feeding ground for Fin Whales in the Mediterranean basin, the needs of

protection are particularly compelling. One of the main direct pressures comes from seismic surveys and all other sources of noise pollution that can induce behavioral changes and consequently lead to direct or indirect mortality (Notarbartolo di Sciara 2014; Monaco et al. 2016). The "Guidelines to address the impact of anthropogenic noise on cetaceans in the ACCOBAMS area" prescribe the use of visual and acoustic detection of marine mammals in areas subject to seismic explorations as a precautionary approach. Chemical pollutants and marine litter introduced at sea thought gas and oil platforms and related activities (maritime traffic, accidental dispersions, underwater pipelines, etc.) constitute a potential threat to the environment, including protected species and commercial fish stocks. The Strait of Sicily is one of the most important traffic lane for crude oil crossing the Mediterranean, with a concentration of oil tanker traffic close to the 80% of the total in the whole region. For this reason, the area is considered at very high risk of pollution, due to potential accidental losses and/or operational discharges of oil or oily residues and mixtures from ships (Patruno, 2008), which should be adequately prevented through adequate planning, proper management and continuous monitoring, in line with the existing international regulations (MARPOL Convention, Prevention and Emergency Protocol (2002) under Barcelona Convention and related Regional Strategy).

Cables and Pipelines in Malta

Electricity generated by the power stations situated on the main island of Malta is distributed throughout the islands of the Maltese archipelago by underwater cables. Power cables are thus laid in each of the two channels between Malta and Comino, Comino and Gozo for electricity supply. The Malta-Italy Interconnector, inaugurated in April 2015, comprises a 120-kilometre high voltage alternating current (HVAC) system capable of bidirectional flow of electrical power, transferring 200MW of electricity. Fuel and Gas pipelines are located in Marsaxlokk harbour and are used to transfer fuel from designated points within the bay to a number of land based installations. The main companies who use these pipelines are Enemed Company Ltd, which was established in 2014, and San Lucian Oil Company Ltd. The Enemed Company Ltd. owns seven submarine pipelines linking its fuel storage facility in Ħas-Saptan to a dolphin (a platform on concrete pylons) in Marsaxlokk Bay. There are five pipelines for fuel (gas, oil, kerosene and petrol), one for fresh water and one for ballast water, although the latter is no longer in use. San Lucian Oil Company Ltd., operates three sub-aquatic pipelines (2 of which are looped in one pipeline) for transfer of fuel oil, light cycle oil and gas oil between vessels and its facility in the San Lucian area in Marsaxlokk. Liquefied Petroleum Gas (LPG) is also transferred via pipeline from supply vessels moored at designated buoys within Marsaxlokk Bay to the nearby plant located on the coast in Qajjenza, Birżebbuġa. The underwater pipelines in recent use comprise a twin pipeline – one for

vapour, one for liquid - laid on the seabed and cast together in concrete. The three major Maltese telecommunications have in recent years laid underwater cables linked to Sicily. This reflects the increase in demand for the provisions of the latest technologies for televisions, broadband Internet, mobile and telephone.

Potential conflicts that may arise from the intensification of maritime traffic in the vicinity of the landing places include damage to cables from anchorage. The laying down and maintenance of pipelines and cables on the seabed is generally associated with localised and short-term adverse effects. However the nature of the effects also depends on the type of benthic habitats affected. Some benthic habitats, such as macro algae, generally recover and are able to recolonise the disturbed areas. Apart from the localised physical loss of habitat and species associated with the footprint of the cables/pipelines, the main impacts are related to physical disturbance of the seabed substrata through resuspension of sediments and increased turbidity. Resuspension of sediments may also occur during the removal of pipelines as a result of damaged or aging pipeline and cable infrastructure.

4.3.6 AQUACULTURE

A keystone of the FEAMP fund is to boost the aquaculture sector in a competitive, profitable and sustainable way. The improvement of sustainable aquaculture (including offshore aquaculture) is considered a pillar within the Blue Growth EU policies. Proper space planning for the development of new sites is particularly compelling in areas featured by intense fishery activities. Space competition may occur without proper planning of the co-location with other activities. The Strategic plan for aquaculture in Italy 2014-2020 has as its primary objective the sustainable development of aquaculture activities to create economy, employment and social benefits. The importance of aquaculture in the fishery sector has increased over the last 20 years, especially given the reduction of about the 40% of fishing effort. A growing demand for fish products is shown worldwide (FAO, 2017 – Fisheries and Aquaculture Statistics) together with a decrease/stability of fish catches. This requires new sustainable aquaculture products, improving productivity, quality and environmental sustainability, also by allocating the farms offshore. The development of the farms offshore allows using innovative technologies (enhanced structures with greater dimensions than the current ones) for growing mussels and the minimization of impacts on the coastal environment (environmental impact due to the plants, visual impact).

The general potential conflict between fishing and aquaculture is mainly tied to spatial constraints and economic competition. The reduction of areas dedicated to fisheries and the sharing of common markets are usually perceived as a strong conflict by fishery operators, already in economic contraction. According to the Strategic Plan, the increase in aquaculture, together with sustainable artisanal fisheries, can be an example of synergy with the widespread coastal tourism through the development of complementary activities, including recreational fishing, environmental services, food and gastronomy sector and ecotourism.

In Sicily, aquaculture sector is mainly characterized by finfish but also shellfish production is present. Until 2010, the aquaculture sector in Sicily guaranteed over 15% of national production; subsequently it suffered a sudden collapse, which led to the closure of more than 50% of the farming plants. Data referred to the year 2013 (Strategic Plan for aquaculture in Italy 2014-2020), indicate the presence of 13 plants active in the regional territory.The mollusc farming in Sicily is represented exclusively by four plants, only dedicated to the housing of mussels. Nowadays, no aquaculture plants are in the Italian waters of the CS area. Potentials for new sites in the area are under analysis (Regione Sicilia, 2008), even if the combined presence of protected habitats and unfavourable hydrodynamic conditions disadvantaged new installations.

The aquaculture industry has evolved over the last 20 years and at present there are six farms operating marine cage culture facilities at nine sites around the Maltese Islands. The production of

the aquaculture industry in 2014 amounted to 4 900 tonnes valued at USD 56 million and the total volume of fresh fish sold amounting to 6 881 tonnes. Farmed species included mainly bluefin tuna (capture-based), seabass and seabream, with sea bream accounting about 65 percent of the total output. All farm owners have aspirations to develop their businesses further, especially if based on alternative species cultured from bred stocks, such as meagre, amberjack and bluefin tuna (Fao, 2018, http://www.fao.org/fishery/facp/MLT/en)

Aquaculture in Malta is marine-based and consists of the capture-based culture of the Atlantic bluefin tuna (*Thunnus tyhnnus thynnus*), as well as the culture of European sea bass (*Dicentrarchus labrax*) and Gilthead Sea bream (*Sparus aurata*). The aquaculture industry has evolved over the last 30 years and at present there are six farms operating marine cage culture facilities at nine sites around the Maltese Islands. Cages used for the culture of sea bass, sea bream and meagre are located approximately one kilometre offshore, while tuna farms were originally situated approximately 2km offshore, with two tuna pens located within the Aquaculture Zone 6km off the south eastern coast of mainland Malta. The Maltese aquaculture sector is highly competitive for space and resources due to the small territory. A long-term aquaculture strategy for Malta has been published for the assessment of the current and future situation of aquaculture in Malta. The main conflict with aquaculture arises from the recreational and tourism sector. All the farms established since 1992 have been subjected to a permitting procedure which included an EIA. Following public outcry as a result of fish feed and oil reaching coastal areas, enforcement action in 2016 and revocation of planning permits, all tuna cages had to be relocated. In 2017 two operators located along the southern coast of Malta have relocated to the Aquaculture Zone. Another operator located 2km offshore in the north of Malta has been temporarily relocated further offshore along the north of Malta.

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4.4 TRANSBOUNDARY ISSUES

Considering the findings from data analysis and the limitations outlined, it is still possible to extract an understanding of the types of issues that need to be considered when attempting to deliver Maritime Spatial Planning in accordance with the provisions of Directive 2014/89/EU.

Since the MSP Directive is applicable within a Member State's marine waters, the required marine spatial plans can be developed and implemented within each Member State's jurisdiction consistent with the UNCLOS. Marine spatial plans are aimed at creating opportunities for economic growth at sea, with minimal user conflicts, through an ecosystems-based approach and must take into account land-sea interactions. Acknowledging that the marine space is more fluid and marine ecosystems do not follow administrative boundaries, the MSP Directive calls upon Member States bordering marine waters to cooperate with the aim of ensuring that maritime spatial plans are coherent and coordinated across the marine region concerned. Such cooperation shall take into account, in particular, issues of a transnational nature (Art 11).

Therefore, whilst every Member State can create its own MSP plan to drive blue growth, it is necessary that such initiatives are not detrimental to the aspirations of neighbouring Member States. Coherence and co-ordination across a marine region also provides an opportunity for greater effectiveness and efficiency in the delivery of blue growth for each concerned Member State. The CS area offers an interesting scenario where the marine waters being considered are bordered by islands with very different political, economical and social contexts. On the northern boundary, there is the south eastern coast of largest Mediterranean island of Sicily which forms part of the much larger Sovereign State of Italy. This Sicilian coast is characterised by the dominant presence of agricultural activities where urban development is contained within the proximity of coastal towns and settlements with fishing harbours, beaches, marinas, and the port area at Pozzallo. The maritime space is used for shipping, hydrocarbon extraction and fisheries. On the southern part, Malta is a small archipelagic Sovereign State with the highest population density in Europe, where major economic and infrastructural development has always relied on coastal and marine space due to the country's insular nature. The stark difference in intensity and diversity of maritime use within the CS area is primarily a result of the political status of the bordering coasts. It is evident from the assessments carried out that, with the available information, the main MSP issues at present are largely contained within the respective country's marine waters. The main MSP transboundary issues that may be identified relate to:

(a) the impacts from maritime activities on environment protection;

(b) impacts from potential increase of maritime activities on the environment and on other uses, both at sea and within the land-sea interface on the coast.

The key maritime activities that may be influencing the quality of the marine environment at a transboundary level include maritime transport and fisheries. Whilst reduction in trawling is likely to occur, the prospect of expansion in recreational fisheries from both coastal areas may still result in fishing activities that maintain, if not increase, pressure on marine resources giving rise to transboundary issues. Should expected trends materialise, in addition to these activities, impacts from increased activities related to coastal tourism, as well as Energy including hydrocarbon extraction are envisaged.

For the purpose of implementing MSP in accordance with the EU Directive, the drivers behind maritime activities and their potential growth need to be understood as well. For example, the significant implications arising from international transport not generated in Malta nor Sicily may be greater than the traffic between the two coastal territories in the CS area. It is yet not clear how MSP can be applied to manage marine traffic, when considering that the MSP Directive is limited to a Member State's marine waters and it must work within the provisions of the UNCLOS. In such a case there is need to determine whether MSP is the most effective instrument to address transboundary effects from maritime transport or whether any other suitable alternative exists. The solution to address the resulting impacts of noise, accidental or illegal dumping of waste may be more appropriately resolved through other measures such as the MSFD marine strategies or international action under the auspices of IMO.

Whilst user conflict may be present within the respective marine waters, particularly in Maltese waters, it has not been identified as a transboundary issue. However if the current scenarios change and should Malta or Sicily for example decide to increase cargo transhipment facilities within their respective coastal or marine waters, the augmented volume of traffic towards these facilities may result in greater intensity of marine vessels within the CS area, with likely implications that could be transboundary. Similarly, should there be a decision to improve inter-island transport between Malta and Sicily for yachting, cruise liners and passengers the resulting infrastructural developments may have localised impacts, but the overall increased marine traffic would then need to be accommodated within an already busy 'marine highway'. The potential for user-conflict at a transboundary level would then become more likely. The greatest influencing transboundary factor on existing and future plans or strategies for blue growth is the ecological value of the marine area within the extent of the CS and in its vicinity as well. The acknowledgement that the CS area is important for the life cycle of various species from avifauna, marine turtles and cetaceans should trigger the need for greater attention within each respective Member State to

evaluate the potential environmental impacts of its future marine plans. The existing designation of marine protected areas creates additional demand for such evaluations. It is here that Recital 23 of the MSP Directive becomes relevant, where the SEA process and other environmental assessments required by Article 6 of Directive 92/43/EEC (Habitats Directive) provide the appropriate support to integrate environmental considerations in the preparation of MSP plans and also provide for transboundary consultations.

In conclusion, the main transboundary issues considered within the parameters of this CS are mainly related to maritime transport primarily that originating from beyond the CS area. The lack of adequate data on all existing maritime activities, and limited data on environmental resources does not permit for a strong conclusion to be reached, however, even in the absence of such information, it is evident from the CEA and MUC undertaken that should blue growth be resolutely pursued, the likelihood for transboundary issues to occur increases, with resulting consequences.

5. PLANNING PHASE

5.1 POTENTIAL FOR GROWTH IN THE ITALIAN AREA FROM A PLANNING PERSPECTIVE

Coastal areas around the globe are experiencing increasing pressures deriving from human activities. Many activities have development interests on coastal zones and one of the major is tourism. Indeed, coastal areas are the most visited by tourists and in many of them tourism represents the most important economic activity. In fact, in the Mediterranean region tourism is the first economic activity for islands like Cyprus, Malta, the Balearic Islands and Sicily. Unfortunately, massive influxes of tourists, often to a relatively small area, as it is in the case study, have a huge impact in terms of environmental and socio-economic transformations. Massive touristic fluxes strongly increase the pollution, waste production, and water needs of the local population, putting local infrastructure and habitats under enormous pressure. Overdevelopment for tourism has the same problems as other coastal developments, but often the impact are greater as the tourist developments are located at or near fragile marine ecosystems. For these reasons, tourism development should be carefully planned to avoid irreversible impacts in a specific area.

In line with the current global trends, one of the main economic activities in the CS area and the most important in terms of growth for the next period is represented by coastal and maritime tourism. Indeed, seaside touristic flow has overall increased in the last 10 years in the CS area after the economic crisis of 2008. For these reasons coastal and maritime tourism in the area represents the activity that has the highest perspective of development and for such can be considered as the main economic driver for the area.

Touristic activities are usually managed at local level (considering that National and Regional strategies are applied locally). From an administrative point of view, in the Sicilian coastline of the case study are present two provinces (Ragusa and Siracusa) and 8 municipalities (Ragusa, Santa Croce, Scicli, Modica, Pozzallo, Ispica, Porto Palo and Pachino) which are interested by the need of a more integrated touristic planning. As described in the chapters above the Italian part of the case study is characterised by a coastal area typically composed by a majority of sandy shores ideal for beach based touristic activities. There are small urbanized centers which correspond to small or minor ports (with the exception of Pozzallo) while the rest of the area is characterized mainly by agricultural activities which extend in the hinterland. Moreover, in the area are present ecological important habitats and natural components as *Cymodocea* and *Posidonia* beds, coralligenous assemblages and the presence of important turtles nesting sites. In consequence, the development of this area urges to be balanced with the needs to preserve the natural capital and in order to

ensure a sustainable growth of the activities while assuring the conservation and maintenance of the GES.

The main pressures of touristic activities in the area are ascribed to the presence of the main ports which act as transport hubs and attractors. In the three port areas of Pozzallo, Portopalo and Marina di Ragusa are concentrated the main touristic activities (passenger traffic and nautical tourism). In the port areas the renovation of docking, port infrastructures and public transport facilities should be improved in order to enhance the transport and touristic sectors. In general, the touristic sector in Sicily has great potential for further growth and development. The Sicilian region, promoting a Regional Strategic Plan for Touristic Development 2014-2020, draw the necessary steps and interventions needed to develop sustainable tourism in the area. This is in line with the international and national objectives which stress the need to attract the development of sustainable, responsible and high-quality tourism. In general, from the assessment and the above analysis, including the cumulative effect assessment and interaction of uses, some main conflicts and synergies have been individuated. Indeed, coastal and maritime tourism in the area can find co-existence and synergies with other uses and activities but, on the other side, some conflicts between tourism and other activities have been identified. Some of the main synergies and conflicts emerged from the assessment and analysis of the CS are:

- Synergies between coastal tourism and traditional fishery and aquaculture (i.e. fishing tourism)

- Synergies between coastal tourism and coastal and marine protected areas, by effectively managing and valorizing the local natural heritage

- Synergies between coastal tourism and underwater cultural heritage, fostering the sustainable management of diving activities in underwater areas with archaeological importance

- Conflicts between coastal tourism and waste management, since inappropriate management of urban waste and waste produced by touristic activities themselves (e.g. litter) can impact on the coastal and natural environment both in ecological and aesthetic terms

- Conflicts between coastal tourism and overfishing - the relation of fishing and tourism is important in the area which has a high gastronomic attractiveness for its fish products, thus effective management of fishing resources should be ensured by, for example, protecting the main breeding areas of overfished species of high commercial value

- Conflicts between coastal tourism with hydrocarbons extraction, which in extreme events may have negative impact on the natural integrity of coastal area.

Furthermore, adopting a long-term vision for the area, some less tangible threats and issues deriving from mass tourism development in the area which could lead to changes of local identity

and values should be taken into account. For instance, the commercialization of local culture can turn local culture into commodities when religious traditions, local customs and festivals are reduced to achieve tourist expectations. Moreover, destinations risk standardization processes in the case of tourists' desires and satisfaction (landscape, accommodation, food and drinks, etc. must meet the tourists' expectation) which damages the variation and beauty of diverse cultures. This would bring to an adaptation to the touristic demands by local craftsmanship and cultural deterioration may occur in the process of commercializing cultural traditions.

A sustainable tourism strategy should be developed based on the information collected but also on a long-term and precautionary vision. It should define priority issues, the stakeholder community, potential objectives and a set of methodologies to reach these objectives. These include:

- Conservation of specific coastal landscapes or habitats that make the area attractive or are protected under nature conservation legislation

- Development of regionally specific sectors of the economy that can be interlinked with the tourism sector (e.g. food and wine, fishing activities)

- Maximizing local revenues from tourism investments

- Enabling self-determined cultural development in the region.

In order to assure a sustainable development of coastal and maritime tourism in the area a specific and inclusive action plan should be drafted. Moreover, the action plan should consider all the relevant stakeholders and disciplines to be involved. For instance, the involvement of administrations at all levels in order to promote cooperation between sectors and of cross-sectorial development models and involving local people in drafting tourism policy and decisions. The involvement of the socio-economic sector could be done by promoting local purchasing of food and building material and setting up networks of local producers for better marketing. The involvement of the environmental sector could be done by improving control and enforcement of environmental standards (noise, drinking water, bathing water, waste-water treatment, etc.) and protecting of endangered habitats through the creation of buffer zones around sensitive natural areas, the prohibition of environmentally harmful sports and the strict application of Environmental Impact Assessment (EIA) and Strategic Environmental Assessment procedures on all tourism related projects and programs. Capacity building should be done through the involvement of academia and research sectors, by training people involved in coastal tourism about the value of historical heritage, environmental management, by training protected area management staff in nature interpretation and by raising environmental awareness among the local population.

The Italian area of the CS presents a high potential for tourism development. But tourism in this area needs to be developed in the most sustainable way possible in order to conserve the natural characteristics of the area which are touristic attractors. The overall and long-term common and holistic visioning of ecosystem-based maritime spatial planning can facilitate the sustainable development of the touristic activities. The touristic attractiveness of this area could help to alleviate the touristic pressures from neighboring areas which are already facing overdevelopment of touristic activities and socio-cultural quality deterioration. Natural assets should be recognized and valorized by touristic activities as fundamental ecosystem service which contribute and sustain economic uses. In this context MSP is a fundamental tool to ensure the development of tourism activities while preserving the ecosystem. It can be used to link the different uses in the area and address the strong seasonality of such activities. In order to achieve all these objectives, the touristic development should be integrated both in land and sea planning frameworks. By incorporating MSP in planning sustainable tourism development strategy at an early stage, prevents damages and expensive mistakes, avoiding the gradual deterioration of the quality of environmental goods and services significant to tourism and avoiding detrimental effect on the quality of the socio-cultural local context. Moreover, MSP can help in enhancing synergies and in avoiding conflicts with other maritime uses. This potential must be supported and managed, guaranteeing its sustainability through a long-term visioning. The following main recommendations can be used to achieve sustainable tourism development in the area:

- Need of a systematic reinforcement of sustainable tourism, reducing the impacts of tourism related structures on the environment (e.g. land use, waste production, marine litter, energy and water consumption)

- Developing cultural and ecotourism in synergy with the adoption of proper protection tools (e.g. MPAs) and develop and incentive fishing tourism

- Extent of coastal tourism offshore with the potential planning of artificial reefs (involving protection and scuba diving activities) and fostering the developing of Underwater Cultural Heritage tourism

- Develop structured inter municipal and regional plans for coastal tourism activities in order to ensure homogeneity

- Safeguard the tourist use of the coasts through the defense against flooding and coastal erosion sustainably

- Improve transport infrastructures and tourism services sustainability

- Develop an effective and innovative marketing on advantages and opportunities of sustainable tourism development

- Establish sustainable and thematic tourist routes, in synergy with productive activities, fostering cultural heritage

- Integrate at the most MSP in tourism planning in order to take into account possible synergies and conflicts with other sectors and the environment.

5.2 MALTA'S MSP PLAN – RECOMMENDATIONS FOR FUTURE UPDATES

The requirements of the MSP Directive

The MSP Directive calls upon Member States to set up maritime spatial plans that identify the spatial and temporal distribution of relevant existing and future activities and uses in their marine waters. An MSP Plan has to contribute towards the sustainable development of the following maritime activities: energy, maritime transport, fisheries and aquaculture, and the preservation, protection and improvement of the environment including resilience to climate change impacts. In doing so, Member States are to take into consideration relevant interactions of activities and uses, such as:

- aquaculture and fishing areas;
- installations and infrastructures for the exploration, exploitation and extraction of oil, gas and other energy resources, of minerals and aggregates, for the production of energy from renewable sources;
- maritime transport routes and traffic flows;
- military training areas;
- nature and species conservation sites and protected areas;
- raw material extraction areas;
- scientific research;
- submarine cable and pipeline routes;
- tourism
- underwater cultural heritage.

The Directive also calls upon Member States that border marine waters to cooperate with the aim of ensuring that maritime spatial plans are coherent and co-ordinated across the marine region concerned, taking into account in particular issues of a transnational nature. Whilst Directive 2014/89/EU provides the basic conceptual components of an MSP plan, the format and level of detail of each MSP plan is dependent on the approach taken by the respective Member State.

Malta's MSP Plan

Malta's first Maritime Spatial Plan forms part of the national spatial strategy that incorporates both land and sea. This document, the Strategic Plan for Environment and Development has been approved by Parliament in 2015. Through the Maritime Spatial Planning Regulations of 2016 under the Development Planning Act (2016) and which transpose Directive 2014/89/EU, the Strategic Plan for Environment and Development or any replacement spatial strategy shall constitute Malta's maritime spatial plan.

In accordance with the Development Planning Act, the spatial strategy regulates the sustainable management of land and sea resources covering the whole territory and territorial waters of the Maltese Islands. It must set out objectives and must ensure that plans and policies issued under

the DPA are spatial, holistic and comprehensive so that all factors in relation to land and sea resources and related environment conservation, are addressed and included and balance demands for development with socio-economic considerations and the need to protect the environment. The spatial strategy must also follow other national policies and plans.

The SPED provides a spatial strategy covering up to 25nm and sets out a policy framework linking the transition between land and sea through the coastal zone. It provides broad guidance for subsidiary plans and decision making on project proposals on the basis of data and information that was available at the time of its preparation. The key strategic objectives for the marine area in the SPED place environmental protection at par with development concerns as the objectives emanating from the Birds and Habitats Directives, Water Framework Directive and Marine Strategy Framework Directive are incorporated within the same marine strategic objectives map that guides development. The level of detail provided in the SPED reflects the lack of comprehensive information within marine waters, not only in terms of environmental quality but also in terms of the interactions between maritime uses and between maritime uses and the quality marine environment. Furthermore, no national policy on blue growth based on future social economic needs was available. The strategic framework adopted in the SPED is therefore to be considered as a precautionary one. No specific issues of a transboundary nature were identified at the time of preparation given that the scale of predicted use was generic; Malta's terrestrial capacity and lack of long term policy for blue growth dictated the degree of potential expansion of maritime activities.

In essence, the SPED presents the basic elements for an MSP plan as called for in Directive 2014/89/EU. It forms the basis to develop and implement maritime spatial planning through a more formal approach within the Maltese Islands. New data and information as well as improved governance amongst key regulatory stakeholders in particular, can guide future improvements accordingly.

The outcome of the Case Study

Despite the limited availability of updated data and consequent analysis, this case study has provided a wider perspective to the context of maritime activities within Malta's marine waters. The application of specific tools for the assessment of cumulative effects, impacts of multiple uses and the analysis of land-sea interactions has highlighted the added value that such instruments can provide to planners and policy makers. The assessment of cumulative effects has presented existing information (used for the preparation of the MSFD Intial Assessment in 2012 and for the SPED SEA) in a different context. Having the possibility to analyse this information within the context of a wider marine region and in a transnational context provides a different perspective on

how decisions need to be taken to guide the location for future maritime activities. For example the relationship between recurrence of spawning and that of nursery habitats for the same species clearly indicates a geographical area of influence that is shared between Malta and Sicily. Within Malta's marine waters the area around Hurd's Bank is considered an important spawning ground for fisheries. Yet this area is within proximity to bunkering sites, aquaculture operations and areas recently been designated as a marine Natura 2000 site. Such spawning grounds are also within the range of the harbour approach routes of the two main ports on Malta.

When addressing the potential for blue growth in this area, more detailed analysis is called for to determine whether the capacity of the area can accommodate increased activities, as the implications may be of national and potentially transboundary nature. More information on the status of fisheries, impacts of maritime activities on fisheries resources and environmental quality is also needed to inform national MSP plans. This area also poses an interesting governance challenge for Malta given that not all of the area is within the 12nm territorial waters, and therefore in accordance with UNCLOS, in the absence of an EEZ, there are limitations on the applicability of MSP.

The evaluation of transboundary issues and the review of existing policy objectives governing maritime activities and environmental protection within the CS area seems to suggest that there exists a wide range of regulatory and policy instruments that may support the scope of the MSP Directive without the need for additional action to be pursued through MSP. Through the CS it is evident that an MSP plan in accordance with Directive 2014/89/EU is not the all encompassing instrument to deliver sustainable development at sea, but one of many, albeit a very relevant instrument as it seeks to identify the most suitable spatial location for maritime activities. Placing the MSP plan within the governance framework for maritime activities and environmental protection within the marine waters of interest may be considered an essential governance step. The need to keep abreast with current and emerging policy changes at regional and international level is also considered an integral component to maintain the dynamic purpose of an MSP plan and also enable its applicability as an instrument for blue growth. Therefore any future reviews of the SPED would benefit from more information on existing and planned changes to national, regional and international regulations to ensure that the MSP plan is complimentary with emergent policy and related governance structures.

The greatest influencing transboundary factor on existing and future plans or strategies for blue growth within the Case Study area is the ecological value of the marine area within the extent of the CS and in its vicinity as well. The availability of a more comprehensive and updated data set would enable the formulation of more specific MSP plans. Synergies with actions taken for the

implementation of the MSFD would certainly support the improvements of a future MSP Plan, in terms of defining and safeguarding areas from significant environmental risks, through policy formulation and even through the SEA process, where depending on the scope of the SPED review, the options for transboundary consultations may also be considered.

User conflict exists in Maltese waters and the preliminary identification of LSI hotspots through the testing of PAP/RAC's proposed methodology for LSI analysis sheds an important light on how the SPED policy framework may be refined. At the strategic level, the SPED has been developed from a land perspective which enabled the formulation of policies aimed at adopting ICZM principles such as minimising user conflicts particularly on the terrestrial and inshore parts of the coastal zone. Yet the definition of hotspots would possibly guide the formulation of more specific policies that may also enable better management of activities in these areas. In addition, the identification of interactions and assessment of user conflicts at sea highlight the need for greater scope in a potential SPED review to consider the type, scale, location and very importantly the seasonality of maritime activities in the marine waters of the MSP plan.

Recommendations for the review of the SPED

In conclusion, through the SIMWESTMED Case Study the following key messages may be taken for consideration in a future review of Malta's current MSP plan:

- considering information on the wider region can provide a broader perspective on the maritime activities being addressed for Malta's marine waters;
- the use of updated information enables more specific policy making;
- the use of data models to identify cumulative impacts and user conflicts enables alternative methods that can be carried out in less time and handle more data sets to guide policy development;
- adopting a common but flexible methodology to account for land sea interactions may enhance the policy framework to provide guidance in the identified locations, particularly LSI hotspots.

This case study illustrates the emerging nature of MSP deployment and the need to develop a clear understanding of how this useful tool fits within the complexity of existing regulations and policies that govern maritime activities and marine environmental protection within national, regional and international contexts. Taking cue from the MSP Directive, which acknowledges the existing of other processes that are in conformity with the Directive (article 4(6)) there is scope for the review of the SPED to consider developing complementary documentation that illustrates how the different regulatory instruments are applicable to the MSP policy framework. Such documentation may support the plan implementation if it is based on a formally agreed governance framework that also outlines how transboundary co-operation is to take place.

6. LESSON LEARNT AND CONCLUSIONS

The exercise of a transboundary maritime spatial planning process performed within the Strait of Sicily (Italy – Malta) clearly illustrates how the challenges to MSP implementation in areas involving different national and international jurisdictions can be addressed. This work may constitute a solid base for planning at national and regional level, in order to foster proper decisions and to support management and conservation actions of environmental components after a thorough understanding of possible issues and difficulties.

As a first instance, the effectiveness of the planning decisions is strongly dependent from the quality of the data and information taken in account. Therefore, it is considered necessary for the purpose of the maritime space within the case study area to improve the quality of the data used to strengthen the assumptions made for the assessment. The difficulties encountered for the preparation of a solid knowledge framework, one of the important results of the study, reflect the level of available information on the predominant activities, pressures and environmental components. Lack of detailed quantitative data in some cases limited the possibility to produce accurate geo-referenced maps to support the MSP analysis. Consequently, an efficient transboundary planning should take in account as a mandatory baseline the composition of a unified information framework of uses and environmental components. Using of a common and shared methodology in the construction of the information framework, establishing an infrastructure for spatial information to support planning and environmental policies (e.g. INSPIRE directive 2007/2/EC compliant), in the analysis of conflicts, synergies and impacts may facilitate an accurate and agreed identification of the main issues of the MSP process, and their description. Data management is as important as the data themselves. Information learned and data created throughout the MSP process may remain underused without good data management. Documentation and metadata storing and sharing should be considered a standard procedures during spatial data management, including a common methodology and information on projections, scale accuracy, data types, confidence levels, sources and contacts. This case study also tested the application of an ad hoc data model developed for the Adriatic within a new transboundary context. When the design elements of data models inherently incorporate the scope of a common infrastructure for spatial information, it provides an opportunity for shared analysis, particularly when data management protocols follow a common approach.

According to Ehler and Douvere (2009), a marine spatial management plan should present an integrated vision of the spatial aspects of their sectoral policies in the areas of economic development, marine transport, environmental protection, energy, fisheries, and tourism. The marine spatial management plan should be closely integrated with public programs and highlight

the spatial dimension of integrated management. Planning in areas with highly different jurisdictional statuses such as the Strait of Sicily should start from the definition of a shared vision and common strategic objectives, derived from the system of existing policies and plans at local, regional, national, EU and international levels, providing a common vision and consistent direction, setting out shared principles, goals, objectives, priorities for the area and defining what these priorities mean in time and space.

An overall and long-term common vision of environmentally safe, healthy, productive and biologically diverse seas sets the wide goals to an ecosystem-based marine spatial planning of human activities, supporting the identification of the environmental priorities that planning must take into account at different planning scales and in different sub-areas. The increasing demand of space for maritime traffic and connections, involving potential environmental consequences, the needs of a shared management of fish resources in the wider areas, the potential expansion of hydrocarbon search and extraction operation, can not be addressed properly without a common strategy involving sectoral policies and adequate spatialization of priorities and needs in the Case Study area and surrounding waters. The analysis of the specific wide and local characteristics and sectoral needs of the planning issues, needs and opportunities in Sicilian and Maltese waters is therefore necessary to provide a rational basis for setting common priorities, to coordinate actions in space and time and to manage and direct concrete measures to where and when they are needed most.

The definition of spatial limits for the Strait of Sicily - Malta Case Study have been elaborated considering needs and priorities emerged from the Initial Assessment, as well as to foster a proper analysis on human uses, ecological processes, synergies and conflicts, governance continuity, and define recommendations to establish appropriated strategies and plans. The geographical extent of the case study area is meant to include transboundary effects and to intercept external instances that might influence MSP in the case study and to test the application of the local MSP processes, understanding processes (both ecological and social), connections (e.g. biological, physical, within and across communities and economies) at different scales (e.g. local, regional, national scales). Our analysis included a wider area approach trying to frame and define the main context and themes for the whole Strait of Sicily (e.g. maritime traffic related issues, fish stocks management, valuable species protection). Then, MSP issues, possible management and planning actions have then been refined in focused analyses on local scales and, depending on the characteristics of the concerns, proposing approaches and planning measures with different spatial resolution. In the Case Study exercise, we have been able to understand which problems should be solved with

strategic plans and which instead require more precise spatial measures (e.g. environmental protection).

The MSP Directive calls upon Member States bordering marine waters to cooperate so that MSP plans are coherent and coordinated across the region concerned (Art 11). With the possibility to have access to data and information on a wider marine area would enable neighbouring Member States to focus their action and determine which aspects pertaining to maritime activities can best be implemented through an MSP plan at a national level, which elements require further attention in view of potential transboundary implications, and more importantly determine whether certain issues can best be addressed through other instruments (such as international shipping).

In order to achieve a proper focus on the issues and opportunities within the Case Study area, the involvement of stakeholders proved to be an indispensable although very difficult step of the MSP process. In our case, we had to start from the baseline step of the definition of the key stakeholders that should have been involved in the effort. Even if the Maltese waters already had a spatial plan (SPED), both in Sicily and Malta we faced the lack of a national structured involvement methodology, so the communication with stakeholders had to start from the basic sharing of information on what MSP is, why it is necessary, and what is the added value that can be derived from it, before being able to capitalize useful information from stakeholders. These steps highlighted the need to enforce and structure proper consultations within the MSP process, in order to enhance trust among stakeholders and decision-makers, encourage voluntary compliance with rules and regulations, share the understanding about problems and challenges of the area, and generate new options and solutions through the inclusion of diverse information (e.g. local knowledge and traditions).

Fostering the touristic sector within the area resulted both from the analysis and stakeholder consultation phases as one of the main drivers for planning that comply with the vocation of the two States involved. This potential must be supported and managed, guaranteeing its sustainability not only for the marine environment, but also taking in account all the social, landscape and resources aspects involved in the developing of the sector, promoting the coexistence with other present or planned uses (e.g. historical fishing activities, cultural heritage and land and sea environmental protection) and taking in account all the potential synergies. The common goal of the promotion of appropriate touristic use of the coastal and marine space, reducing conflicts and protecting ecologically valuable areas and resources, allows a better definition of the objective to be achieved in different subareas. Concerning tourism, the Case Study highlighted important differences within the two national contexts. Malta already is a strong touristic hot-spot for the Mediterranean sea that needs to face the continuous expansion of the intensive touristic demands for space and resources, while the Sicilian Case Study area shows an high potential for the touristic

development, following the whole regional trends, that should carefully be planned to avoid conflicts with environmental conservation and other social features. These different needs, however, could be linked in a common management effort, following the implementation of Sicily-Malta connections and sharing good practices and transboundary projects (e.g. within the Interreg Italy-Malta Programme 2014-2020 and future ETC Programmes).

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