



Macaronesian Maritime Spatial Planning

“THE PROCESS OF MSP IN MADEIRA – THE SITUATION PLAN” Madeira

MarSP Deliverable:

D.4.8. Develop a report about the application of MSP in maritime space of Madeira

November 2019



Coordinated by



Funded by



Partners



WP name	WP4. Development of the Marine Spatial Planning Processes
Task name	Task 4.2. Madeira
Deliverable Name	D.4.8. Develop a report about the application of MSP in maritime space of Madeira
Due Date of deliverable	November 2019
Actual submission Date	November 2019
Citation	Lopes I, Jorge V. 2019. The process of MSP in Madeira – The Situation Plan. Deliverable - D.4.8., under the WP4 of <i>MarSP: Macaronesian Maritime Spatial Planning</i> project (GA nº EASME/EMFF/2016/1.2.1.6/03SI2.763106).

Document Information	
Document Name	The process of MSP in Madeira – The Situation Plan
Document ID	D.4.8.
Version	1.1.
Version Date	November 2019
Author(s)	Isabel Lopes, Vítor Jorge
Dissemination Level:	Public

History			
Version	Date	Modification	Author(s)
1.1.	November 2019	November 2019	Isabel Lopes, Vítor Jorge

Summary
The present report has the finality to present the process of MSP in Madeira through the Situation Plan

Table of contents

1.Introduction	16
2.Vision and specific objectives	16
3.The autonomous Region of Madeira	19
3.1. Climate	19
3.2.Human pressure	21
3.3.Litoral of the islands	22
3.4.The regional maritime economy	24
4.The importance of the maritime spatial planning	26
4.1. Portugal and the maritime spatial planning	27
4.2. The maritime spatial planning VS the land space planning	28
4.2.1. Three-dimensionality	29
4.2.2. Connectivity	29
4.2.3. Complexity of trophic chains	30
4.2.4. Uncertainty	30
4.2.5. Human-Biodiversity Relationship	30
4.2.6. Property Rights	31
4.2.7. Human Population	31
4.2.8. Infrastructures	31
5.Analysis of legislation, policies, plans or programs	32
5.1. Legislation related to maritime spatial planning	32
5.1.1. Maritime Spatial Planning Directive	32
5.1.2. Law of Basis for Planning and Management of the National Maritime Space	33
5.1.3. Integrated Maritime Policy	34
5.1.4. Marine Strategy Framework Directive	36
5.1.5. Blue Growth Strategy	37
5.1.6. Common fisheries policy	38
5.1.7. Maritime Strategy for the Atlantic Region	39
5.1.8. Water Framework	41
5.1.9. Regional legislation	42

5.1.9.1. Regional Ordinance No. 46/2014 of April 22	42
5.1.9.2. Regional Legislative Decree no. 15/2013 / M of May 14 amended by Administrative Rule no. 46/2014 of January 14	42
5.1.9.3. COUNCIL NO. 510/2017	42
5.2. International programs, plans, conventions or international agreements	43
5.2.1. UNCLOS – United Nations Convention on the Law of the Sea	43
5.2.2. IMO - International Maritime Organization	43
5.2.3. MARPOL - International Convention for The Prevention of Pollution from Ships	44
5.2.4. CBD - Convention on Biological Diversity	44
5.3. National programs, plans	44
5.3.1. National Ocean Strategy 2013 - 2020	44
5.3.2. Strategic Plan for Portuguese Aquaculture 2014 - 2020	45
5.3.3. Tourism Strategy 2027	46
5.3.4. National Strategy for Nature and Biodiversity Conservation 2025	46
5.3.5. Industrial Strategy for Ocean Renewable Energies	47
5.3.6. National Program of the Territory Ordinance Policy	47
5.4. Regional programs, plans	48
5.4.1. Marine Strategy for the subdivision of the Madeira	48
5.4.2. Strategic Integrated Transport Plan for the Autonomous Region of Madeira 2014-2020 (PIETRAM 2014-2020)	49
5.4.3. Strategic Reference Plan Madeira Sea 2030 - Sea Strategy Madeira 2030	50
5.4.4. Strategy CLIMATE - Madeira. Adaptation Strategy for Climate Change in the Autonomous Region of Madeira	51
5.4.5. Operational Program of the Autonomous Region of Madeira 2014-2020	53
5.4.6. Regional Program for Territorial Planning of the Autonomous Region of Madeira (PROTRAM)	53
5.4.7. Program of Tourist Planning of the Autonomous Region of Madeira (POT)	54
5.4.8. Regional Environmental Policy Plan (PRPA)	56
5.4.9. Plan of the Energy Policy of the Autonomous Region of Madeira (PPERAM)	57
5.4.10. Action Plan for Sustainable Energy - Madeira Island and Plan of Action for Sustainable Energy - Porto Santo Island	57
5.4.11. Strategic Plan for Waste from the Autonomous Region of Madeira (PERRAM)	58
5.4.12. Regional Water Plan (PRAM)	59
5.4.13. Management Plan for the Hydrographic Region of the Madeira Archipelago 2016-2021 (PGRH 2016-2021)	60

5.4.14. Risk and Flood Management Plan of the Autonomous Region of Madeira (PGRI - RAM)	61
5.4.15. Coastal Program of Porto Santo (POC - Porto Santo)	62
5.4.16. Master Plan of the Port of Funchal, Master Plan of the Port of Caniçal and Master Plan of Porto Santo Port	63
5.4.17. Municipal Master Plans	64
5.4.18. Plans related to marine protected areas	64
5.5. Compatibilization	64
6. Administrative services and restrictions	66
6.1. Port infrastructure, marinas and recreational ports	66
6.1.1. Port infrastructure	66
6.1.1.1. Main ports	67
6.1.3. Precautionary areas for navigation and mandatory piloting	82
7. Nature conservation	84
7.1. Marine protected areas and nature network	84
7.1.2. Madeira cetaceans site	86
8. Military services	92
9. Airport services	94
10. Underwater cultural heritage	95
11. Land anchor areas: allowed and prohibited	100
12. Submarine, emissaries and ducts	103
13. Dredge dipping	105
13. Loan stains for artificial coastal power	107
14. Coastal Defense Works	107
6. Current and potential maritime uses, activities and constraints in Madeira	109
6.1. Fisheries	109
6.1.1. Sector characterization	109
6.1.1.1. Statistical information	112
6.1.1.2. Legal framework and constraints	114
6.1.1.2.1. Competent institutions for sector management	114
6.1.1.2.2. Normative basis and instruments	114
6.1.1.3. Current spatial distribution	114
6.1.1.4. Analysis of interactions	114
6.1.1.4.1. Interaction with other sectors	114

6.1.1.5.Land-sea interaction	114
6.1.1.6.Interaction with the environment	114
6.2.Aquaculture	115
6.2.1. Sector characterization	115
6.2.1.1. Present Situation	116
6.2.1.2. Potential Situation	117
6.1.2.3. Statistical information	119
6.1.2.4.Legal framework and constraints	119
6.1.2.4.1.Competent institutions for sector management	119
6.1.2.4.2. Normative basis and instruments	119
6.1.2.5. Current spatial distribution	120
6.1.2.6. Potential spatial distribution	120
6.1.2.7. Analysis of interactions	121
6.1.2.7.1. Interaction with other sectors	121
6.1.2.7.2.Land-sea interaction	121
6.1.2.7.3.Interaction with the environment	121
6.3.Marine Biotechnology	124
6.3.1.Sector characterization	124
6.3.1.1.Legal framework and constraints	124
6.3.1.1.1. Competent institutions for sector management	124
6.3.1.1.2. Normative basis and instruments	124
6.3.1.2. Analysis of interactions	124
6.3.1.2.1. Interaction with other sectors	124
3.2.2. Land-sea interaction	125
6.3.1.3.Interaction with the environment	125
6.4.Mineral extraction	126
6.4.1.Sector characterization	126
6.4.1.1.Legal framework and constraints	131
6.4.1.1.1.Competent institutions for sector management	131
6.4.1.1.2.Normative basis and instruments	132
6.4.1.2. Current spatial distribution	132
6.4.1.3.Analysis of interactions	132
6.4.1.3.1.Interaction with other sectors	132

6.4.1.3.2.Land-sea interaction	133
6.4.1.3.3.Interaction with the environment	133
6.5.Non-Metallic Mineral Resources	134
6.5.1.Sector characterization	134
6.5.1.1. Present Situation	134
6.5.1.2.Statistical information	135
6.5.1.3. Legal framework and constraints	135
6.5.1.3.1.Competent institutions for sector management	135
6.5.1.3.2.Normative basis and instruments	135
6.5.1.4. Current spatial distribution	137
6.5.1.5.Analysis of interactions	137
6.5.1.5.1.Interaction with other sectors	137
6.5.1.5.2. Land-sea interaction	138
6.5.1.5.3.Interaction with the environment	138
6.6.Renewable Energy	140
6.6.1.Sector characterization	140
6.6.1.1. Present Situation	140
6.6.1.2. Potential situation	140
6.6.1.3.Legal framework and constraints	142
6.6.1.3.1Competent institutions for sector management	142
6.6.1.3.2.Normative basis and instruments	142
6.6.1.3.3.Current spatial distribution	142
6.6.1.4. Potential spatial distribution	143
6.6.1.5.Analysis of interactions	143
6.6.1.5.1. Interaction with other sectors	143
6.6.1.5.2. Land-sea interaction	144
6.6.1.5.3. Interaction with the environment	144
6.7.Submarine cables, ducts and outfalls	146
6.7.1.Sector characterization	146
6.7.1.1.Present Situation	147
6.7.1.2. Potential Situation	149
6.7.1.3. Legal framework and constraints	149
6.7.1.3.1.Competent institutions for sector management	149

6.7.1.3.2. Normative basis and instruments	149
6.7.1.4. Current spatial distribution	150
6.7.1.5. Analysis of interactions	151
6.7.1.5.1. Interaction with other sectors	151
6.7.1.5.2. Land-sea interaction	151
6.7.1.6. Interaction with the environment	152
6.8. Scientific research	154
6.8.1. Sector characterization	154
6.8.1.1. Present Situation	154
6.8.1.2. Potential situation	154
6.8.1.3. Legal framework and constraints	165
6.8.1.3.1. Competent institutions for sector management	165
6.8.1.4. Analysis of interactions	165
6.8.1.4.1. Interaction with other sectors	165
6.8.1.4.2. Land-sea interaction	165
6.8.1.4.3. Interaction with the environment	166
6.9. Recreation, Sports and Tourism	167
6.9.1. Sector characterization	167
6.9.1.1. Present Situation	168
6.9.1.2. Legal framework and constraints	183
6.9.1.2.1. Competent institutions for sector management	183
6.9.1.2.2. Normative basis or instruments	183
6.9.1.3. Current spatial distribution	185
6.9.1.4. Analysis of interactions	185
6.9.1.4.1. Interactions with other sectors	185
6.9.1.4.2. Land-sea interaction	186
6.9.1.5. Interactions with the environment	186
6.9.1.6. Statistical Information	187
6.10. Underwater Cultural Heritage	193
6.10.1. Sector characterization	193
6.10.1.1. Present Situation	194
6.10.1.2. Legal framework and constraints	195
6.10.1.2.1. Competent institution for sector management	195

6.10.1.2.2. Normative basis or instruments	195
6.10.1.3. Current spatial distribution	196
6.10.1.4. Analysis of interactions	198
6.10.1.4.1. Interaction with other sectors	198
6.10.1.4.2. Land-sea interaction	199
6.10.1.4.3. Interaction with the environment	199
6.11. Dredging Immersion	200
6.11.1. Sector characterization	200
6.11.1.2. Present Situation	200
6.11.1.3. Statistical information	201
6.11.1.4. Legal framework and constraints	202
6.11.1.4.1. Competent institutions for sector management	202
6.11.1.4.2. Normative basis and instruments	202
6.11.1.5. Current spatial distribution	203
6.11.1.6. Analysis of interactions	203
6.11.1.6.1. Interaction with other sectors	203
6.11.1.6.2. Land sea interaction	204
6.11.1.7. Interaction with the environment	204
6.12. Ship Sinking and other structures	205
6.12.1. Sector characterization	205
6.12.1.2. Present Situation	205
6.12.1.3. Potential Situation	206
6.12.1.4. Legal framework and constraints	206
6.12.1.4.1. Competent institutions for sector management	206
6.12.1.4.2. Normative basis and instruments	206
6.12.1.5. Current spatial distribution	207
6.12.1.6. Analysis of interactions	209
6.12.1.6.1. Interaction with other sectors	209
6.12.1.6.2. Land sea interaction	209
6.12.1.7. Interaction with the environment	209
6.13. Navigation and maritime transport	211
6.13.1. Sector characterization	211
6.13.1.2. Statistical information	211

6.13.1.3. Analysis of interactions	217
6.13.1.3.1. Interaction with other sectors	217
6.13.1.3.2. Land-sea interaction	217
6.13.1.4. Interaction with the environment	217
7. Forecast of occupation of maritime space - Madeira subdivision	218
8. Bibliography	223

LIST OF FIGURES

Figure 1 – The Autonomous Region of Madeira.	19
Figure 2 - Topography of the island of Madeira	20
Figure 3 Topography of the island of Porto Santo	21
Figure 4 - Satellite image of dust hanging over the Madeira archipelago.	21
Figure 5 Examples of human pressure in the ecosystems	22
Figure 6 – Cabo Girão.	23
Figure 7 - Representation of the areas defined for the implementation of the Marine Strategy Framework Directive	37
Figure 8 – Strategic Integrated Transport Plan for the autonomous Region of Madeira (PIETRAM 2014-2020).....	49
Figure 9 – Strategic Reference Plan Madeira Sea 2030 – Sea Strategy Madeira 2030.....	50
Figure 10 Strategy CLIMATE - Madeira. Adaptation Strategy for Climate Change in the Autonomous Region of Madeira.....	51
Figure 11 - Operational Program of the Autonomous Region of Madeira 2014-2020.....	53
Figure 12 - Delimitation of water bodies in maritime space - Porto Santo Island, Selvagens Islands and Desertas Islands.....	61
Figure 13 - Port of Funchal	68
Figure 14 - Port of Caniçal	71
Figure 15 – Port of Porto Santo	72
Figure 16 Terminal of Porto Santo	72
Figure 17 - Main ports. Source: APRAM, S.A.	73
Figure 18 – Port of Porto Novo.....	74
Figure 19 – Terminal of Câmara de Lobos	74
Figure 20 - Location of secondary ports. Source: APRAM, S.A.....	75
Figure 21 - Location, New Location of tertiaries ports. Source: APRAM, S.A.....	77
Figure 22 -Infrastructures of access to the sea such as small piers. Source: Hydrographic Institute	78
Figure 23 - Port approach areas - Northwest of wood island. Source: APRAM, S.A.....	79
Figure 24 - Port approach areas - North-northwest of madeira island. Source: APRAM, S.A.	80
Figure 25 - Port approach areas - Southeast of wood island. Source: APRAM, S.A.....	80
Figure 26 - Port approach areas - South-southeast of madeira island. Source: APRAM, S.A.	81
Figure 27 - Port approach areas - Southeast of madeira island. Source: APRAM, S.A.	81
Figure 28 - Port approach area - holy island port. Source: APRAM, S.A.	82
Figure 29 - Mandatory piloting areas. Source: APRAM, S.A.	83
Figure 30 - Marine protected areas on the island of Madeira, island of Porto Santo and Desertas islands. Source: IFCN, IP RAM.	84
Figure 31 - Protected marine areas of the Wild Islands. Source: IFCN, IP RAM.	85
Figure 32 Area of exclusion of activity and observation of cetaceans. Source: Resolution no. 699/2016 of October 17.....	86
Figure 33 Area I. Source: Regional Legislative Decree No. 15/2013/M, of May 14.	88
Figure 34 Area li.	89
Figure 35 - Area I and Area II. Source: Regional Legislative Decree No. 15/2013/M, of May 14.....	90
Figure 36 - Area for the protection of vulnerable marine ecosystems (EMV). Source: Ordinance No. 114/2014 of May 28	92

Figure 37 - Area of military exercises performed from land and that may have some influence at sea. Source: Portuguese Army	93
Figure 38 - Area of military exercises performed at sea. Source: Hydrographic Institute	93
Figure 39 - Aeronautical services. Source: Regional Regulatory Decree No. 1/2014/M of January 30.	94
Figure 40 - Underwater cultural heritage on the Southeast coast of madeira island.....	97
Figure 41 Underwater cultural heritage on the west coast of madeira island.	98
Figure 42 - Underwater cultural heritage existing on the island of Porto Santo. Source: Regional Secretariat of Tourism and Culture and General Direction of Cultural Heritage.....	98
Figure 43 - Existing land anchor areas on the island of Madeira. Source: Hydrographic Institute ..	100
Figure 44 - Existing land extinguishing areas on the island of Holy Port. Source: Hydrographic Institute.....	101
Figure 45 - Existing landhouse areas in the Desertislands. Source: Hydrographic Institute.	102
Figure 46 - Emissaries and submarine cables - island wood. Source: PGRH 2016 - 2021 and Hydrographic Institute.....	103
Figure 47 - Emissaries and submarine cables - island of Porto Santo. Source: Waters and Waste of Madeira, S.A.	104
Figure 48 - Location of the submarine duct. Source: APRAM, S.A.	105
Figure 49 - Place for dredger immersion. Source: APRAM, S.A.	106
Figure 50 - - Proposal for loan stain for the artificialization of the beach of port od Porto Santo. .	107
Figure 51 - Geographical distribution of the main fishing areas of purse-seine fishing by the fleet registered in Madeira in 2015	112
Figure 52 – Aquaculture áreas. Source: DRP.	120
Figure 53 Potential aquaculture areas. Source: DRP.....	120
Figure 54 - Occurrence of metallic minerals in the national maritime space.....	132
Figure 55 - Location of inert extraction areas. Source: Regional Secretariat for the Environment and Natural Resources - Regional Directorate for Spatial Planning and Environment	137
Figure 56 – Potential areas for renewable energies. Source: AREAM.....	143
Figure 57 - Outfalls and submarine cables (island of Madeira). Source: PGRH 2016 - 2021 and Hydrographic Institute.....	150
Figure 58 - Existing submarine outfalls on the island of Porto Santo. Source: Water and Waste from Madeira, S.A.	150
Figure 59 - Location of the submarine pipeline at the Caniçal terminal. Source: APRAM, S.A.	151
Figure 60 - Distance from the coast to different depths.	155
Figure 61 - Scientific research area – cold water corals. Source: Oceanic Observatory of Madeira	158
Figure 62 - Result of the withdrawal of the marine funds. Source: Quartau et al,2018	164
Figure 63 - Interpretation of the submarine topography: the light blue lines represent the scars, the black lines the ravines, the dark blue lines represent the canals and lines Red dotted areas represent the avalanches of debris from landslides. Source: Quartau et al, 2018.	165
Figure 64 - Funchal marina.....	168
Figure 65 - Open water swimming area – current area (Madeira island).....	170
Figure 66 - Open water swimming area – potential area (Madeira island).....	171
Figure 67 - Open water swimming area – current area (Porto Santo Island).....	171
Figure 68 - Current underwater hunting area (Madeira island).....	172

Figure 69 - Sport fishing – current area (Madeira island)	174
Figure 70 - Sport fishing – potential area (Madeira island)	174
Figure 71 - Sport fishing – potential área (Porto Santo Island)	175
Figure 72 - Sea walk - Cabo girão.....	176
Figure 73 - Operating area of whale-watching vessels. As cores of the lines correspond to the exit points of the vessels	177
Figure 74 - The ARM in the circuits of the Atlantic Cruise Region and in the cruise circuits between America and the Europe. Adapted from Figueira da Sousa, 2004.	182
Figure 75 - Area of exclusion of cetacean observation activity.....	185
Figure 76 - Location of the existing underwater cultural heritage on the island of Madeira. Source: Secretaria Regional da Economia, Turismo e cultura – Direção Regional da Cultura	196
Figure 77 - Location of the existing underwater cultural heritage on the island of Madeira (West). Source: Secretaria Regional da Economia, Turismo e Cultura – Direção Regional da Cultura.	197
Figure 78 - Location of the existing underwater cultural heritage on the island of Madeira (East). Source Secretaria Regional da Economia, Turismo e Cultura – Direção Regional da Cultura.	197
Figure 79 - Location of underwater cultural heritage in the exclusive economic zone of the RAM. Source: Secretaria Regional da Economia, Turismo e Cultura – Direção Regional da Cultura	198
Figure 80 - Location of the area for the dredging deposit. Source: APRAM, S.A.....	203
Figure 81 - Location of artificial reefs on the island of Madeira (West).	207
Figure 82 - Location of artificial reefs on the island of Madeira (East).	208
Figure 83 - Location of artificial reefs on the island of Porto Santo.	208
Figure 84 - Detail of existing and potential uses and activities - West coast of Madeira Island.	218
Figure 85 - Detail of existing and potential uses and activities - Madeira island	219
Figure 86 - Detail of existing and potential uses and activities - east coast of Madeira.....	219
Figure 87 - Detail of existing and potential uses and activities - Madeira island.	220
Figure 88 - Detail of existing and potential uses and activities - Porto Santo island.	220
Figure 89 - Detail of existing and potential uses and activities - Madeira Island and Porto Santo..	221
Figure 90 - Detail of existing and potential uses and activities - Selvagens Islands.	221
Figure 91 - Detail of existing and potential uses and activities - exclusive economic zone.	222

LIST OF TABLES

Table 1 - Characteristics of the region's recreational marinas.....	78
Table 2 - Location of sports practice. Source: Colaço, 2009)	188
Table 3 – Support for nautical modalities. Source: DRJD	189
Table 4 - Stopovers of cruise ships in the Region. Source: APRAM, S.A.	192
Table 5 - Volumes dredged in the ports of RAM. Source: APRAM, S.A	202

LIST OF GRAPHICS

Graphic 1 - Madeira-Canary Islands (shaded) area, prohibited by the use of bottom-set gillnets and bottom trawls by Community vessels, below the 200 m bathymetric.....	110
Graphic 2 - Discharge of fish (ton) and values (thousands €) in RAM	112
Graphic 3 - Main captured species in RAM (ton) 2015 (%)	113
Graphic 4 - Main captured species in RAM (€/kg), 2015 (%)	113
Graphic 5 - Total annual production of aquaculture (ton) and corresponding value (kg/€) in the RAM	119
Graphic 6 - Extraction of aggregates in seabed	135
Graphic 7 - Percentage of the number of trips made by three maritime-tourist companies during the year, based on a total of 1601 trips to the south coast of Madeira (24-month analysis - July 2010 to June 2012).	179
Graphic 8 - Effort (in number of trips) made on board vessels of cetacean observations by quarter (2010-2012), with and without observer of the Museum of the Whale of Madeira.	180
Graphic 9 - Evolution of the registration of vessels in the RINM-MAR	187
Graphic 10 - Types of vessels registered in RINM-Mar	187
Graphic 11 - Evolution of the number of clubs in nautical sports	189
Graphic 12 - Evolution of the number of athletes	190
Graphic 13 - Evolution of the number of competitions/sports organizations	190
Graphic 14 - Evolution of employment in nautical sports (coaches + referees + judges)	191
Graphic 15 - Variation of passengers and stopovers throughout the year in the Port of Funchal in 2017. Source: APRAM, S. A.	192
Graphic 16 - Evolution of the cargo movement in RAM (ton)	212
Graphic 17 - Evolution of the moved cargo in the ports of the RAM by type of cargo (RAM)	213
Graphic 18 - Movement of containers in the ports of RAM – container entry	213
Graphic 19 - Movement of containers in the ports of RAM – container outflow.....	214
Graphic 20 - Movement of ships/yachts in the ports and marinas of the RAM.....	215
Graphic 21 - Evolution of maritime passengers – regional traffic.....	216

1. Introduction

This report has the finality to present the process of the maritime spatial planning in Autonomous Region of Madeira.

To develop this report, was used the results of the WP3 – Defining potential marine uses in Macaronesia, dealing with constraints and conflicts while assuring the good marine environmental status, namely:

- D.3.1. Technical report on potential scenarios,
- D3.2. List of areas of ecological and biological significance (EBSAs) or Vulnerable Marine Ecosystems (VMEs);
- D.3.3. List of marine protected areas;
- D.3.4. Potential distribution maps for toher maritime sectors;
- D3.5. Spatial distribution maps of keystone species, habitats and impacts;
- D.3.6. Matrix of constraints applied to maritime space o Madeira.

It should be noted that the Autonomous Region of Madeira is in a very advanced process of maritime spatial planning compared to the other regions of Macaronesia and as such, this document will serve as a support for a future revision of the Situation Plan for the Maritime Space of Madeira (POSEM - Madeira).

2. Vision and specific objectives

The PSOEM - Madeira presents itself as the present and potential portrait of the regional maritime space through the representation and identification of the spatial and temporal distribution of existing and potential uses and activities and the recognition of natural and cultural values of strategic relevance for the environmental sustainability and intergenerational solidarity.

Its elaboration complied with the legal regime of territorial management instruments, in order to establish and justify sectoral options and objectives with territorial impact as well as other objectives presented by plans and programs that have a direct or indirect impact on the maritime space.

Vision:

The planning of the regional maritime space, materialized by the PSOEM, as an instrument of the ecological sustainability of the oceans, of economic and social development, of juridical consolidation and geopolitical affirmation of Portugal in the Atlantic basin.

Guiding principles:

- Principle of environmental sustainability of the oceans;
- Precautionary principle;
- Subsidiarity principle;
- Principle of territorial cohesion;
- Principle of compatibility of uses and activities;
- Principle of the compatibility of policies and planning instruments;
- Principle of participation and simplicity of perception;
- Principle of adaptive management;
- Integrated management;
- Precautionary approach;
- Promoting collaboration for responsible governance of the oceans;
- Promotion and promotion of economic activities;
- Regional and cross-border cooperation and coordination.

Objectives:

The objectives of the PSOEM - Madeira, mainly integrate the objectives referred to in the basic law of the maritime spatial planning (LBOGEM) and geopolitical objectives. Account has also been taken of existing legislation, international, national or regional plans and programs.

The objectives that were defined in the PSOEM were the following:

1. Contribute to the valorisation of the sea in the national economy by promoting the sustainable, rational and efficient exploitation of marine resources and ecosystem services, ensuring the safeguarding of the natural and cultural heritage of the ocean;
2. Contribute to national cohesion, reinforcing the archipelagic dimension of Portugal and the role of its interterritorial sea;
3. Contribute, through the planning of the national maritime space, to the management of the Atlantic basin;
4. Contribute to strengthening the geopolitical and geostrategic position of Portugal in the Atlantic basin as the largest coastal state in the EU;
5. Ensure legal certainty and transparency of procedures in the allocation of TUPEM;
6. Ensure the maintenance of good environmental status of marine waters, preventing the risks of human action and minimizing the effects of natural disasters and climatic actions;
7. Ensure the use of available information on the national maritime space;
8. Contribute to the knowledge of the ocean and strengthen the national scientific and technological capacity.

3. The autonomous Region of Madeira

The maritime area of the Madeira is integrated in the biogeographical sub-region of Macaronesia, in the Atlantic Ocean. Also is part of this sub region, the archipelago of the Azores, the Canaries and Cape Verde. The maritime space of the Madeira Autonomous Region (ARM) corresponds to an area of approximately 446 108 km². About 500 times greater than the land area occupied by the islands of the archipelago, and comprises, in addition to the islands and islets, several submarine banks (Seine, Lion, Unicorn, Dragon, Susana and Ampere) distributed mainly in the north-northeast direction, being the closest (Seine), at a distance of 135 nautical miles from the island of Madeira.



Figure 1 – The Autonomous Region of Madeira.

3.1. Climate

The Madeira archipelago, due to its location, in the subtropical North Atlantic region, is characterized by its mild climate, with a low annual thermal amplitude, due to the moderating effect of the Atlantic Ocean, within the climate context associated with the region of Macaronesia.

Polar frontal surface disturbances and stationary cold depressions, as well as the Azores anticyclone, shape the climate of the Region. The direct influence of the subtropical anticyclone of the Azores and the Atlantic trade winds, protects the archipelago from the depressions that occur in the North Atlantic.

The climatic characteristics of the archipelago are also influenced by the relief and geographical orientation, which introduces differences in the values of air temperature and precipitation distribution.

This situation is clearer on the island of Madeira where the slopes regularly have a steep slope, which causes a shift between shaded areas and areas with high sun exposure. Thus, it is possible to observe many very significant microclimates.



Figure 2 - Topography of the island of Madeira

Although the island of Porto Santo is affected by the same metrological systems, the topography presents lower altitudes, with morphological characteristics of a sub-arid climate.

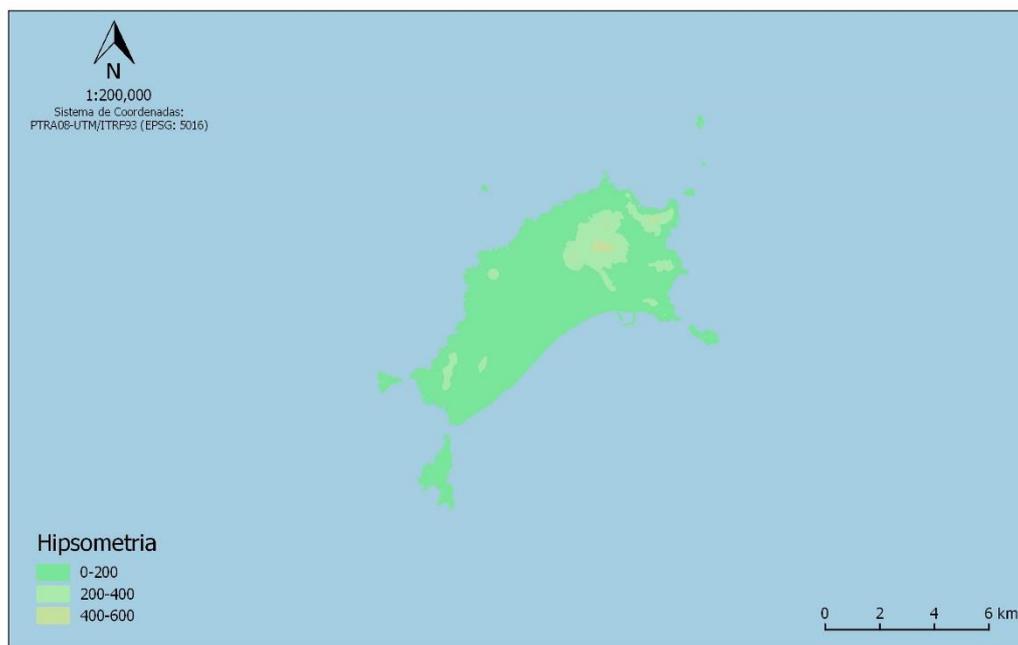


Figure 3 Topography of the island of Porto Santo

Dust from northern Africa also affects the climate of the archipelago, raising the temperature.

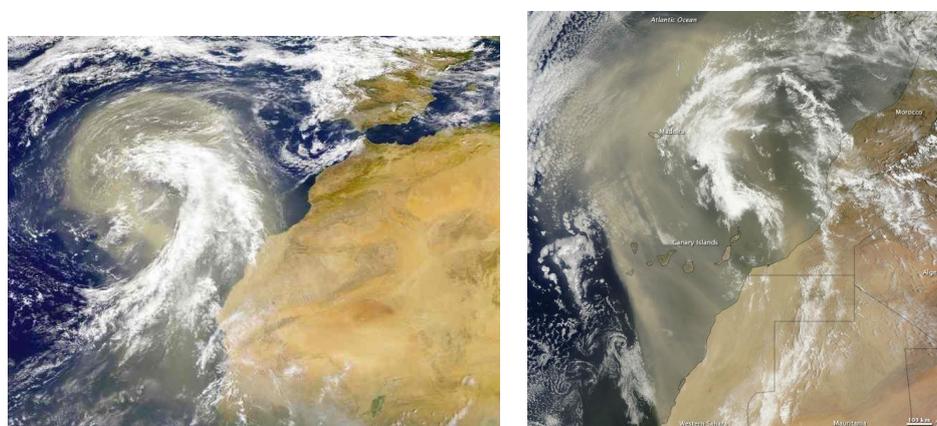


Figure 4 - Satellite image of dust hanging over the Madeira archipelago.
 Source: The Earth Observing System Data and Information System (EOSDIS)

3.2.Human pressure

According to the Regional Directorate of Statistics (DREM), the resident population in the RAM for the year 2015 was estimated at 256 424 inhabitants, with 5 186 inhabitants residing in Porto Santo (DREM, 2015). In the same year, the population density of the RAM was 319.9 inhabitants / km² (INE, 2015), higher than the national average, which for the same year was

estimated to be 112.1 inhabitants per km² (INE, 2015). The population and economic activities are concentrated mainly on the island of Madeira along the coast. This situation will have repercussions on economic development and will put pressure on ecosystems.



Figure 5 Examples of human pressure in the ecosystems

3.3.Litoral of the islands

The coast of the island of Madeira is characterized by the narrowness of the insular platform, presenting in the southern slope a small slope that occurs until 100 meters of depth. The bathymetry presents a parallel to the coastline, and the 100 meters do not distance themselves more than 3 km from the coastline, except in the most western area of the island, the distance wave reaches 9km (Instituto Hidrográfico, 2003).

From a geomorphological point of view, the coast of the island of Madeira is constantly affected by landslides that balance the gravitational stability of volcanic buildings. About 80%

of its extension is occupied by cliffs, which are characterized by impressive reaches reaching Cabo Girão at 580 m and altitude.

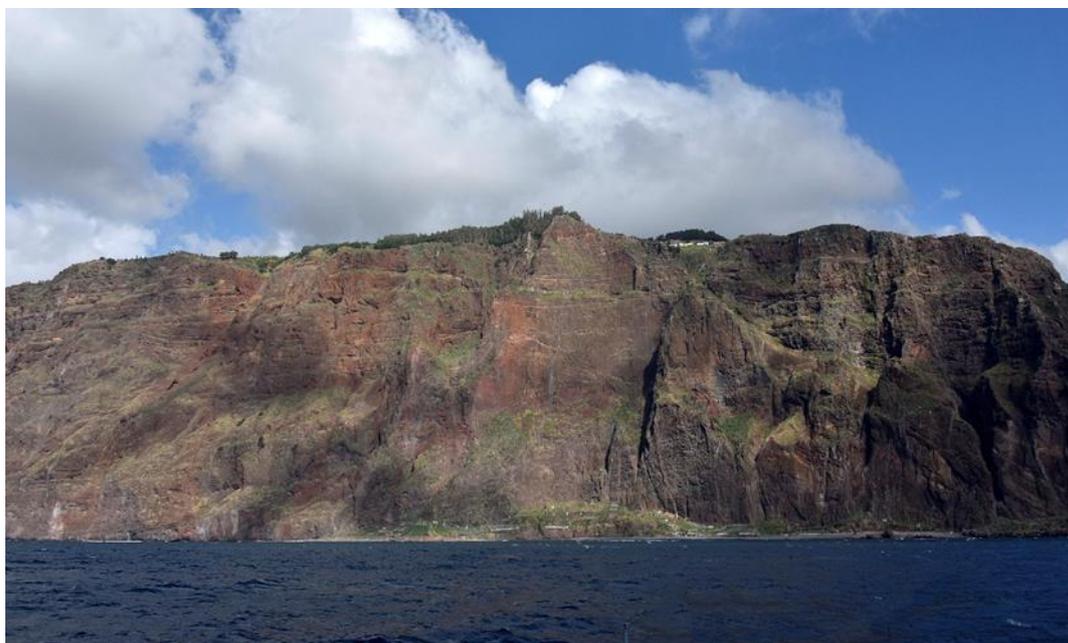


Figure 6 – Cabo Girão.

On the south coast of the island of Madeira, the line of cliffs is interrupted by the amphitheater of Funchal, Machico bay and the most important river valleys such as the Ribeira Brava and Socorridos riversides. The North coast is more cliffed, constituted by high and continuous cliffs being only cut by the streams of São Vicente or São Jorge, Ribeira Seca and Ribeira da Metade. The rapid retreat of the cliffs, boosted by the rapidity of the marine erosive processes, causes some streams to be suspended and precipitate in cascade or drain through a connecting throat where the slope can increase to the vertical (Ribeiro, 1990: 17-18) .

The island of Porto Santo emerged through an ancient reef. Actually is constituted for a dune string in the south coast of the island.

The Desertas islands constitutes the emergent part of an underwater crest. The current shape of this ridge reflects the occurrence of large strand movements that contributed significantly to the extremely cliff-like character that characterizes the coastline of these islands.

Relatively to the Selvagens islands, the Selvagem Grande coastline is characterized by a shoreline with lowlands. The Selvagem Pequena area varies according to the tides, with an area of 0,65 km².

3.4. The regional maritime economy

The framework of the Integrated Maritime Policy, the National Strategy for the Sea 2013-2020 which includes the Blue Growth, the Sea Madeira Strategic Reference Plan 2030 as well as the Marine Strategy Framework Directive for the Madeira subdivision, establish a conceptual definition of sea. The economy of the sea comprises all the economic activities that are carried out at sea, directly and indirectly, and which privilege the value chain in which they are inserted.

Most of these activities are present in RAM, although they are divided essentially into three groups (Lopes, 2016):

- Consolidated activities in business and market terms, as is the case of cruise tourism and recreational boating;
- Activities that are still at an embryonic stage, such as aquaculture;
- Activities that are stagnant, such as shipbuilding and ship repair.

The data presented in the following table was based on the the Instituto Nacional de Estatística (INE), the Direção Regional de Estatística da Madeira and the Direção Regional de Trabalho e da Ação Inspectiva – Serviço de Estatística do Trabalho, the Sea Madeira Strategic Reference Plan 2030, the master dissertation Proposal for the Constitution of a Sea Cluster in the Autonomous Region of Madeira and the Role Performed by the Maritime Spatial Planning. It was intended to obtain a series of indicators representing the weight of the activities of the sea in the regional economy.

The statistical information for the maritime economy for 2015 is relatively scarce or confidential, so it was decided to analyse between the years 2007 and 2014.

- In 2014, about 0,6% of the enterprises in the Madeira archipelago were related to the economy of the sea. This figure was 0,2% lower than in 2007;
- It is estimated that about 1.1% of the personnel employed in business are related to maritime activities. This value may be higher because we have indicators that are missing;
- Approximately 2,3% of volume business. In 2007 the value was close to 1,9%;
- Around 1,6% of the business GVA generated, when in 2007 it represented 2,1%.

One of the problems encountered was the fact that the existing information was widely dispersed. In addition, there are data that can not be available due to statistical secrecy, as happened in this evaluation, and therefore limited the analysis of economic activity.

In the recent years, maritime economic activity has been the target of several investments: support to companies, development of maritime economic activities and above all in the generation of employment. According to the Sea Madeira Strategic Reference Plan 2030, the RAM received the following community funds between 2007-2013:

- PO Intervir+ (FEDER) – The approved projects of companies with activity in Sea sectors amounted to 3 million euros;
- PO Rumos (FSE) – Approved project worth 44 thousand euros;
- PROMAR – Were approved 9,68 million euros of private investment and 767 thousand euros in public projects.

With the approval of several European funding projects, which also include the MAC 2014-2020, the economy of the sea will receive a strong boost.

4. The importance of the maritime spatial planning

The rapid population growth and accelerating consumption lead to higher needs of food, energy, minerals and maritime trade resources. Due to the limitations of land space, coastal areas and marine areas are increasingly sought to establish economic activities, taking away the new technological and scientific developments (Ehler and Douvère, 2007).

Since marine resources, as well as maritime space, are limited, the economic development of some maritime activities has had consequences for negative for the good environmental state of the marine environment. The development of economic activities on the marine environment can lead to two types of conflicts. On the one hand, the multitude of unordered human activities have caused damage to marine ecosystems. On the other hand, not all uses are compatible with each other, either because they are responsible for directly through the same space, either because they have adverse effects on each other. So, it's necessary to order the use of maritime space not only to circumvent conflicts of use, but also to try to enhance the advantages that a rational use of the sea may bring to society.

Maritime spatial planning aims at managing in maritime space, in spatial and temporal terms, based on the minimization of conflicts, compatibility between activities and uses and the use of marine resources and services (Frazão, 2016). You should cover the cycle full identification of problems and opportunities, collection of information, planning, decision-making, enforcement, review or updating.

Maritime spatial planning aims to encourage the development of in accordance with existing legislation and relevant national policies sectors and complying with environmental standards.

Briefly, the maritime spatial planning process allows:

- Choose the most suitable locations for the location of the different activities;
- Manage the use of marine resources according to sustainability standards;
- Involve the various stakeholders in order to ensure that everyone has a opportunity to contribute to the planning of maritime space;
- Adopt a holistic approach to decision-making, considering the benefits and impacts of all human, current and future activities, which occur in the marine environment;
- Improve access to marine data and information;

- Reduce usage conflicts.

In the EU, Member States should also foster cross-border cooperation and cooperation with the authorities of third countries in the marine region concerned.

4.1. Portugal and the maritime spatial planning

In Portugal, the concern about the defence of maritime areas with a view to the common good is old. On 31 December 1864, under D. Luis, the shores of the maritime, river and windy waters were integrated into the public domain of the State. Domain that was considered "enforceable". As the 621 were the roads and the streets, so "the beaches, the rivers navigable and floatable with their banks, the canals and ditches, artificial ports and existing docks or that in the future are built " became domain of the State. By equating the maritime areas to roads and streets, it was recognized that its privatisation was incompatible with the organization of the territory for the sake of the public good.

It is at that time that the concept of margin, a pioneering concept and that would be consolidated, as early as 1971, by Decree-Law No. 468/71 of November 5. The margin was then understood as "(...) a contiguous strip of land or overlooking the line that limits the waterbed". The margin, between land and water, was seen as essential for the regulation of activities and for protection.

In 1993, the Portuguese government, implicitly recognizing the importance of ordering the coastline, approved Decree-law No. 309/93 of September 2, with the purpose of defining criteria for the allocation of private use of plots of public domain land intended for the implementation of infrastructure and support equipment for the use action of the beaches. On the other hand, it was understood to be the time to enshrine rules, not only relating to the beach, but to the entire shore, covering both the Maritime Public Domain (DPM) as a "land protection zone" whose maximum is not exceeding 500 m, counted from the line limiting the margin of sea waters and a "maritime protection strip", which has a maximum limit to batimetric 30 m. This Decree-Law imposed, for the coast and coastal area of the continent, the preparation of Coastal Waterfront Planning Plans (*POOC in Portuguese*).

Although the POOCs are primarily focused on the planning of the range of terrestrial protection, the concept of ordering the sea in Portugal emerged therefore twenty years

before the EU Maritime Spatial Planning Directive was adopted, which would only be to know the light of day in July 2014.

Between 1993 and 2014, the country did not lose sight of the need to order its maritime space 649 and that such a order could not be on the shores of the continent's coastal banks. Thus, in 2008, through Order No. 32 277/2008 of 18 December, the preparation of the Maritime Spatial Planning Plan 652 (POEM) was decided, the public disclosure of which was made through Order No. 14 449/2012 of 8 653 November. This plan, although it was not constituted in a binding legal instrument, came, by decree-law 38/2015, of March 12, to be considered as the reference situation for the planning of the national maritime space and for the issuance of private use securities until the approval of the Situation Plan.

Finally, in February 2014, the Assembly of the Republic approved the Bases Law of the Policy of Planning and Management of the National Maritime Space (LBOGEM *in Portuguese*). LBOGEM provides on the planning of the Portuguese maritime areas, defining, for that purpose, the national maritime space, extending from the base lines to the outer limit of the continental shelf beyond the 200 nautical miles. LBOGEM also defines the planning instruments, which is embodied in this Situation Plan and the allocation plans that will be developed. Subsequently, the Decree-Law No. 38/2015 of March 12, 676 developed LBOGEM and consequently the provisions applicable to the Situation Plan.

In the case of the Autonomous Region of Madeira, with the publication of LBOGEM and the Order No 11494/2015 of 14 October, the process of the maritime spatial planning was initiated in 2016 through the Situation Plan.

4.2. The maritime spatial planning VS the land space planning

The need for coordinated planning of competing maritime activities and strategic management of the different maritime areas has been recognised in several international and national documents, such as in the UNCLOS, in Directive 2014/89/EU of Parliament and the Council of 23 July 2014 and National Strategy for the Sea 2013-2020 (Becker-Weinberg, 2016).

Coastal states should therefore adopt measures for correct planning and the proper use of their maritime space, but knowing that order cannot be limited only to the limits imposed by

maritime borders which define maritime areas where States exercise sovereignty rights or jurisdiction (Becker-Weinberg, 2016).

Maritime spatial planning must consider the great connectivity of the marine environment, its three-dimensional space and the real lack of borders.

Without wishing to exhaust the theme, the following briefly refer to the main assumptions and constraints that require the technical and scientific process of maritime spatial planning to be significantly different from that used in the land space planning.

4.2.1. Three-dimensionality

Oceans are three-dimensional systems and living beings that colonize are distributed along the planes and columns of water, developing ecological niches from the surface of the waters to the ancient depths, creating a very complex trophic web that ends up connecting all seas into the global ocean concept.

Three-dimensionality profoundly differentiates marine ecosystems from terrestrial ecosystems. In the latter two-dimensionality is the occupation of space. This great difference is due to the density difference that exists between the water and air elements. Human activities and uses can also take advantages of the three-dimensionality of the oceans and occupy the maritime space on several levels, allowing the existence of various uses along the water column, with superficial uses and uses of the seabed.

The three-dimensional nature of the oceans poses to us governance challenges and, concomitantly, of spatial planning in relation to what happens in the emerged territories (Jones, 2014).

4.2.2. Connectivity

Compared to what happens in the terrestrial area, marine organisms generally have a wide regional distribution, with low rates of endemism, creating ecosystems with undefined borders, debated by the large connectivity with different habitats. This connectivity is still reinforced by hydrological standards that promote the connection between oceanic masses.

The same connectivity also gives greater resilience to marine ecosystems, compared to terrestrial ecosystems. However, if the connectivity has positive effects, allowing a dilution

and dispersion effect, thus reducing the effects of pollution, also leads to the consequences of a particular action at enormous distances affecting very sensitive distant ecosystems.

Since the connectivity of marine environments is distinguished in the terrestrial environment, the models of nature conservation, management of the natural resources and the ordering of human activities must necessarily be different and based, therefore, on very different paradigms (Carr et al., 2003).

4.2.3. Complexity of trophic chains

Marine ecosystems have less defined borders and have a greater habitat interconnection than terrestrial ecosystems. In the first, the chains trophic have five and six levels, non-pyramidal, which originate trophic webs that develop following the great connectivity of the marine medium. Terrestrial ecosystems have as a rule 3 or 4 trophic levels of pyramidal configuration, with border ecosystems and habitat much more defined.

Thus, maritime spatial planning requires a holistic look at all activities that unfold at sea and requires adaptive management as increases the knowing on the dynamics and composition of these systems.

4.2.4. Uncertainty

The complexity of marine ecosystems associated with the uncertainty of their knowledge is one of the major challenges in ocean governance. This is certainly incomparably higher than that relating to terrestrial ecosystems. It is probably only known just over 5% of marine ecosystems.

Thus, the decisions that are taken will have to take into account and allow adaptation as knowledge increases and unpredictability decreases (Stelzenmüller et al., 2018).

4.2.5. Human-Biodiversity Relationship

Biodiversity in terrestrial ecosystems is numerous times associated with certain practices of land use made by man. Thus, the protection of the wild life goes hand in hand with the protection of ancestral cultures that allow the handling of ecosystems and the maintenance of wildlife.

4.2.6. Property Rights

In terrestrial ecosystems property is by private standard and there are rights which, in one way or another, condition spatial planning. At sea the property rights do not exist. At sea resources are either on jurisdiction of a coastal State, or are subject to schemes arising from multi-departing agreements and/or regional agreements. In particular, according to UNCLOS, the freedom of fisheries and the principle of the jurisdiction of the Flag State in respect of navigation, however, are the States subject to the conservation and management rules applicable by decision of organisations with competence in these matters. In the area, mineral resources are subject to the principle of the common heritage of humanity, and to the regulations approved by the ISA. It is to note that even in maritime areas under the jurisdiction of a coastal State, the rights of the State are not absolute, and there is therefore no possibility of having the maritime territory as if it were exclusive.

On this subject, Portuguese law is clear: the Maritime Public Domain belongs to the State and the limit of private property cannot include the seabed. Thus, the maritime spatial planning has as main actor the coastal State, either as owner or as a political decision maker, or an interlocutor with the other Coastal States with which it has to tolerate in a logic of exercise of sovereignty that is variable, according to UNCLOS.

4.2.7. Human Population

As is known the sea has no resident human populations, apart from those that temporarily occupy offshore platforms for the exploitation of hydrocarbons or those that are shipped. In the latter case, there are always temporary populations and mobile, whose demographic universe is located on land.

Maritime spatial planning does not therefore have to worry about the problems inherent in all demographic issues occurring on land.

4.2.8. Infrastructures

The infrastructure transience scale at sea is much smaller than the scale on land and the typologies of completely diverse infrastructure. At sea there are no roads and the navigation sums only have physical reality when the vessels use them.

5. Analysis of legislation, policies, plans or programs

In this phase, the legislation in force and the programs and plans that are directly or indirectly related to maritime space were analysed.

The analysis of the legislation, the plans or programs helped in the definition of the vision and in the creation of the objectives. It also allowed to verify the existence of incompatibilities between the plans or programs in force and the constitution of the PSOEM.

5.1. Legislation related to maritime spatial planning

In the case of legislation, the vision and objectives were always intended to comply with what was stipulated by Directive 2014/89 / EU of 23 July establishing the framework for maritime spatial planning and national legislation, the basic law of the maritime spatial planning (LBOGEM).

In this subchapter will analyse the legislation in force regarding the planning of the maritime space and will then analyse the plans and programs in force.

5.1.1. Maritime Spatial Planning Directive

Considered a transversal policy of Integrated Maritime Policy (IMP), the MSP Directive aims at promoting the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources. The Directive enforces European Union (EU) member states with maritime jurisdiction to draw up national maritime spatial plans by 2021. The maritime spatial planning directive refers the following objectives (European Union, 2014):

- Consider economic, social and environmental aspects to support sustainable development and growth in the maritime sector, applying an ecosystem- based approach, and to promote the coexistence of relevant activities and uses;
- Contribute to the sustainable development of energy sectors at sea, of maritime transport, and of the fisheries and aquaculture sectors, and to the preservation, protection and improvement of the environment, including resilience to climate

change impacts; promotion of sustainable tourism and the sustainable extraction of raw materials;

- This directive also promotes cross-border cooperation in order to create a coherent framework.

5.1.2. Law of Basis for Planning and Management of the National Maritime Space

The Portuguese Parliament approved the Law 17/2014 of Basis for Planning and Management of the National Maritime Space (LBOGEM) in 2014. LBOGEM establishes the legal basis and the general guidelines for Portugal's policy on marine spatial planning and management. In 2015, Decree-Law 38/2015 developed its legal norms and transposed the EU MSP Directive (Becker-Weinberg, 2015a). The objectives of planning and management established by LBOGEM are the following (Becker-Weinberg, 2015b; Assembleia da República. 2014):

- Promote the sustainable economic, rational and efficient exploitation of marine resources and of the ecosystem services, ensuring the compatibility and sustainability of the different uses and activities developed therein, considering the intra and intergenerational responsibility in the use of the national maritime space and towards job creation;
- Consider the preservation, protection and restoration of the natural values and of the coastal and marine ecosystems and the attainment and conservation of the GES of the marine environment, as well as the prevention of risks and the minimization of the effects of natural disasters, climate change or human activities;
- Ensure the legal certainty and the transparency of the procedures granting the titles of private use, as well as allow the exercise of the rights of information and participation referred in the present law;
- Seek the use of the available information regarding the national maritime space.
- Prevent or minimize possible conflicts between uses and activities carried out in the national maritime space.

5.1.3. Integrated Maritime Policy

In 2007 an Integrated Maritime Policy for the European Union was published, also known as the Blue Book. According to CCE (2007), the implementation of an Integrated Maritime Policy calls for an integrated and cross-sectoral approach, based on cooperation and coordination of the various policies relating to maritime sub-sectors and on excellence in research, technology and will be anchored in the Lisbon Agenda for Growth and Jobs and the Göteborg Agenda for Sustainable Development. It will enable Europe to respond to the challenges posed to it and contribute to the desired strengthening of the European maritime vision (CCE, 2007). An integrated maritime policy of the European Union should develop common tools, identify and exploit synergies and avoid or resolve conflicts and draw up and present a work program, with the following projects being of importance:

- A European maritime space without barriers;
- A European strategy for marine research;
- The elaboration by the Member States of integrated national maritime policies;
- A European maritime surveillance network;
- A guide for the planning of maritime space by the Member States;
- A strategy to mitigate the effects of climate change on coastal regions;
- A reduction in CO₂ emissions and pollution from ships;
- The elimination of pirate fishing and destructive bottom-trawling practices on the high seas;
- A European network of maritime clusters;
- A review of the exclusions provided for in European Union labour legislation for the maritime transport and fisheries sectors.

The IMP is a framework to facilitate the development and coordination of diverse and sometimes conflicting sea-based activities, with a view to:

1. Maximising the sustainable use of the oceans and seas, in order to enable the growth of maritime regions and coastal regions as regards:
 - a) Shipping: improving the efficiency of maritime transport in Europe and ensuring its long-term competitiveness, through the creation of a European Maritime Transport Space without barriers, and a maritime transport strategy for 2008-2018;

-
- b) Seaports: issuing guidelines for the application of environmental legislation relevant to ports and proposing a new ports policy;
 - c) Shipbuilding: promoting technological innovation and a European network of maritime multi-sectorial clusters;
 - d) Maritime jobs: enhancing professional qualifications to offer better career prospects in the sector;
 - e) Environment: reducing the impact and adapting to climate change in coastal zones, and diminishing pollution and greenhouse gas emissions from ships;
 - f) Fisheries management: eliminating discards, destructive fishing practices (e.g. bottom trawling in sensitive areas) and illegal, unreported and unregulated fishing, and promoting environmentally safe aquaculture.
2. Building a knowledge and innovation base for maritime policy, through:
- a) A comprehensive European Strategy for Marine and Maritime Research (Marine Strategy Framework Directive (2008/56/EC); the Seventh Framework Programme for Research contributed to its implementation through innovation resulting from research for an integrated approach to maritime affairs (2007-2013);
 - b) Joint, cross-cutting calls and opportunities for innovation in the blue economy under Horizon 2020, the Framework Programme for Research and Technological Development (2014-2020);
 - c) Support for research on climate change and its effect on maritime activities, the environment, coastal zones and islands;
 - d) A European marine science partnership aimed at dialogue among the scientific community, industry and policy makers.
3. Improving quality of life in coastal regions, by:
- a) Encouraging coastal and maritime tourism;
 - b) Preparing a database on Community funding for maritime projects and coastal regions;
 - c) Creating a Community Disaster Prevention Strategy;
 - d) Developing the maritime potential of the EU's outermost regions and islands.

4. Promoting EU leadership in international maritime affairs, through:
 - a) Cooperation in maritime affairs under the Enlargement Policy, the European Neighbourhood Policy and the Northern Dimension, to cover maritime policy issues and management of shared seas;
 - b) Projection of the EU's Maritime Policy based on a structured dialogue with major partners.

5. Raising the visibility of maritime Europe, by:
 - a) Launching the 'European Atlas of the Seas' internet application as a means of highlighting the common European maritime heritage;
 - b) Celebrating an annual European Maritime Day on 20 May.

6. Creating internal coordinating structures for maritime affairs and defining the responsibilities and competences of coastal regions.

5.1.4. Marine Strategy Framework Directive

Considered a transversal policy of IMP, the Marine Strategy Framework Directive (MSFD) aims to achieve the Good Environmental Status (GES) of the EU's marine waters by 2020, therefore protecting the marine environment and the resources upon which marine-related economic and social activities are based. The objectives of the MDF are as follows:

- a) Protect and preserve the marine environment, prevent its deterioration or, where practicable, restore marine ecosystems in areas where they have been adversely affected;
- b) Prevent and reduce inputs in the marine environment, with a view to phasing out pollution; so as to ensure that there are no significant impacts on or risks to marine biodiversity, marine ecosystems, human health or legitimate uses of the sea.

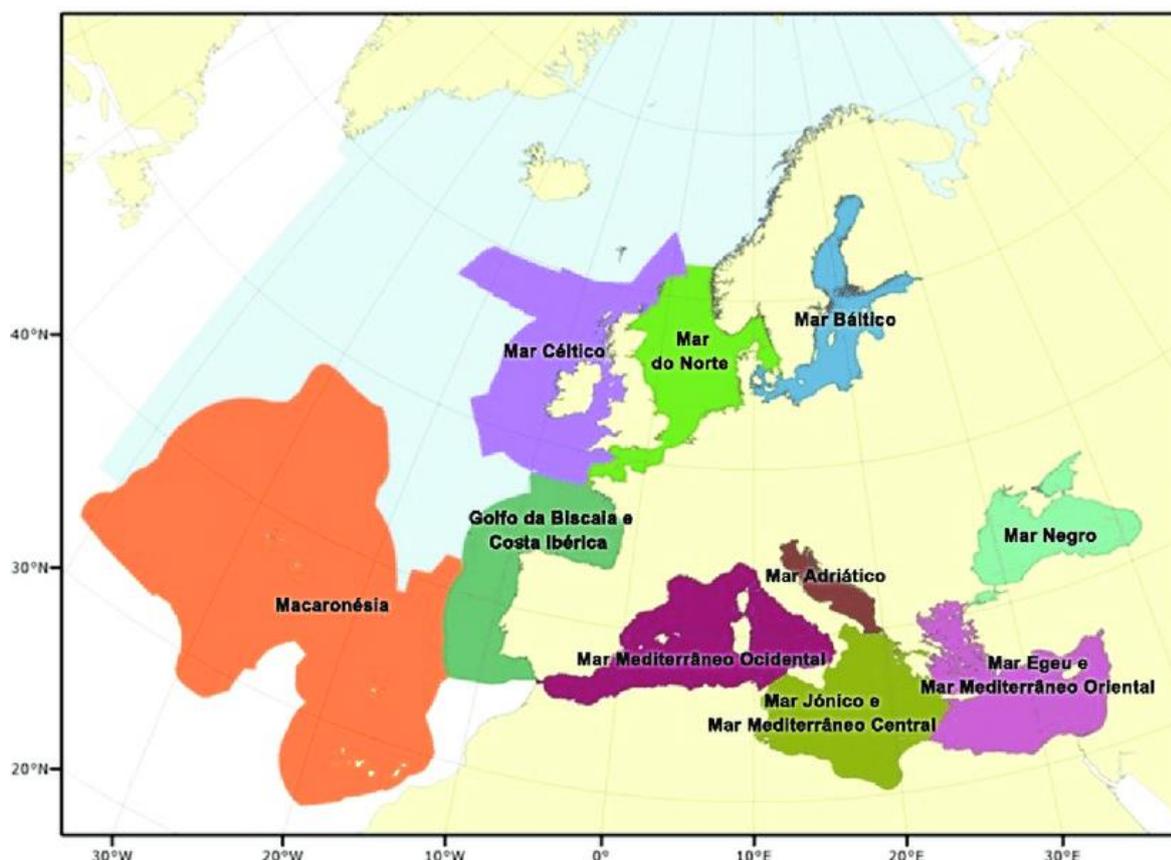


Figure 7 - Representation of the areas defined for the implementation of the Marine Strategy Framework Directive

5.1.5. Blue Growth Strategy

The Blue Growth is one of the policies identified as cross-cutting to the IMP and the Commission Communication of 2012 on the Blue Growth Strategy has pushed forward the IMP and launched a process that has put the blue economy on the agenda of the Member States, business and civil society.

The "Blue Growth Strategy" aims to support long-term sustainable growth in the marine and maritime sectors. The strategy presents the five value chains as being capable of generating sustainable employment and growth in the blue economy: renewable energy aquaculture, blue biotechnology, coastal tourism and seabed mining.

Maritime spatial planning is one of the common bases defined in the Blue Growth Strategy, which contributes to the success of the blue economy through the effective and sustainable management of activities at sea.

The Communication describes how Member States and EU policies are already supporting the blue economy and identifies specific areas in which targeted action could serve as an additional stimulus. Several initiatives will subsequently be launched to explore and develop the potential for growth in these areas.

5.1.6. Common fisheries policy

The Common Fisheries Policy has the aim to manage EU fishing fleets and conserving fish stocks in European waters. The Common Fisheries Policy was created in the 1970s and has been periodically revised and updated to the most recent document, which took effect in 2014. The CFP aims to ensure that fishing and aquaculture are sustainable and is a source of healthy food. It also aims at ensuring a dynamic fishing industry and a fair standard of living for fishing communities. The Common Fisheries Policy have the following objectives:

- Gradually eliminate discards, considering the best available scientific advice, by avoiding and reducing unwanted catches, and by gradually ensuring that catches are landed;
- Make the best use of unwanted catches, without creating a market for such of those catches that are below the minimum conservation reference size;
- Provide conditions for economically viable and competitive fishing capture and processing industry and land-based fishing related activity;
- Provide for measures to adjust the fishing capacity of the fleets to levels of fishing opportunities, with a view to having economically viable fleets without overexploiting marine biological resources;
- Promote the development of sustainable aquaculture activities to contribute to food supplies and security and employment;
- Contribute to a fair standard of living for those who depend on fishing activities, bearing in mind coastal fisheries and socio-economic aspects;
- Contribute to an efficient and transparent internal market for fisheries and aquaculture products and contribute to ensuring a level–playing field for fisheries and aquaculture products marketed in the Union;
- Consider the interests of both consumers and producers;

- Promote coastal fishing activities, considering socioeconomic aspects.

5.1.7. Maritime Strategy for the Atlantic Region

The "Maritime Strategy for the Atlantic Region" covers, in general terms, the coast, territorial waters and jurisdictional waters of the five EU Member States with Atlantic coast (France, Ireland, Portugal, Spain and the United Kingdom) and such as the international waters that reach the Americas, the West, Africa and the Indian Ocean, the East, the Antarctic Ocean, the South, and the Arctic Ocean, to the North. The planning of the maritime space is decisive for the development of two areas that the strategy elicits as promising in economic terms: the first, offshore wind energy and the second, wave and tidal energy, areas with strong development potential in Portugal, see the recent publication of the "Industrial Strategy and Action Plan for Ocean Renewable Energies".

The "Action Plan for a Maritime Strategy in the Atlantic Region" develops the Maritime Strategy for the Atlantic Region and sets out priorities for investment and research to advance blue growth in the Atlantic Region, contributing to the "Blue Growth Strategy ", promoting sustainable growth in coastal areas and ensuring the good environmental and ecological status of the Atlantic ecosystem. The Action Plan examines possible solutions to address the challenges of growth, carbon footprint reduction, sustainable use of natural resources of the sea, responding effectively to 700 threats and emergencies and implementing a water management approach. Based on ecosystems.

The Action Plan contains the following specific objectives:

1. Promote entrepreneurship and innovation:
 - a) Sharing knowledge between higher education organisations, companies and research centres;
 - b) Enhancement of competitiveness and innovation capacities in the maritime economy of the Atlantic area;
 - c) Fostering adaptation and diversification of economic activities by promoting the potential of the Atlantic area.
2. Protect, secure and develop the potential of the marine and coastal environment;
 - a) Improving maritime safety and security;

-
- b) Exploring and protecting marine waters and coastal zones;
 - c) Sustainable management of marine resources;
 - d) Exploitation of the renewable energy potential of the Atlantic area's marine and coastal environment.
 3. Improve accessibility and connectivity;
 - a) Promoting cooperation between ports.
 4. Create a socially inclusive and sustainable model of regional development.
 - a) Fostering better knowledge of social challenges in the Atlantic area;
 - b) Preserving and promoting the Atlantic's cultural heritage.
 5. Promote entrepreneurship and innovation:
 - a) Sharing knowledge between higher education organisations, companies and research centres;
 - b) Enhancement of competitiveness and innovation capacities in the maritime economy of the Atlantic area;
 - c) Fostering adaptation and diversification of economic activities by promoting the potential of the Atlantic area.
 6. Protect, secure and develop the potential of the marine and coastal environment;
 - a) Improving maritime safety and security;
 - b) Exploring and protecting marine waters and coastal zones;
 - c) Sustainable management of marine resources;
 - d) Exploitation of the renewable energy potential of the Atlantic area's marine and coastal environment.
 7. Improve accessibility and connectivity;
 - a) Promoting cooperation between ports.
 8. Create a socially inclusive and sustainable model of regional development.
 - a) Fostering better knowledge of social challenges in the Atlantic area;

- b) Preserving and promoting the Atlantic's cultural heritage.

5.1.8. Water Framework

The Directive 2000/60 / EC of the European Parliament and of the Council of 23 October establishes a framework for Community action in the field of water policy (Directive 891 Water Framework Directive) and has been transposed into the legal system internal by Law 892 no. 58/2005, of December 29 (Water Law), as amended by Decree-Law no. 893 245/2009, of September 22, no. 60/2012, of March 14 , and no. 130/2012, of 22 of 894 June.

An effective and coherent water policy should take into account the vulnerability of ecosystems located near the coast and estuaries or in relatively closed gulfs or seas as their balance is strongly influenced by the quality of the inland waters that flow to them. One of the objectives of the Water Law is effectively the protection of marine waters, including territorial waters.

The guarantee of articulation and compatibility of the Situation Plan with programs and territorial plans that focus on the same area or on areas that, due to the structural or functional interdependence of its elements, require an integrated coordination of planning.

According to article 5 of Decree-Law no. 38/2015, of March 12, the instruments for the planning of the national maritime space must ensure compatibility with the plans elaborated under the Water Law, namely with the Hydrographic Region Management Plans (PGRH), which are water planning instruments for the management, protection and environmental, social and economic valuation of waters at the level of integrated river basins within a river basin district.

5.1.9. Regional legislation

5.1.9.1. Regional Ordinance No. 46/2014 of April 22

Regulates the carrying capacity inherent to cetacean observation activity in the region and delimits an exclusion area for cetacean observation. This area is characterized by being a preferential habitat of the Roaz dolphin to feed, socialize, rest and reproduce.

5.1.9.2. Regional Legislative Decree no. 15/2013 / M of May 14 amended by Administrative Rule no. 46/2014 of January 14

Regulated all the activities of marine vertebrate observation in the RAM and defined the carrying capacity inherent to the observation of this activity. These activities should follow a set of good practices, such as approaching and observing animals, so as not to cause any disturbance.

5.1.9.3. COUNCIL NO. 510/2017

Fixing the fees due for the extraction of inert materials in the seabed, as well as for the collection of rolled rock, to be in force during the year 2018 of 29 December. Portugal, Autonomous Region of Madeira, Vice-Presidency of Regional Government and Regional Secretariat for Environment and Natural Resources, Official Journal of the Autonomous Region of Madeira, 1st series, nº222, p.

5.2. International programs, plans, conventions or international agreements

5.2.1. UNCLOS – United Nations Convention on the Law of the Sea

The UNCLOS (also known as the Montego Bay Convention), which has been in force in Portugal since 3 December 1997, identifies and defines the sea areas over which the coastal States exercise their sovereignty (Territorial Sea), and those in which those States have rights sovereignty or exclusive jurisdiction (Exclusive Economic Zone and Continental Shelf), as well as other spaces on which specific powers are conferred by the Convention, such as the contiguous zone. The way of marking the width of such spaces shall be as set out in Articles 5 and 7 of UNCLOS, ie from the normal baseline - or, where applicable, from the straight baseline -, defined as the low-water line along the coast, represented in the large-scale sea charts, officially recognized by the coastal State.

The UNCLOS has become the instrument that provides for the rights and limitations of the use of maritime space by the various States, defining concepts such as exclusive economic use, rights of passage of ships, rights of exploitation of resources, conservation duties and safeguarding of the environment marine.

5.2.2. IMO - International Maritime Organization

In 1948, an international conference was held in Geneva, where a convention was formally established for the Intergovernmental Maritime Consultative Organization, which in the meantime was amended in 1982 to IMO (IMO - International Maritime Organization).

The IMO Convention entered into force in 1958 and the new Organization met for the first time the following year. IMO is a specialized agency of the United Nations and is the global authority for the definition of safety standards and environmental performance in international shipping.

Portugal signed the IMO Convention on March 6, 1948, and its approval for accession occurred through Decree No. 117/76 of February 9, and the respective instrument of accession was deposited by Portugal, to the Secretary-General of the United Nations, on March 17, 1976.

5.2.3. MARPOL - International Convention for The Prevention of Pollution from Ships

The MARPOL, adopted on 2 November 1973 by the IMO, is the principal international convention dealing with the prevention of marine pollution from ships, whether by accident or by operational causes. The protocol, of the same name, was adopted in 1978 in response to a series of oil tanker accidents that occurred between 1976 and 1977.

Since the 1973 MARPOL Convention did not enter into force, the MARPOL Protocol of 1978 has absorbed the MARPOL Convention. The combined instrument of the Convention and the Protocol entered into force on 2 October 1983. A protocol to amend the Convention was adopted in 1997 and a new Annex (Annex VI on the prevention of air pollution from ships) was added, which entered into force on May 19, 2005. Meanwhile, MARPOL has been updated to 600 over the years.

5.2.4. CBD - Convention on Biological Diversity

The CBD, also known as the Biodiversity Convention, has as its main objective the conservation of biological diversity through the sustainable use of its resources. The fair and equitable sharing of benefits arising from the use of genetic resources, including the appropriate transfer of relevant technologies, taking into account rights over those resources and technologies is also one of CBD's objectives.

The final text of the CBD was agreed upon and adopted at the Nairobi conference on 20 May 1992 and entered into force on 29 December 1993. The CBD was ratified by Decree-Law No 21/93 of June 21st.

5.3. National programs, plans

5.3.1. National Ocean Strategy 2013 - 2020

The National Ocean Strategy 2013-2020 aims at meeting the challenges for the promotion, growth and competitiveness of the maritime economy, adopting the paradigm of blue growth in Portugal. The pursuit of the NOS 2013-2020, through the action plan, considers the following objectives:

- a) reaffirm the national maritime identity in a modern, proactive and entrepreneurial framework.
- b) bring to realization the economic, geostrategic and geopolitical potential of the national maritime territory, turning the Mar-Portugal into an asset with permanent economic, social and environmental benefits.
- c) create conditions for attracting investment, both national and international, in all Sea economy sectors, promoting growth, employment, social cohesion and territorial integrity, and, until 2020, promoting an increase of the sea economy contribution for the GDP of about 50%.
- d) strengthen national scientific and technological capacity, stimulating development of new areas of action that promote the knowledge of the Ocean and effectively, efficiently and sustainably enhance its resources, uses and activities as well as the ecosystem's services.
- e) make Portugal, on a worldwide level, a leading maritime nation and an undisputed partner of the IMP and of the EU maritime strategy, in particular for the Atlantic area.

5.3.2. Strategic Plan for Portuguese Aquaculture 2014 - 2020

The Strategic Plan for Portuguese Aquaculture 2014-2020 (PEAP 2014-2020) aims to increase and diversify the offer of national aquaculture products in accordance with the principle of sustainability, food security and quality. PEAP also aims to satisfy consumers' needs and contribute to local development and job creation. Actions to meet this general aim are grouped in three axes or operational objectives:

- a) Simplify administrative procedures to reduce the needed administrative processes and periods to obtain licenses in order to facilitate the processes for investors
- b) Facilitate the access to the maritime space and identification of potential areas where aquaculture is more feasible and has less environmental impacts, ensuring the combination with other uses.
- c) Reinforce the competitiveness of the sector and promote equitable conditions for EU operators with the aim to increase, diversify and value the national aquaculture production.

5.3.3. Tourism Strategy 2027

The Tourism Strategy 2027 of Portugal was launched in 2017 with the aim to foster tourism as a hub for economic, social and environmental development in all the Portuguese territory, positioning Portugal as one of the most competitive and sustainable destination in the world. The Strategy is based on five axes. The first of them is “Value the territory and its communities” and one its actions is fostering tourism within the maritime economy through (Turismo de Portugal, 2017):

- a) Reinforce the position of Portugal as a destination of nautical, sport and recreational activities associated to the sea, and as a international reference for surfing.
- b) Enhance and value infrastructure, equipment and services supporting nautical tourism, especially ports, marinas and nautical centres.
- c) Nautical activities related to diving, kayaking, whale-watching, fisheries and other recreational activities that integrate the sustainable use in the maritime culture
- d) Enhance routes and tourism offers related to the sea and nautical activities.
- e) Actions to value the coast, including the re-qualification of waterfronts and beaches.
- f) Health and wellness tourism projects associated to sea therapeutic properties
- g) Value sea-related products associated to Mediterranean diet.

5.3.4. National Strategy for Nature and Biodiversity Conservation 2025

The National Strategy for Nature and Biodiversity Conservation 2025 is the fundamental instrument for the development of the environment policy, responding in the national and international responsibilities in the decreasing the loss of natural heritage. This Strategy is based in three strategic axes (Ministerio do Ambiente, 2017):

1. Improve the state of conservation of natural heritage;
2. Promote the recognition of the value of natural heritage;
3. Boost the appropriation of natural and biodiversity values

Axis 3 includes several objectives for the sea (Ministerio do Ambiente, 2017):

- Guarantee the sustainable use of marine resources

- Promote the articulation and integration of objectives about nature and biodiversity conservation in plans, programmes, instruments, and rules of the maritime space
- Ensure the sustainability in the use of marine or terrestrial genetic resources
- Adequate methodologies of Environmental Impact Assessment to the economic activities in the marine environment

5.3.5. Industrial Strategy for Ocean Renewable Energies

The Industrial Strategy for Ocean Renewable Energies was approved in 2017 to set guidelines to accelerate the development of its ocean renewable energy sector in Portugal. EI-ERO describe its Action Plan, which contains three main strategic actions (Conselho de Ministros, 2017)

- Attack R&D and new testing and development projects on marine renewable energy to be installed in Portugal
- Create support to accelerate the export of marine renewable energy technologies through the reinforcement of national business capacity by attracting private investments, administrative simplification and support and fostering of innovative services and products.
- Develop Investor Intelligence initiatives for ocean renewables.

5.3.6. National Program of the Territory Ordinance Policy

The National Territorial Planning Policy (PNPOT) is a territorial development instrument of strategic nature that establishes the great options with relevance to the organization of the national territory, consubstantiates the frame of reference to be considered in the elaboration of the other territorial management instruments and constitutes an instrument of cooperation with the other Member States for the organization of the territory of the European Union.

The PNPOT is currently undergoing a change, and the beginning of work for the preparation of a new 2014-2020 Program of Action has also been determined.

Given that the Basic Law on Soil Public Policy, Land Planning and Urban Planning (LBSOTU) does not apply to the planning and management of the national maritime space, the new PNPT does not cover the national maritime space. However, since the maritime space is an integral part of the national territory, PNPT integrates the contribution of the national maritime space to the development of the territory, in particular the coastal zone in the Continent and the archipelagos of the Autonomous Regions of the Azores and Madeira.

In addition, territorial programs, plans and instruments and maritime spatial planning instruments should ensure their articulation and compatibility, where they relate to the same area or areas which, due to the structural or functional interdependence of their elements, require integrated coordination of planning.

5.4. Regional programs, plans

5.4.1. Marine Strategy for the subdivision of the Madeira

In 2014 the Regional Secretariat for the Environment and Natural Resources presented the Marine Strategy for the subdivision of the Madeira. This document meets the demands of the Marine Strategy Framework Directive and its transposition to the national law to elaborate marine strategies in each of the subdivisions of the country. Marine Strategies are developed in accordance to an action plan which includes a phase of preparation and a phase for programme of measures. The objectives for the subdivision that correspond broadly to the objectives of the MSFD itself (SRA, 2014):

- Protect and preserve the marine environment, prevent its deterioration or, where practicable, restore marine ecosystems in affected areas;
- To prevent and reduce inflows into the marine environment with a view to phasing out pollution as defined in Article 3 in order to ensure that there are no significant impacts or risks to marine biodiversity, marine ecosystems, human health and legitimate uses of the sea.

5.4.2. Strategic Integrated Transport Plan for the Autonomous Region of Madeira 2014-2020 (PIETRAM 2014-2020)

The Strategic Integrated Transport Plan of the Autonomous Region of Madeira (PIETRAM 2014-2020) outlines a strategy to improve mobility management land, sea and air transport in the Autonomous Region of Madeira. With the PIETRAM 2014-2020, the Autonomous Region of Madeira (RAM) now has a sectoral plan that establishes the strategic guidelines at the Regional level for the of transportation, as an instrument for articulating the activity of the Regional Government with that of other entities.

PIETRAM 2014 - 2020 provides a description of the evolution of maritime transport in goods, passengers and cruise ships and maritime-tourist activity. It develops, forecast of potential demand and possible scenarios for this sector.

The PIETRAM as a sectorial plan of regional scope, aims to establish strategic guidelines for intervention in the transport sector, so its elaboration is articulated with the priorities of the Regional Government (Consulmar and Figueira de Sousa, 2016):

- Improve the external accessibility, air and sea for passengers and cargo, in order to promote the greater competitiveness of the Region;
- Improve accessibility and mobility of people and goods between the islands of Madeira and Porto Santo, with greater convenience and lower costs.

In the field of maritime transport, they are identified as the main opportunities for the region:

- Policy initiatives to reactivate the goods and passengers between Madeira and mainland Portugal (cargo Ro / Ro);
- Capture of new lines of cruise ships combining the global trend increase in the number of passengers for the next five-year period (as the Cruise Market Watch



Figure 8 – Strategic Integrated Transport Plan for the autonomous Region of Madeira (PIETRAM 2014-2020)

forecast), with increased installed capacity and improvement of the quality of the service provided in the reception of ships in the port of Funchal;

- Creation of new cruise circuits linking the various territories that make up the Macaronesia;
- Trend in the growth of demand for maritime-tourist activities, especially new circuits.

5.4.3. Strategic Reference Plan Madeira Sea 2030 - Sea Strategy Madeira 2030

The Madeira Wood Strategy 2030 analyses all activities related to the economy of the sea in RAM. It also includes measures of business-oriented, or other economic entities, entities of the Regional innovation and public entities with skills and assignments in key policy areas regional public policies that frame resources and activities.

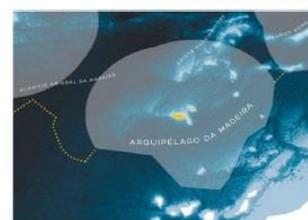
This document is intended to provide a reference for strategic interventions and operations, representing a contribution from the Commercial and Industrial Association of Funchal - Madeira Chamber of Commerce and Industry (ACIF) - CCIM) for the development of the sea in the RAM.

The Mar Madeira Strategic Reference Plan 2030 was elaborated on the initiative of ACIF for the purpose of:

- Define the vision and strategic positioning of the RAM in the scope of the Sea and the Coast, identifying the distinctive and critical factors of success for the valorisation of the array of resources and activities of the Economy of the Sea.
- Construct a perspective of clustering of activities, based on the implementation of a Plan of Action, framing measures, actions, projects and business ideas, with



PLANO REFERENCIAL ESTRATÉGICO MAR MADEIRA 2030
ESTRATÉGIA MAR MADEIRA 2030



Relatório Final
PARTE I – DIAGNÓSTICO E PROSPETIVA DA ECONOMIA DO MAR
Abril, 2015



Intervir + para uma Região cada vez mais europeia



Figure 9 – Strategic Reference Plan Madeira Sea 2030 – Sea Strategy Madeira 2030

operational support for programming and monitoring of initiatives (scientific, economic, educational and sports) connected with the Sea and the Coast.

- To design an instrument that enhances the attractiveness of the economic activity complex aiming at strengthening the competitiveness of the AMR in the global market, with a view to sustainable and sustainable development of the Sea.

In the Madeira Sea Strategy 2030, the maritime space is referred to in the Strategic 6 - Implement a governance model capable of responding to the challenges of developing the economy of the sea. The planning of the maritime space is pointed out as a domain of action of an eminently transversal nature, one of the major challenges to the development of an economy of the sea.

5.4.4. Strategy CLIMATE - Madeira. Adaptation Strategy for Climate Change in the Autonomous Region of Madeira

The CLIMA-Madeira Strategy integrates knowledge on climate various sectors (agriculture and forestry, biodiversity, energy, water resources, hydrogeomorphological, human health and tourism) and defines an integrated approach measures that allow the region to adapt to reducing their vulnerability to their impacts.

The RAM, due to its characteristics and specificities, has a particular vulnerability impacts of climate change, particularly with regard to raising the level of and extreme weather events. In this particular attention should be paid to the island of Porto Santo, due to the existence of coastal

conditions with a coastal strip of beaches and dunes of low altitude that extends along the greater part of the Southeast sector of the island. In the case of Madeira, it should be noted the coastal areas that low levels, as in the case of localities of Machico and Ribeira Brava.

The CLIMA-Madeira Strategy was preceded by studies, in particular CLIMAAT II - Impacts and Measures to Adapt to Climate Change in the Archipelago of Madeira.

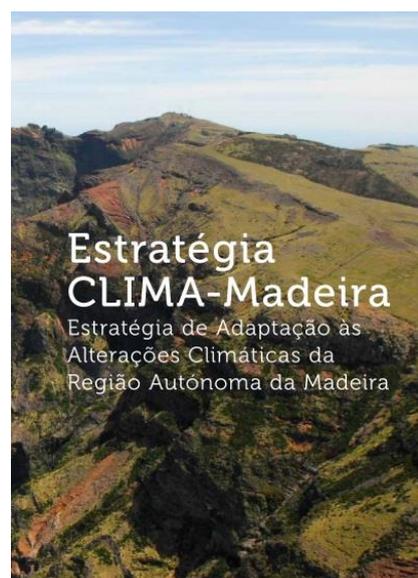


Figure 10 Strategy CLIMATE - Madeira. Adaptation Strategy for Climate Change in the Autonomous Region of Madeira

In this strategy, it is also stated that the effects of climate change will be reflected in the level of marine biodiversity, in particular in certain species considered to be most vulnerable (sperm whale, common whale, whale tropical and the dolphin roaz). In the case of fish and marine invertebrates, the climate change could lead to a reduction in colder climates.

The CLIMA-Madeira Strategy thus constitutes a fundamental tool for measures to address climate change and to support in a concerted and expeditious manner the Regional Government's policies regarding impacts of climate change.

The CLIMA - Madeira Strategy defines the following set of objectives:

- Improve the knowledge about the relationship of the climatic system with the natural and human system in the RAM;
- Reduce the vulnerability of AMR to the impacts of climate change;
- Explore opportunities;
- Promote adaptation based on evidence demonstrated by scientific studies and good practice;
- Integrate the adaptation into the existing government instruments in the RAM;
- Promote involvement and enhance synergies between the various stakeholders in the adaptation process.

5.4.5. Operational Program of the Autonomous Region of Madeira 2014-2020

The Regional Operational Program "Madeira 2014-2020" is a multifund program with contributions from the European Regional Development Fund and the Social Fund European Union for the period 2014-2020, covering the outermost region of Madeira. THE

The total allocation for the Operational Program amounts to EUR 403 million, with financial contribution of EUR 274 million from the European Development Fund (ERDF) and EUR 129 million from the European Social Fund (ESF).

The program aims to contribute to the promotion of competitiveness of the regional economy, cohesion within the region, as well as the contribution of the region to the implementation of the Union's main 2020 targets European Union.

In the Operational Program, the sea and marine resources are designated as regional assets for the development that can contribute to the economic recovery and it will be necessary to invest in its value and increase the efficiency and sustainability of its use.

The resources of the sea that integrate the sectors of activity of the blue economy are referred to as fundamental to the regional economic growth and the creation of working conditions and should therefore be valued and enhanced.

The Operational Program encourages with the archipelagos of the Azores and the Canary Islands.

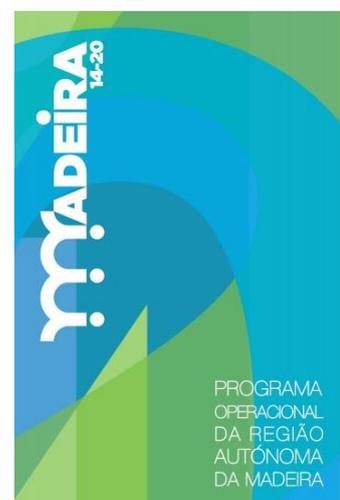


Figure 11 - Operational Program of the Autonomous Region of Madeira 2014-2020

5.4.6. Regional Program for Territorial Planning of the Autonomous Region of Madeira (PROTRAM)

In compliance with the provisions of Article 161 of Regional Legislative Decree no. 18/2017 / M, of June 27, establishing the Regional System of Territorial Management of Autonomous Region of Madeira, was published in the Official Gazette of the Autonomous Region of Madeira, 1st series, no. 222, supplement, of December 29, 2017, Resolution no. 1105/2017,

adopted at the meeting of the Government Council, which revision of the Plan for the Planning of the Territory of the Autonomous Region of Madeira (POTRAM), elaborating the new Regional Spatial Planning Program of the Autonomous Region of Madeira (PROTRAM).

PROTRAM is framed by the Basic Law of the Public Policy of Land Planning and Urban Planning (Law no. 31/2014, of May 30) and by the Legal Regime of the Instruments of Territorial Management (Decree-Law no. 80/2015, of May 14).

This program will foster the appreciation of natural resources with absolute respect the humanized landscape, the safeguarding of the natural, historical and cultural heritage which fits tourism, leisure and recreation.

During the preparation of this report, started the process of elaboration of PROTRAM.

5.4.7. Program of Tourist Planning of the Autonomous Region of Madeira (POT)

The Tourism Planning Program of the Autonomous Region of Madeira (POT) was approved by Regional Legislative Decree no. 15/2017 / M of June 6. The mission of the

Is to define a tourism development strategy of 10 years. This strategy will consolidate the region as a destination differentiated tourism, for the authenticity of the offer, based on the quality of the service, aiming at economic, social and environmental sustainability.

The POT defines for Madeira the following vision: A destination for the whole year, from unparalleled natural beauty, safe, easily accessible, cosmopolitan, recognized as a 'must visit of Europe, with sunny and mild climate, a strong tradition of welcome and a wide range of of experiences, able to surpass the most demanding expectations.

The POT identifies the sea as one of the main strategic resources for the development of tourism in the region. In this sense, it is in depth the articulation and compatibility of the POT with the planning of the maritime space in which the Situation Plan fits.

Within the main objectives resulting from the analysis of the diagnosis made by the POT, were presented some of the development strategies in which it falls the sea theme:

- To requalify, in the logic of modernization and maintenance, the tourist product dominant in the consumption of Nature / Landscape;
- Strengthening the formatting of niche products, with a view to increasing the attraction of tourism, in world demand, which they find in their respective activities the main motivation of their movement;
- Develop and consolidate emerging products due to the socio-economic context present, coupled with some emerging dynamics, and development of new tourism products reasons of specific attraction to the region;

Optimize the secondary offer in a logic of networking, taking advantage of the fact that Madeira now has a richer and diversified, whether in cultural, sporting or entertainment terms, supported by in equipment and infrastructures.

The achievement of the objectives and the strategy of the POT implies the development of actions, not only at local and regional level, as well as actions of high incidence territorial and organizational and immaterial. Thus, the POT action program is composed of three types of programs which are subdivided into sub programmes and / or projects. The three types of programs are as follows:

- Structuring Programs for RAM;
- Thematic Programs and Strategic Projects by Areas and Sectors;
- Organizational Programs for Tourism.

In the Thematic Program and Strategic Projects by Areas and Sectors, the POT More Sea program for tourism and sport activities using the sea as a resource. In this chapter, it is mentioned that the tourist, sports, recreational and cultural activities connected to the sea, are gaining importance in the over the last decades, contributing to the growth of the regional economy.

In this thematic program are given some guidelines or projects that should be the following:

- Creation or improvement of port infrastructures or support to the development of maritime-tourism or sports activity;

- Preparation of an evaluation report on the evolution of maritime tourism activity with a view to identifying constraints, needs and opportunities, and the presentation of adjustment proposals and / or corrective measures to ensure the development of the activity in line with high quality and safety standards;
- The need to develop complementary regulations in relation to sea rides if there is a very significant activity;
- Need to analyse the organization and infrastructure of the ports or in order to allow for the extension of the number of starting points;
- Equating the possibility of creating specific legislation on fishing tourism in order to regulate this activity in the sense of being guaranteed monitoring and control thereof.

5.4.8. Regional Environmental Policy Plan (PRPA)

The Regional Environmental Policy Plan (PRPA) characterizes the state of the environment in identifying barriers and constraints, as well as benefits that can be anticipated with the implementation of a sustainable development.

The plan states that most of the marine pollution originates from the terrestrial environment activities resulting from human attachment to the coast and the vast extent of territorial waters on the other.

Therefore, the coastline suffers, in general, great pressures, which reflected in spatial planning and the generation of high pollution loads, with consequences for the quality of sea water and marine ecosystems.

The region is on the route of the main substances, some of them with characteristics of high toxicity, making the maritime area vulnerable to accidents, illegal discharges of wastewater and solid waste, among others.

In this plan, the maritime component focused on the following objectives:

- Conservation and restoration of natural heritage, with particular emphasis on preservation and enhancement of protected areas, through the implementation of mechanisms that enable their rational management;

- Development of planning and planning tools;
- Enhanced capacity for monitoring and control of environmental quality;
- Raising public awareness of environmental issues.

5.4.9. Plan of the Energy Policy of the Autonomous Region of Madeira (PPERAM)

The Energy Policy Plan of the Autonomous Region of Madeira (PPERAM) intends to endow the Regional Government with an Energy Policy instrument adapted to the new opportunities and constraints introduced by regional development, by the trends in the energy sector and environmental concerns.

The central objectives of the PPERAM are to valorise energy resources regional actions through the implementation of energy efficiency and nationality actions, always considering that it is an isolated island system in terms energy sources.

In the plan it is mentioned that the regional energy system shows a strong dependence and polarization around petroleum products. However, this can be remedied through the use of renewable energy modulation capability for the smaller scales, adapting much better, to island scales and needs, thus favouring the of the islands.

The central objectives of the regional energy policy security of supply, economic competitiveness and protection of the environment - are intertwined with relevant purposes around the valorisation of regional energy resources and the implementation of energy efficiency and rationality actions, taking into account the characteristics of an isolated island system.

5.4.10. Action Plan for Sustainable Energy - Madeira Island and Plan of Action for Sustainable Energy - Porto Santo Island

The Plan of Action for Sustainable Energy for Madeira and the Plan of Action Sustainable Energy for the Island of Porto Santo constitute an instrument of planning that has guided the adopted strategy of valorisation of resources endogenous and energy efficiency promotion.

According to these plans, energy policy is geared towards ensuring the security of energy supply, ensure the economic and social sustainability of environmental performance of the sector and the quality of energy services and contribute to employment, competitiveness and added value.

In this context, for the island of Madeira and for the island of Porto Santo, a set of objectives and targets for the year 2020 and studied the actions to achieve these goals, including renewable energy.

The following objectives were defined for these plans:

- Improving the security of energy supply;
- Reduce dependence from abroad;
- Reduce energy intensity in gross domestic product;
- Reduce carbon dioxide emissions.

5.4.11. Strategic Plan for Waste from the Autonomous Region of Madeira (PERRAM)

The Strategic Plan for Waste of the Autonomous Region of Madeira (PERRAM) defines the strategic options and operational interventions for waste management in the RAM. PERRAM was structured in two parts considered fundamental for the definition of and implementation of a waste management strategy:

- Part A - Strategic Options;
- Part B - Operational Interventions.

Part A is primarily strategic and aims at designing the waste to the region. The definition of the strategy to be implemented includes:

- The strategy of reducing and reusing materials;
- The definition of material recycling targets and their timing;

The definition of the strategy to be adopted for the collection of municipal solid waste, recyclables and special waste;

- The specification of the waste treatment solution recommended for the region, including the dimensioning and location of the various components;

- An indication of the management tools to be adopted to promote effective implementation of the recommended measures;
- The discussion of alternative institutional schemes for the management system of waste from the RAM.

Part A also refers to the high costs associated with shipping for the shipment of recyclable products outside the region.

Part B consists of the identification of operational strategic options adopted in Part A. This on the actions to be implemented and the means to be used to achieve the established goals:

- Reduction of waste production;
- Recycling of materials;
- Implementation of the collection, treatment and final destination system;
- Adequacy of the regional legislative framework;
- Guidelines for the revision of the institutional framework and implementation of management tools;
- Monitoring the implementation of PERRAM.

5.4.12. Regional Water Plan (PRAM)

The Madeira Regional Water Plan (PRAM) is an instrument of planning, with a view to the management of in terms of quantity and quality, in order to availability, valorization, protection and management of water.

The PRAM concretizes the participation of the Autonomous Region of Madeira in the planning of the water resources of Portugal, in accordance with the principles strategic and programmatic aspects of the National Water Plan.

5.4.13. Management Plan for the Hydrographic Region of the Madeira Archipelago 2016-2021 (PGRH 2016-2021)

The Management Plan for the Hydrographic Region of the Madeira Archipelago (PGRH 2016 - 2021) is characterized as a water planning instrument aimed at management, protection and environmental, social and economic valuation of water at the hydrographic basin.

Its long-term objective is to ensure the sustainability of all activities with impact on water, thus ensuring the availability of good quality water for sustainable and equitable use.

The PGRH 2016-2021 intends to fulfil the following objectives:

- Ensure the sustainable use of water, ensuring the satisfaction of needs of the present generation without compromising the possibility of generations to meet their own needs;
- Provide criteria of affectation for the various types of intended uses, having taking into account the economic value of each of them, as well as harmonization of water management with regional development and sectoral policies, individual rights and local interests;
- To establish the environmental quality standards and the criteria regarding the state of waters.

Under this plan, an analysis is made of the hydromorphological pressures that affect coastal waters, in particular as regards environmental quality and ecosystems and how these are influenced by the different dynamic processes and by human actions and interventions.

In the Summary Report on the Characterization of the Hydrographic Region, the that should be analysed. In the island of Madeira, four masses of water: COSTMADP1; COSTMAD P2; COSTMADI1; COSTMADI2. At the Porto Santo was identified as COSTPORI. For the Desertas islands COSTDESI. For the Selvagens islands to COSTELI1 to the Big Wild and COSTELI2 to the Small Wild.

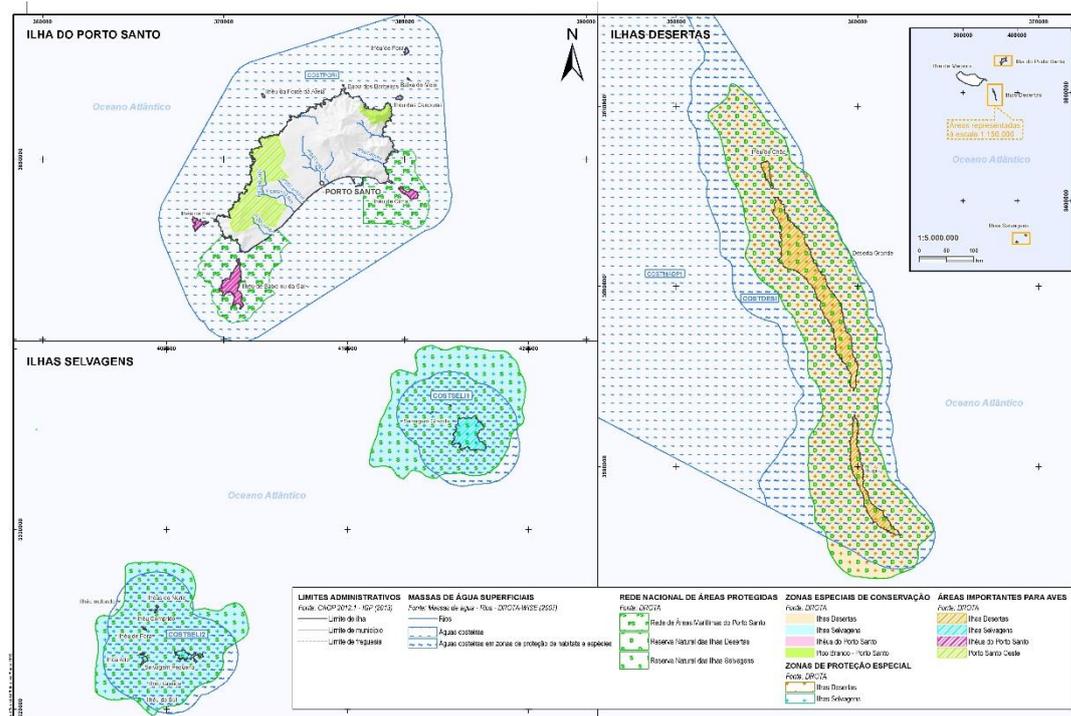


Figure 12 - Delimitation of water bodies in maritime space - Porto Santo Island, Selvagens Islands and Desertas Islands

5.4.14. Risk and Flood Management Plan of the Autonomous Region of Madeira (PGRI - RAM)

The general objective of the Flood Risk Management Plan of the Autonomous Region of Madeira (PGRI-RAM) focuses on reducing the potential harmful consequences of from floods to human health, the environment, cultural heritage, infrastructures and economic activities in areas identified as potentials. This general objective integrates the following strategic objectives:

- Increase the perception of the flood risk and the strategies of action in the population and the social and economic agents;
- Improve knowledge and predictability to tailor flood risk;
- Improve spatial planning and exposure management in flooding;
- Improve resilience and reduce the vulnerability of elements in areas of possible flooding;
- Contribute to the improvement or maintenance of good water bodies.

In this way, the risk associated with flood zones is through structural and preferably non-structural measures, focusing on actions preventive measures. The term "reduced" includes all measures with the potential to flood risks, in order to reduce the floods.

The PGRI-RAM is composed of a set of measures that have as a framework to reduce the risks associated with floods, taking into account the time period which takes to implement a particular measure and the time available to complete it - until 2018, 2019 or 2021 - depending on how the measure could be incorporated into the preliminary flood risk assessment and the areas with significant potential risks, flood risk mapping or in the revision of the PGRI - RAM, respectively.

5.4.15. Coastal Program of Porto Santo (POC - Porto Santo)

The Legal Regime of Territorial Management Instruments - Decree - Law no. 80/2014 of May 30, adapted to the Region by Regional Law Decree No. 18/2017 of 27 June, develops the Basic Law of the Public Policy of Soils, Territory and Urbanism in Law n. 31/2014 of May 30, which falls within the scope of preparation and approval of the POC, as well as the nature, objectives, material content and documentary of these territorial management instruments.

The Porto Santo Coastal Coast Program (POC - Porto Santo) is of a regional nature and is prepared by the Regional Government. The program establishes the natural resources and values and aims to safeguard regional interest and the guarantee of the conditions of permanence indispensable for the sustainable use of the territory.

This plan determines the frame of reference of the actions allowed, conditioned or with respect to the occupation, use and transformation of the soil that will be included in other plans, such as the Situation Plan.

The POC - Porto Santo is located on the coast of Porto Santo, with a approximately 45 km, covering the municipality of Porto Santo. On the side of land area, a land area of protection and the sea side, a maritime area of protection whose delimitation observes the following criteria:

- Protected terrestrial zone - composed of the margin of the sea waters and a band, measured horizontally, with a width of 500 m, counted from of the line which limits the margin of the sea
- Marine protection zone - range between the bed boundary of the waters of the sea and the bathymetry of the 30 m referenced to the hydrographic zero

The coastline of Porto Santo consists of distinct geomorphological sections predominantly integrating zones of high coast, in cliffs cliffs, the East, to the North and West, and dunes and beaches, to the Southeast. Thus, the delimitation of the the seabed served a number of different situations, coastal morphology.

The area of intervention of POC - Porto Santo will cover a total area of 68.8 17.5 km², about 25% of the total area, corresponds to the terrestrial zone of protection and 51.3 km², about 75% of the total area, corresponds to the maritime protection zone.

During the preparation of the Situation Plan, the process for the continued work on the POC - Porto Santo.

5.4.16. Master Plan of the Port of Funchal, Master Plan of the Port of Caniçal and Master Plan of Porto Santo Port

The master plans present a brief description of the main functions and valences of the main ports of the Region - Funchal, Caniçal and Porto Santo - and respective (wharfs).

These documents refer to the maximum depths of each port, the navigational manoeuvres that must be carried out in a manner that ensures safety, available port equipment, infrastructures and land installations port services available.

The Master Plan of the Port of Funchal was drawn up in 2005 and has as main objective reordering of port activities, promoting the progressive relocation of the commercial activity for the port of Caniçal and the specialization of the port of Funchal in tourist port The Master Plan was eventually revised in 2012 due to inclement weather which took place in February 2010, altering the physiography of the Funchal seafront.

The Port Master Plan of Caniçal was created in 2004 and has the purpose of making it in the commercial port of the region. The port began as a commercial port in the year of 2005.

The Porto Santo Master Plan was drawn up in 2002 and had the objective of delimiting the functional areas of the port and define the principles and rules of occupation and use of the port.

5.4.17. Municipal Master Plans

The Situation Plan also took into account the Municipal Master Plans in force in Region, particularly in the coastal areas. The Chambers were also consulted Municipalities in order to carry out a survey of the main infrastructures and equipment relating to the sea, economic activities or sporting events.

5.4.18. Plans related to marine protected areas

The planning and management plans, the programs of measures and management and management of protected areas, aim to establish the safeguarding natural, scenic, cultural and geological resources and values, as well as the management regime compatible with the sustainable use of the territory.

Since the Situation Plan suggests full articulation and plans or programs covering the same area or structural or functional interdependence of its elements, it is necessary that the these documents are duly analysed.

All these plans or programs establish a safeguard policy and conservation of natural resources and values and of the management regime compatible with sustainable use of the territory, which translates into different protection regimes and zonation's (uses and activities to be interdicted, conditioned and promoted, for protection regime).

5.5. Compatibilization

The definition of the vision and objectives was made on the basis of what was stipulated by Directive 2014/89 / EU of July 23 and by LBOGEMN.

In a second phase, each of the plans or programs as well as the legislation in force were evaluated in order to verify if there were incompatibilities and to integrate the objectives in the objectives of the PSOEM. It was found that there were no liabilities and that some of the objectives of the plans or programs presented coincided.

Since it was a national plan, it was decided to define broader objectives so that regional realities could be adjusted.

6. Administrative services and restrictions

Administrative services result from legal impositions, or administrative acts, which are intended for public utility and which may result in prohibitions or limitations or compel the practice of actions. The services and restrictions also cover the maritime space so that the delimitation of private or common use uses or activities are dependent on compatibility with these areas.

It follows the description of existing administrative services and restrictions in the maritime space under the jurisdiction of RAM.

All layers of information, referring to service and administrative restrictions, are properly identified in the *geoportal*, and their visualization and extraction of limits is possible according to specific needs.

6.1. Port infrastructure, marinas and recreational ports

6.1.1. Port infrastructure

Port areas, in addition to their limits of jurisdiction, define services related to the need for transit of ships to and from the port. The Situation Plan identifies maritime access to the various ports and mandatory piloting areas.

The areas of jurisdiction of the main ports are the responsibility of the Port Administration of the Autonomous Region of Madeira, S.A. (APRAM. S.A.), an entity responsible for managing the port areas and the Vice-Presidency of the Regional Government.

The delimitation of these port areas is based on Regional Legislative Decree No. 25/2003/M of August 23, and the work of amending the areas of jurisdiction that take place.

According to these work, the port infrastructure in RAM that is under the purview of APRAM, S.A., is divided into three categories of importance for management:

- Main ports, with a range of 3 nautical miles
- Secondary or 2nd level ports, with 1.5 nautical miles
- Terciaries or 3rd level ports, with ranges of 500 linear meters

In port areas are included:

- Areas reserved and consolidated by specific plans for fundeadours in the main ports of RAM determined in Articles 21 to 24 of the Security Regulation annexed to the Apram S.A. Operating Regulation, approved in paragraph 4 of Act No. 38/2010 of 28 September of the Board of Directors
- Pipeline terminals
- Areas of exclusive access to port areas

The delimitation of port areas will take into account the following criteria:

- a) The base of the cliffs and/or top of the "sea rocks" as a basis for delimiting the land points plus upstream of the seabed
- b) The jurisdiction "at quota" (altimetry consideration) for cases where domain overlaps are present, in particular with regional and/or equivalent roads and tunnel situations
- c) For the delimitation definition model, an original orthogonal base, from an imaginary line, applied at the transition points between the land zone and the maritime area being managed new 30° opening angles in opposite directions, creating thus, their uniform "covered-up cones", serving as bed-area boundary lines, port areas to be defined
- d) The different demarcation distances for each port area category (3 miles, 1.5 miles and 500 meters), are marked on the demarcation lines defined in the preceding point
- e) The union of the points, consequent to the ends of the two lines previously identified, lead to the delimitations of the coverage areas of each port.

6.1.1.1. Main ports

The port of Funchal, Caniçal and Porto Santo are the main port infrastructure of the archipelago. It is through these ports that the region establishes maritime links with the outside.

The configuration, infrastructure, equipment and services, which today characterize these port areas, result from the implementation of port master plans.

In the region, several improvements have been made over the last few years in port areas through recovery and development works. The main characteristics of the costly infrastructure serving the main port infrastructure are then stated.

Port of Funchal

The port is located in the bay of Funchal city. In recent years, the port of Funchal has been the target of profound restructuring. The inability to deal with the multiplicity of commercial and tourist activities led to the restructuring of the port of Funchal, making it a port dedicated to cruise tourism and nautical activities, freeing the city of Funchal from movement and freight transport, passing the commercial activity to the port of Caniçal.



Figure 13 - Port of Funchal

Characteristics of port infrastructure:

Pier 1

It includes a *Ro/Ro* ramp and is intended to serve ferry traffic. This pier has the following features:

- Total length of the pier - 150 m
- Depth of the shoulder basin:
 - 60 m with funds between (-6.0 m) ZH and (-8.0 m) ZH
 - 90 m with funds between (-3.0 m) ZH and (-6.0 m) ZH

Pier 2

It is intended to serve cruise ships. This pier has the following features:

- Total length of the pier - 425 m
- Depth of the shoulder basin (-9.0 m) ZH

Pier 3

It is intended to serve cruise ships. This pier has the following features:

- Total length of the pier - 347 m
- Depth of the shoulder basin (-10.0 m) ZH

Pier 4

This pier is intended to receive the navy patrol ship. This pier has the following features:

- Total length of the pier - 65 meters
- Depth of the shoulder basin (-6.0) ZH

Pier 5

This pier is intended for the reception of port service vessels and fishing vessels. This pier has the following features:

- Total length of the pier - 95 meters
- Depth of the shoulder basin (6.0) ZH

Pier 6

It is intended to serve cruise ships. This pier has the following features:

- Total length of the pier - 260 m
- Depth of the shoulder basin (-7.5 m) ZH

Pier 7

Located next to the st. Lazarus varadouro. A new docking terminal will be created between the western end of the shelter jetty of the dock of S. Lazarus and the extreme of the wall of laying guiding the mouth of the river of S. João for patrol ships of the navy and other ships.

Pier 8

It is intended to serve cruise ships. The dimensional characteristics of this pier are as follows:

- Total length of the pier - 363 m
- Foundation quota (-9.0 m) ZH

Canical Port

At the far east of the south coast of Madeira island, Canical port is located. It is a commercial port responsible for the movement of commercial cargo: containerized cargo, general cargo, solid and liquid bulk.

The surroundings of the port of Canical is today an important logistics platform for the region, housing various services and industries.

Characteristics of port infrastructure:

Pier 1 or tripod terminals and Ro/Ro

It includes a Ro/Ro ramp and is intended to serve bulk traffic, with the exception of fuels and Ro/Ro. The pier has the following features:

- Total length of the pier - 640 m
- Depth of the shoulder basin (-13.4 m) ZH

Pier 2 or multipurpose terminal

It is intended to serve containerized and fractionated general cargo vessels:

- Total length of the pier - 420 m
- Depth of the shoulder basin (-8.0 m) ZH

The Canical fuel terminal is located east of the port of Canical. Associated with the terminal there is a fuel storage park located in the Industrial Free Zone of Madeira. This terminal is dedicated to the reception of petroleum products.

This terminal consists of 4 mooring buoys oriented south/north and receives ships up to 180 meters long and with a dimension of -15 ZH.

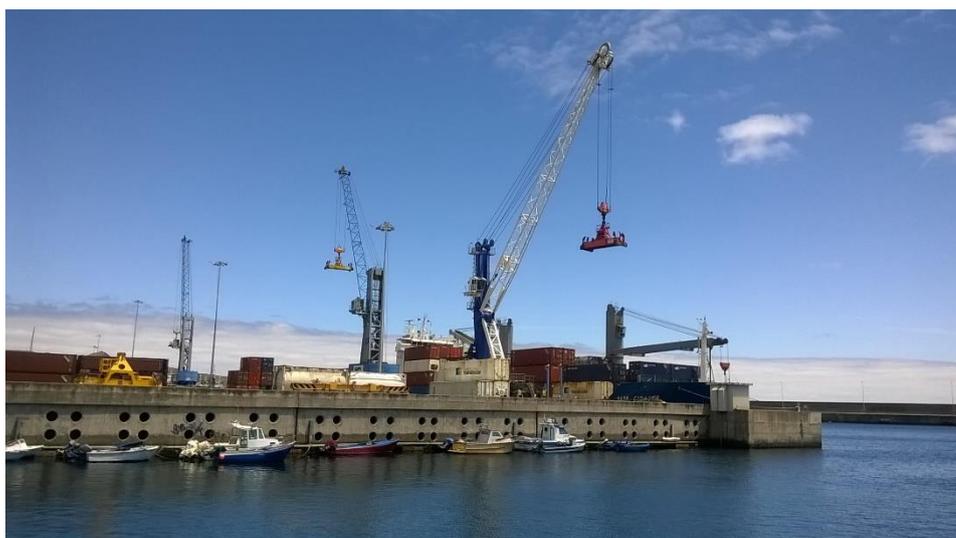


Figure 14 - Port of Caniçal

Porto do Porto Santo

The port of Porto Santo is located on the east end of the south coast of the island of Porto Santo. It is an artificial port, built in the mid-80s of the last century.

Access to the port is made by the marginal regional road to the coast, constituting as the axis of connection to the main urban nucleus of the island. The port aims to transport people and goods and the development of recreational and sports activities.

Characteristics of port infrastructure

Pier 1

Includes Ro/Ro ramp and is intended to serve the inter-island ferry ship, cruise ships, general cargo ships (containerised and factioned), and fuels:

- Total length of the pier - 300 m
- Depth of the shoulder basin:
 - 200 m with funds from (-7.0 m) ZH
 - 100 m with funds from (-6.0 m) ZH

Pier 2

It is primarily intended for the reception of general cargo vessels.

- Total length of the pier - 200 m
- Depth of the shoulder basin of (-3.0 m) ZH to (-7.0 m) ZH

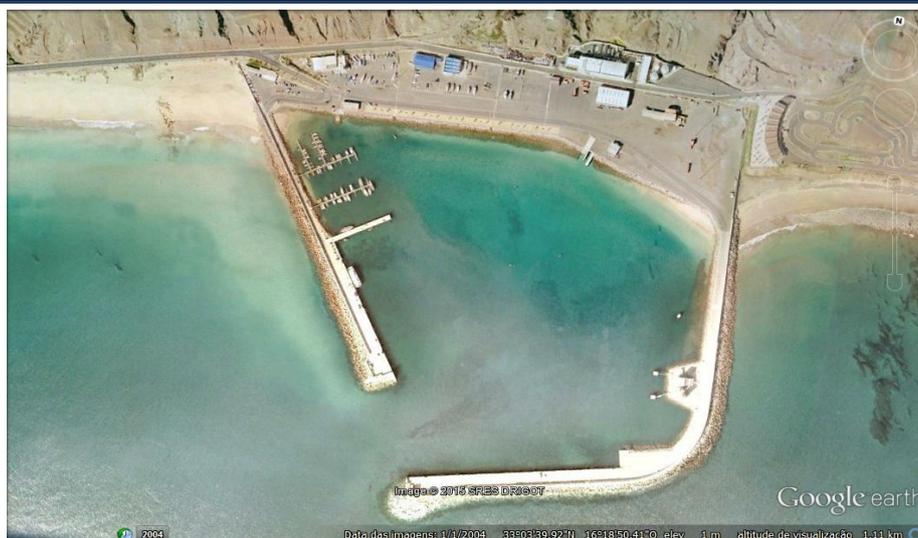


Figure 15 – Port of Porto Santo

The terminal of Porto Santo, is installed next to the curved section of the main jetty of the port of Porto Santo. This terminal is intended for the discharge and movement of solid bulk (cement) and is awarded by APRAM, S.A. The terminal of Porto Santo has a depth of the shoulder basin of -6.0 m ZH.



Figure 16 Terminal of Porto Santo

The following figure includes the main port infrastructure.

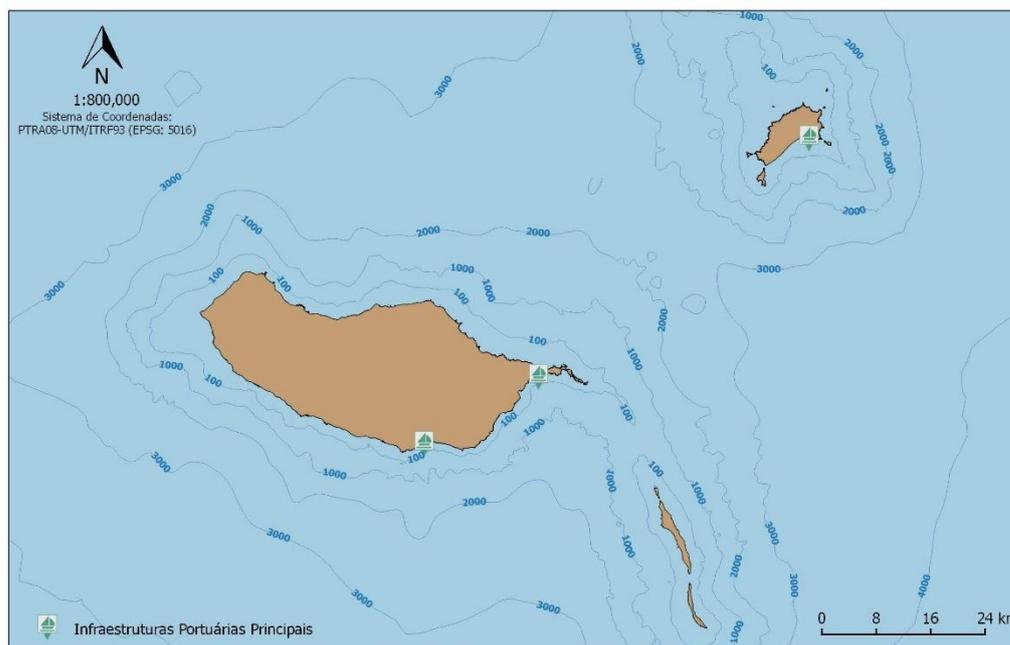


Figure 17 - Main ports. Source: APRAM, S.A.

Secondary ports

The secondary ports defined in the region are as follows:

- Porto do Porto Novo
- Port of Câmara de Lobos
- Port of Porto Moniz
- Port of Calheta

Porto do Porto Novo

The port of Porto Novo is located in the municipality of Santa Cruz. It is intended for the discharge of aggregates.



Figure 18 – Port of Porto Novo

Terminal of Câmara de Lobos

The port of Câmara de Lobos includes a port area and has an a45 m long dock with funds between -3 m and -4 m (ZH) for fishing boats, sea-tourist and recreational vessels.

In the port of Câmara de Lobos is included the former terminal of the Rescued. This terminal is intended for bulk cement discharge and is characterized by having funds of -8.0 meters (ZH), which



Figure 19 – Terminal of Câmara de Lobos

allows the docking of ships up to 120 m long and quiet maximum of 7 m.

Port of Porto Moniz

The port of Porto Moniz, has a shelter jetty with a pier. The main functions performed by the pier are intended to support artisanal and recreational fishing and recreational nautical.

Port of Calheta

It has an dockable pier about 100 m long, with funds about -3.8 m (ZH).



Figure 20 - Location of secondary ports. Source: APRAM, S.A.

Tertiaries ports

The terciaries ports defined for the region are as follows:

- Port of Machico
- Porto da Ribeira Brava
- Port of Paul do Mar
- Port of Santa Cruz

Port of Machico

The port of Machico has two docks, one 90 m long and the other with 60 m in length and with funds up to -6 m (ZH). The main functions performed by this port are intended to receive local fishing vessels, maritime-tourist and recreational nautical.

Porto da Ribeira Brava

The port of Ribeira Brava has two docks, one 50 m long and the other with 80 m in length. The main functions performed by this port consist of receiving some local fishing vessels, tourist seafarers and recreational nautical.

Port of Paul do Mar

The port of Paul do Mar has a shelter jetty approximately 169 m long and bottoms between -1m and -4m ZH. The port is intended to serve artisanal and playful fishing, recreational nautical and tourist maritime activities.

Port of Santa Cruz

The port of Santa Cruz has a shelter jetty approximately 50 m long. The port is intended to serve artisanal fishing, recreational nautical and tourist maritime activities.



Figure 21 - Location, New Location of tertiary ports. Source: APRAM, S.A.

In the region there are also several secondary infrastructures that provide access to the sea in adequate security conditions. These are essentially ramps, piers, pontoons that have supported the development of maritime-tourist activity or which at least have the potential to serve this activity.

Although they are not referenced as secondary or tertiary ports, it is also important to mention the Pier of the Magdalene of the Sea and the pier of Santa Cruz (under the head of the airport), the pier of the Seixal, as well as some pontoons, pier bridges or other structures fixed side of vessels that exist along the coast. In some cases these infrastructures are in poor condition and therefore require significant maintenance interventions. These infrastructures are under the safeguarding of public or private entities.



Figure 22 -Infrastructures of access to the sea such as small piers. Source: Hydrographic Institute

Main marinas and recreational ports

RAM has five main infrastructures with shelter against maritime unrest. Five of these infrastructures are located on the southern coast of Madeira Island and one on the island of Porto Santo. In total, these infrastructures provide approximately 770 floating parking spaces. Currently, Funchal marina experiences reception problems, with sold out. Each of these marinas is part of a specific port.

Table 1 - Characteristics of the region's recreational marinas

Designation	Floating mooring station	Dry Park	Comp. Max. of the vessel (m)	Operator/Manager	Construction Date
Marina do Funchal	240 (visitors +20)	S.i.	20	Private	1984
Marina Quinta do Lorde	260	0	50	Private	2002
Port of Recreio de Machico	70	0	20/25	Public	2005
Santa Cruz Recreational Port	40/60 (if equipped with walkways and fingers)	15/30 (facilities of the Yacht Club of Santa Cruz)	15/20	Public	2006
Marina do Porto Santo	140	40/50	50	Private	S.i.

It should also be mentioned the dock for maritime-tourist activities, next to the port of Funchal. This dock has an acostable pier about 200 m long and a minimum service depth of – 3.5 m (ZH).

Port approach areas

For the main, secondary, tertiaries and marinas/recreational ports, the areas of port approach were delimited. The delimitation of these areas was based on the diploma in force - Regional Legislative Decree No. 25/2003/M of August 23, and the work of amending the areas of jurisdiction that took place during the preparation of the Situation Plan.

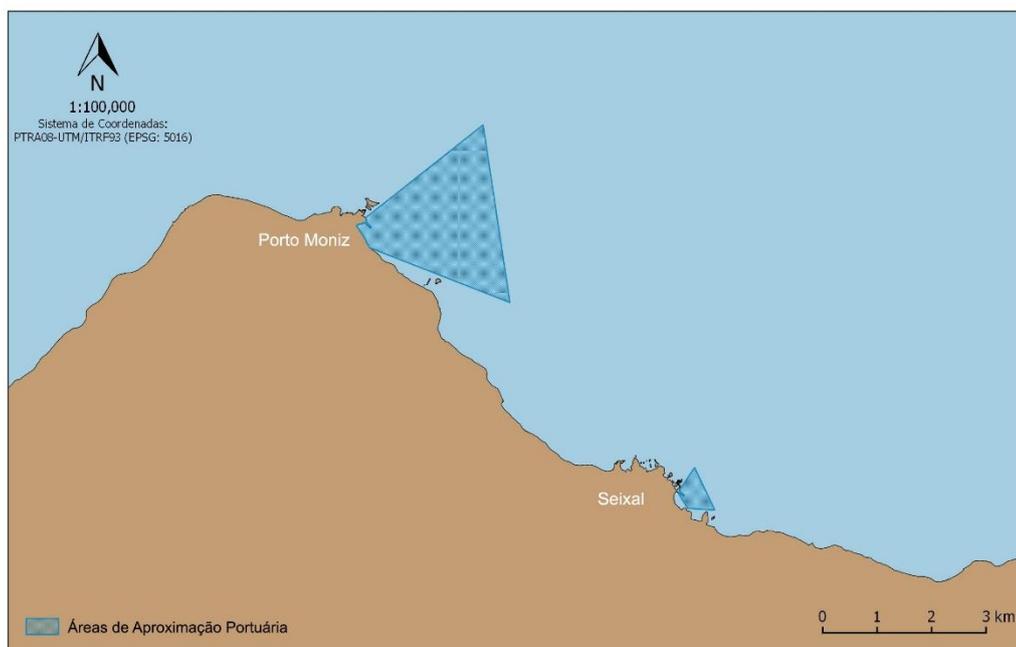


Figure 23 - Port approach areas - Northwest of wood island. Source: APRAM, S.A.

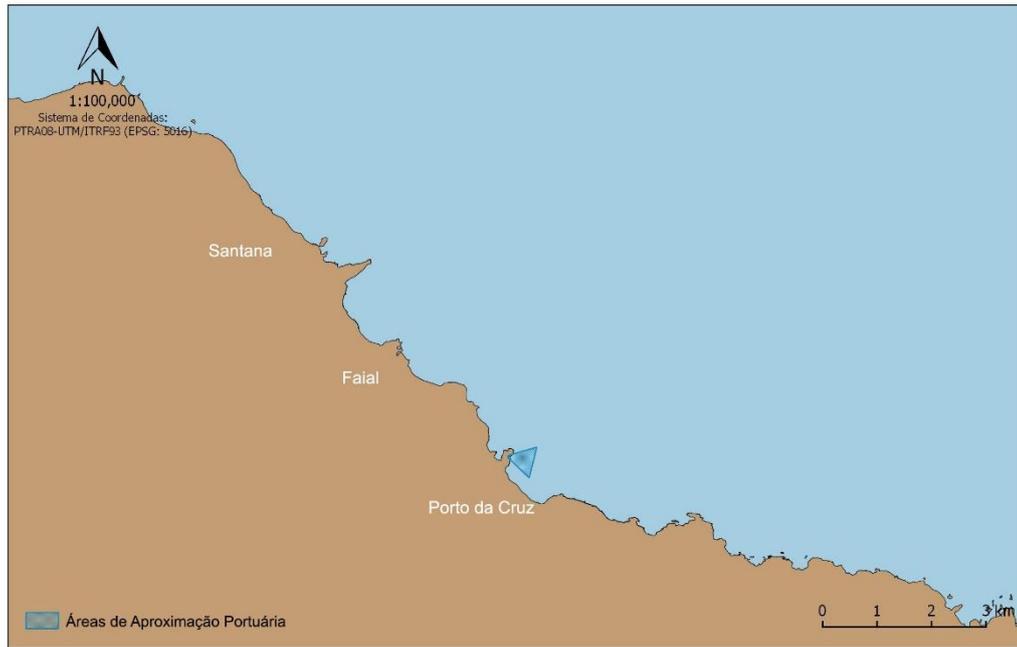


Figure 24 - Port approach areas - North-northwest of Madeira island. Source: APRAM, S.A.

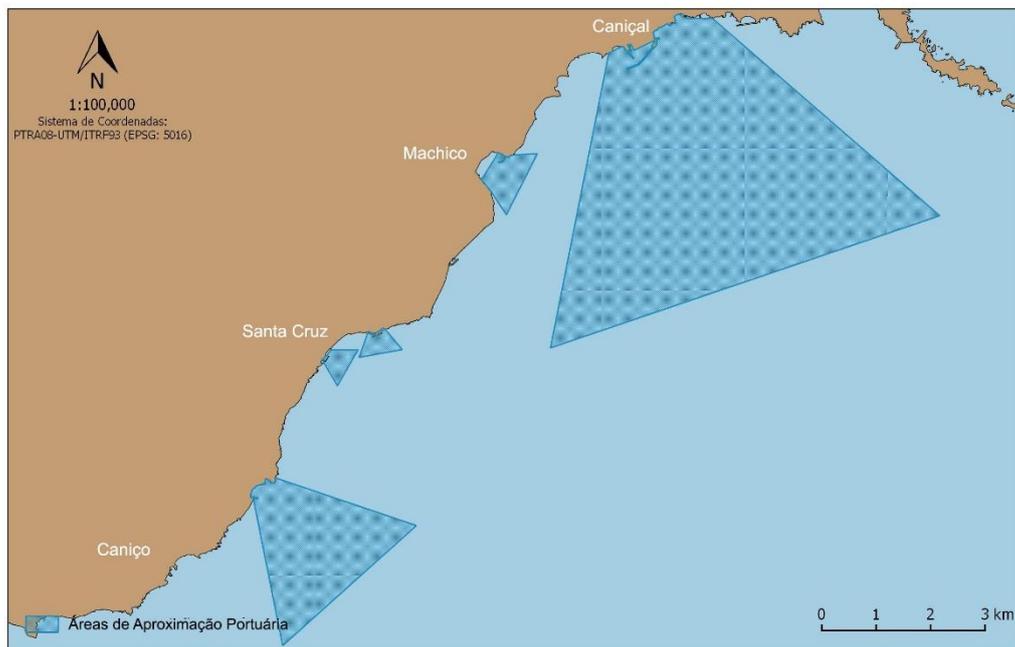


Figure 25 - Port approach areas - Southeast of Madeira island. Source: APRAM, S.A.

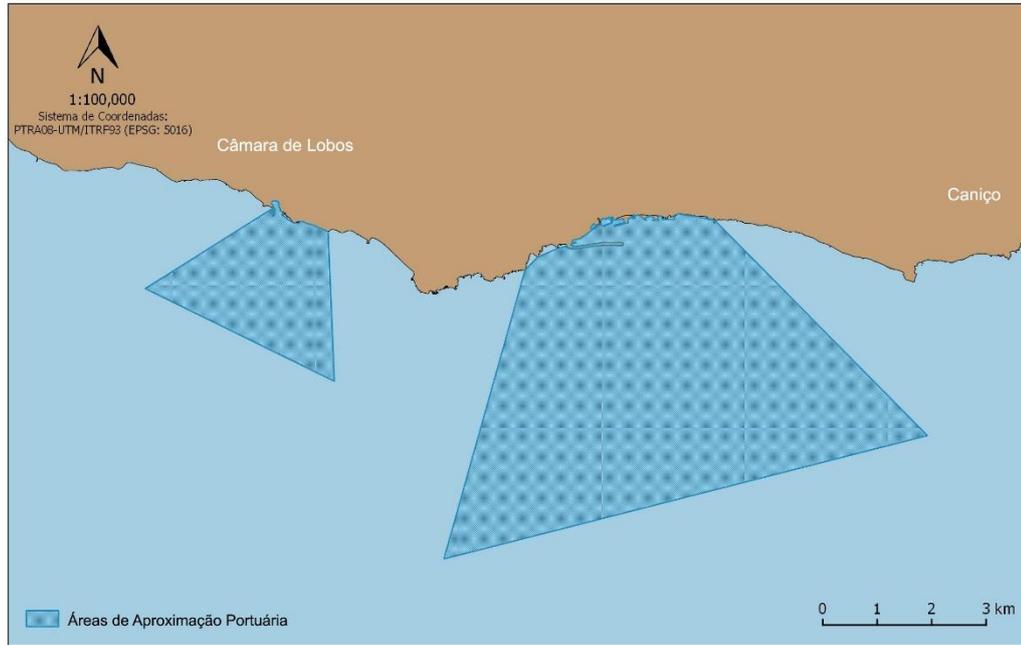


Figure 26 - Port approach areas - South-southeast of madeira island. Source: APRAM, S.A.



Figure 27 - Port approach areas - Southeast of madeira island. Source: APRAM, S.A.

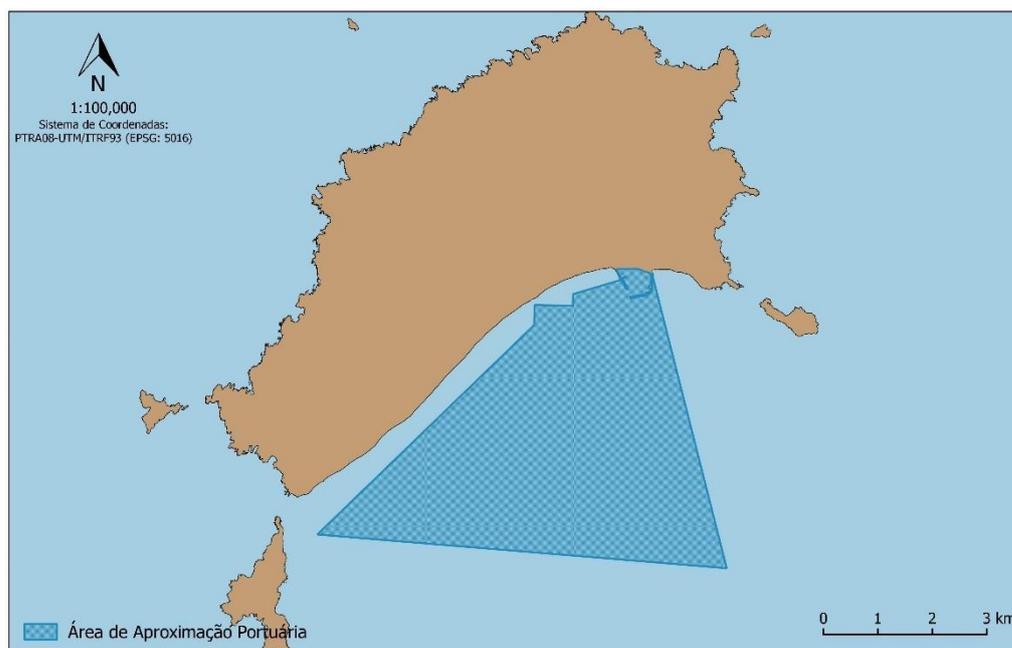


Figure 28 - Port approach area - holy island port. Source: APRAM, S.A.

6.1.3. Precautionary areas for navigation and mandatory piloting

The Archipelago of Madeira, consisting of a set of volcanic islands, based on a deep continental shelf and steep slope along the coastline, is devoid of submerged geological obstructions that may pose a risk to the navigation and passage, especially on the south coast of Madeira Island. In this way, an appropriate safeguard for land should be fulfilled which should be at least three miles.

On the north coast of the islands of Madeira and Porto Santo, certain geological obstructions are seen, recommending that traffic navigation be kept at least eight nautical miles from the coast line. Thus, the use of the piloting service is mandatory in the following areas:

- Port of Funchal: the interior of the port and up to the outer limit of 3 miles, centered on the lighthouse of the eastern tip of the pontinha jetty
- Caniçal Port: the interior of the port and up to the outer limit of 3 miles, centered on the lighthouse of the south jetty
- Port of Porto Santo: the interior of the port and up to the outer limit of 3 miles, centered on the lighthouse of the southern jetty



Figure 29 - Mandatory piloting areas. Source: APRAM, S.A.

Landing at ports and marinas takes place in naughty waters and without risks of riding for the experienced navigator, provided that in the operation the minimum of nautical care is followed.

The maneuver is conditioned within the port basins, due to the following factors:

- Size of ships
- Punctual adverse weather conditions

Special caution should be given to the tidal regime in the Wild Islands, which causes the appearance of a part of the island.

7. Nature conservation

7.1. Marine protected areas and nature network

The marine protected areas (AMP) existing in the Madeira subdivision were designated by IFCN - IP RAM, and correspond, mostly, to coastal AMP located in the territorial sea.

In The AER, areas for nature conservation essentially have a nature reserve status and are mainly created under the Habitats and Birds Directive. At this date there are five Zec under the Habitats Directive with marine area – Islet of widow, wild islands, desert islands, islanders of Porto Santo and Ponta de São Lourenço, of which three are also ZPE under the Birds Directive – Wild Islands, Desert islands and Ponta de São Lourenço.

Figures 30 and 31 represent the areas of natura network.

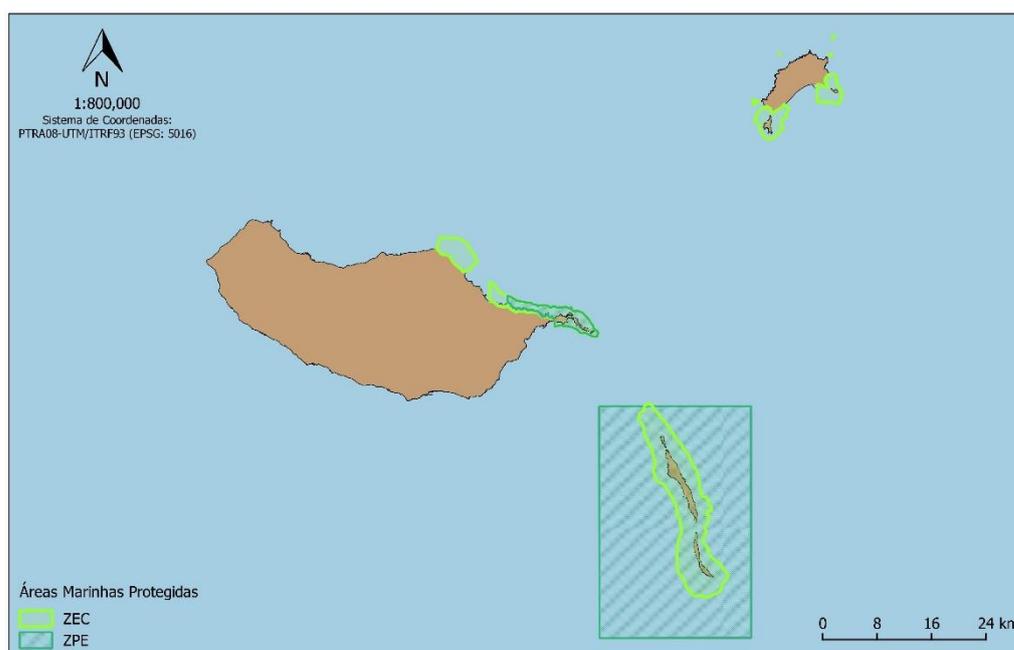


Figure 30 - Marine protected areas on the island of Madeira, island of Porto Santo and Desertas islands. Source: IFCN, IP RAM.



Figure 31 - Protected marine areas of the Wild Islands. Source: IFCN, IP RAM.

The delimitation of these marine protected areas aims to protect and safeguard *habitats* and ecosystems considered important or vulnerable.

7.1.2. Madeira cetaceans site

Madeira's cetacean site (Resolution 699/2016 of October 17 approves the inclusion of the Cetacean Site in Madeira), may constitute an area of servitude or administrative restriction. Activities or uses, both private and common-natured, should take into account this area in order to minimize the impacts they may have on cetaceans or other reptiles, such as turtles, who visit and enjoy maritime space.

Thus, research should be intensified so that the impacts caused by activities or uses can be minimized.

EXCLUSION AREAS FOR CETACEAN OBSERVATION

The Regional Ordinance No. 46/2014 of April 22, regulates the *load capacity* inherent to the activity of observing cetaceans in the region and delimits an exclusion area for the observation of cetaceans. This area is characterized by being a preferred *habitat* of the dolphin - roaz to feed, socialize, rest and reproduce (Freitas *et al.*, 2013).

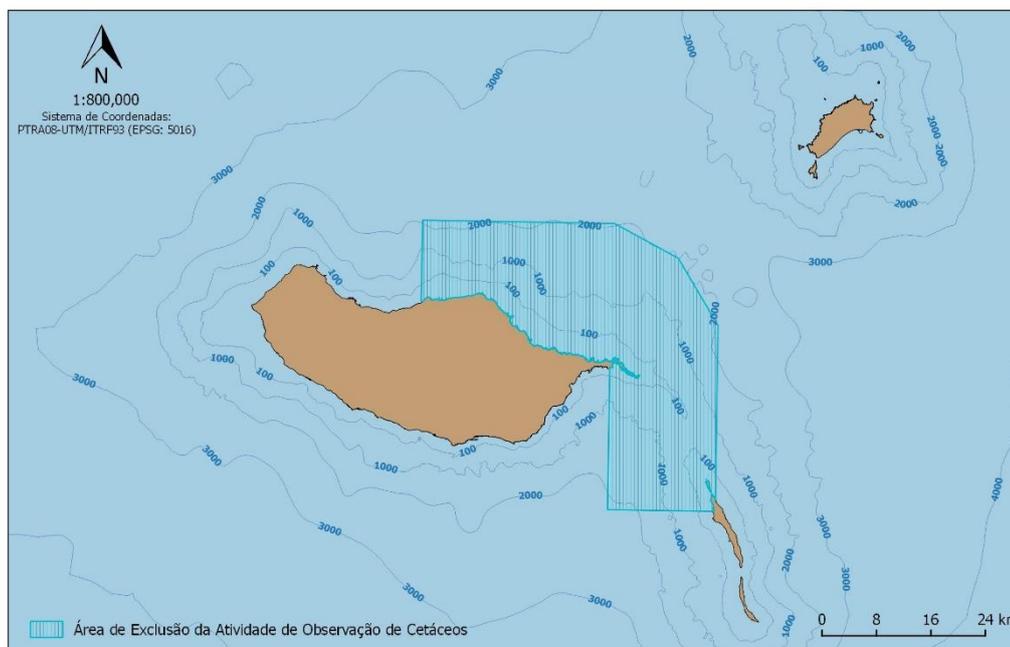


Figure 32 Area of exclusion of activity and observation of cetaceans. Source: Resolution no. 699/2016 of October 17.

The exclusion area of cetacean observation activity has a total area of 1021 square kilometers, defined by the following coordinates:

- a. 32,825 N / -17,000 W
- b. 32,933 N / -17,000 W
- c. 32,933 N / -16. 698 W
- d. 32,888 N / -16,597 W
- e. 32,799 N / -16,533 W
- f. 32,551 N / -16,533 W
- g. 32,551 N / -16,702 W
- h. 32,739 N / -16. 702 W
- i. Baseline to join the points a and h

AREAS FOR CETACEANS OBSERVATION

Regional Legislative Decree No. 15/2013/M of May 14, amended by Ordinance No. 46/2014 of January 14, legally framed and regulated all marine vertebrate observation activities in the AER and defined the load capacity inherent in the observation of this activity. These activities should follow a set of good practices, in particular when approaching and observing animals so as not to cause any kind of disturbance.

Cetacean observation activity, if not properly regulated, can cause stress in marine vertebrates, hindering or preventing the rest, demand for food and communication of animals with each other or else, from a more negative perspective, animals to leave the regional maritime area.

Article 5, Chapter II of this Diploma, it is stated that the observation of marine vertebrates is carried out in accordance with one of the following modalities:

- Tourist and/or maritime animation operation - tourist
- Scientific operation
- Recreational observation
- Special cases

Article 7 defines the distances from which the platforms for the observation of marine vertebrates are in active approximation, i.e.

- a) They are less than 300 m from the marine mammal or the nearest group of mammals or seabirds, counted in the case of mammals, from the outer limit of the circular area referred to in Article 4(8)
- b) They distance less than 150 m and up to 50 m from the nearest navy turtle(s) (s)

In the case of the marine vertebrates themselves heading to the platform, it must maintain the initial course and speed.

The maximum number of platforms in the approach area of a marine mammal or group of marine mammals is limited by the following distances:

- a) In the area between the east bound of the municipalities of Santa Cruz and Calheta, following south the azimuth 180° (Area I):
 - i. Distance \geq at 50m and up to 100m – up to two platforms;
 - ii. Distance $>$ at 100m and up to 300m – up to two platforms;
 - iii. Distance $>$ at 300m and up to 500m – up to four platforms.

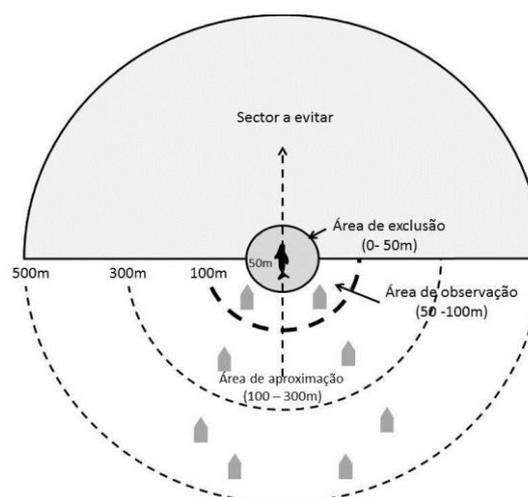


Figure 33 Area I. Source: Regional Legislative Decree No. 15/2013/M, of May 14.

- b) In the remaining areas (Area II):
- I. Distance \geq at 50m and up to 100m – a platform;
 - II. Distance \geq at 100m and up to 300m – a platform;
 - III. Distance \geq at 300m and up to 500m – up to two platforms.

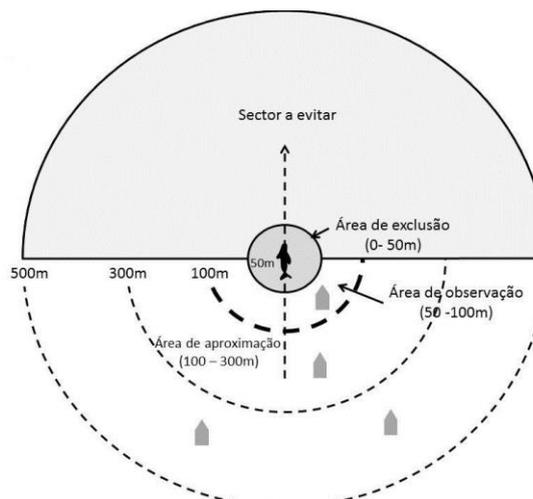


Figure 34 Area II.
Source: Regional Legislative Decree No. 15/2013/M, of May 14.

The same article states that vessels outside the approach area, waiting to enter, must respect a minimum waiting period of 120 minutes after the abandonment of the last vessel in the approach area.

Article 8 of Chapter II shall be considered *platforms under observation* when:

- They are between 100 m and 50 m from the marine mammal or group of nearest mammals or seabirds, or when marine mammals themselves are heading to the platform, in which case it must maintain the initial course and speed
- They are between 50 m and 25 m from the nearest sea turtles, as long as the platform approaches with the engine in neutral, by windward of the animal

The observation platforms should make a smooth and convergent approach in the direction and direction of animal swimming at an approximate angle of 30°.

Underwater observation should be made in the observation sectors exemplified below:

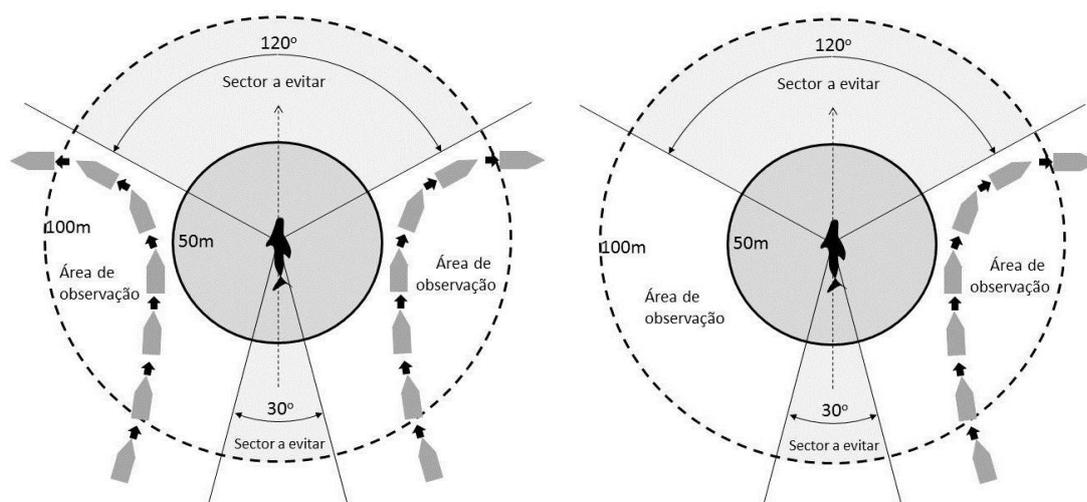


Figure 35 - Area I and Area II. Source: Regional Legislative Decree No. 15/2013/M, of May 14.

This Diploma also mentions the maximum time that platforms must meet for the observation of vertebrates, speed, rules of good conduct which must be adopted by vessels in such a way as not to harm mammals or seabirds, the as vessels obtain authorization to carry out the tourist operation of observation of vertebrates, as is carried out the management and supervision, the regime of counter ordinations as well as the ancillary penalties.

Scientific observation of marine vertebrates for scientific purposes lacks authorization from IFCN, IP - RAM.

VULNERABLE MARINE ECOSYSTEMS

Vulnerable Marine Ecosystems (VME) ecosystems are considered fragile to the impacts of deep sea fishing activities, or other abrasive activities of the seabed.

MSV are easily damaged marine ecosystems due to their physical and functional fragility. The definition of vulnerability is related to the likelihood that a population, community, or *habitat* will undergo substantial changes due to a short or long-term disturbance, as well as the likelihood of recovery. These areas are characterized by detaining *habitats* and species with high protection status, so it is necessary to carry out their preservation, preventing the use of fishing gear that conflict with this objective.

The Concept of VME emerged within the United Nations General Assembly which resulted, together with the *Food and Agriculture Organization of the United Nations* (FAO), in

Resolution No. 61/105, which aims to adopt measures aimed at protecting marine ecosystems vulnerable to the destructive effects of deep-core fishing activities by regulating these activities.

In 2008, FAO developed the *Guidelines for the management of deep-sea fisheries* by proposing a set of criteria for the identification and delimitation of possible AREAS of MSV, such as: rarity, functional importance, fragility, reduced resilience and structural complexity.

In accordance with European legislation, they define themselves as any marine ecosystem whose integrity is threatened by significant adverse impacts resulting from physical contact with deep-back fishing gear in the normal course of fishing operations, including reefs, underwater hills, hydrothermal sources, cold water corals or cold water sponge fields.

In the EU, a number of measures to restrict fishing for the protection of EmVs have been adopted, in particular through Regulation (EC) 850/98 of the Council of 30 March, Regulation (EU) No 227/2013 of 13 March, the European Parliament and the Council, and it is currently Regulation (EU) No 1380/2013 clarifying the procedure for adopting fishing restriction measures in marine protected areas under the Common Fisheries Policy.

Regulation (EU) 2016/2336 of the European Parliament and the Council of 14 December lays down specific conditions for deep-sea fishing in the North-East Atlantic and provisions for fishing in international waters in the North-East Atlantic. Annex III to this Regulation includes a list of families and species indicative of the presence of MSV by habitat type, namely: cold water coral reefs, coral gardens, depth sponge aggregations, sea feather fields, clusters of cedars and briozonea.

In national terms, Ordinance No. 114/2014 of May 28 should be referred, which lays down the conditions applicable to national fishing vessels authorized to operate in the VME. The main objectives of this ordinance aim to:

- Promoting the management and sustainable exploitation of marine biological resources
- Protecting biodiversity, vulnerable marine ecosystems and other natural values
- Preserving the marine funds from the adverse impacts of fishing activity
- Contributing to the collection of information on vulnerable marine ecosystems

Although this area is within the EEZ of the region, it is properly safeguarded as fishing gear, such as bottom drag, is not allowed in RAM.

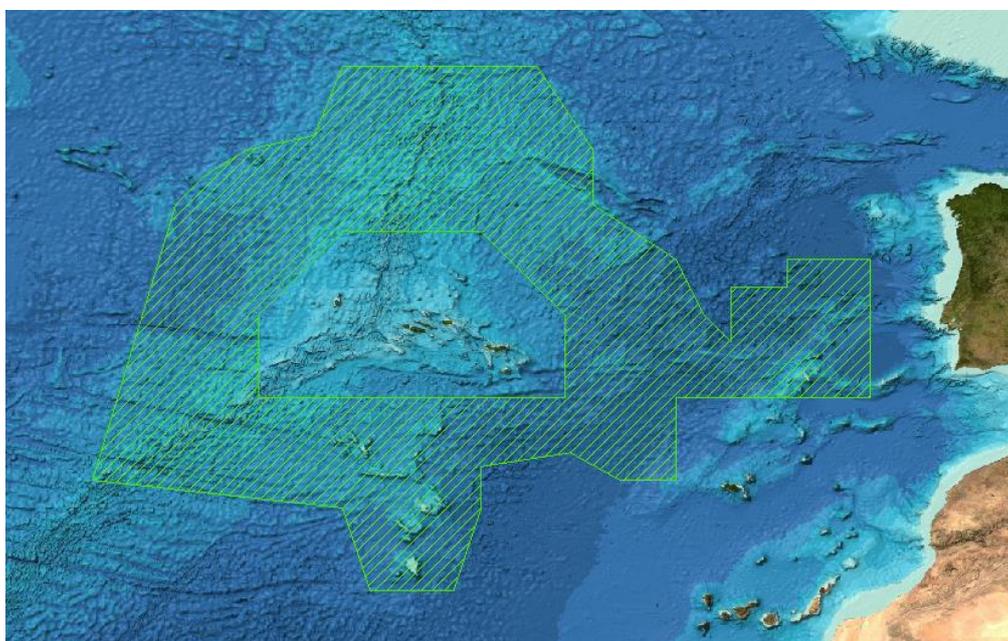


Figure 36 - Area for the protection of vulnerable marine ecosystems (EMV). Source: Ordinance No. 114/2014 of May 28

8. Military services

MILITARY ARMY AND PORTUGUESE ARMY ARMY AREA

In the maritime space of RAM, military exercises are carried out by the Portuguese Navy, which take place mainly on the south coast of the island of Madeira and Porto Santo. The military exercises developed by the Portuguese Army also have influence in the maritime space, namely real shooting exercises that take place in the Ponta do Pargo area. This type of exercise has the support of the Portuguese Navy that engages naval means attributed to the device of the Madeira Maritime Zone Command and ensures the interdiction of the maritime area corresponding to the scope of weapons, preventing ships and vessels from being able to get hit.

The military exercise zone carried out by the navy covers the area of Sítio Cetaceans Madeira (see figure 37, subchapter M4.8. and Volume VI-M). Since actions considered of a military nature have predictable impacts on cetaceans, the situation should be analyzed by the Plan

for Planning and Management of the Cetacean Site area. Both entities must work together to accommodate both interests.

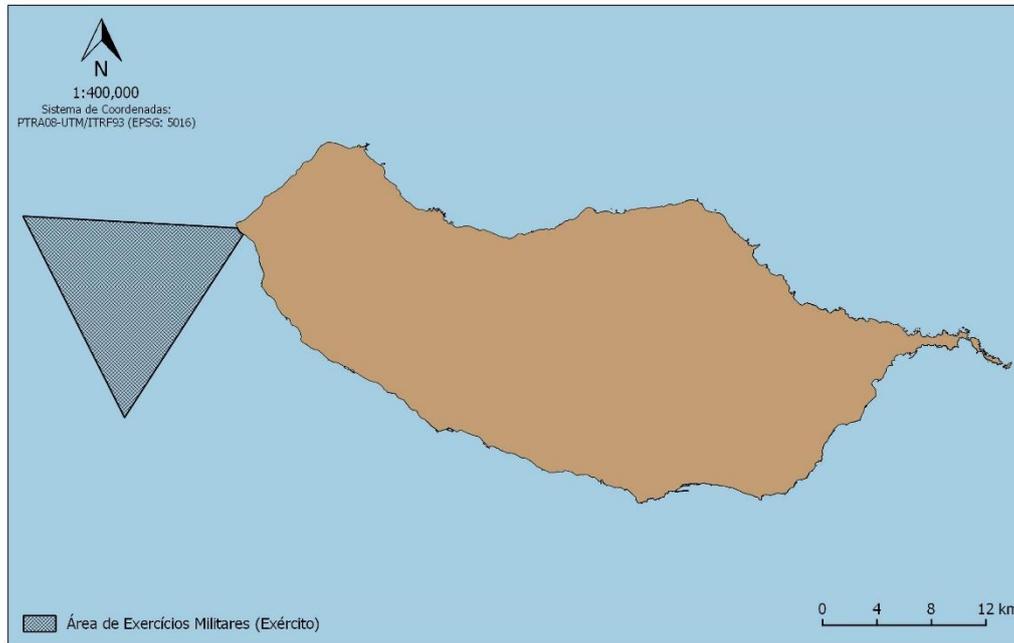


Figure 37 - Area of military exercises performed from land and that may have some influence at sea. Source: Portuguese Army

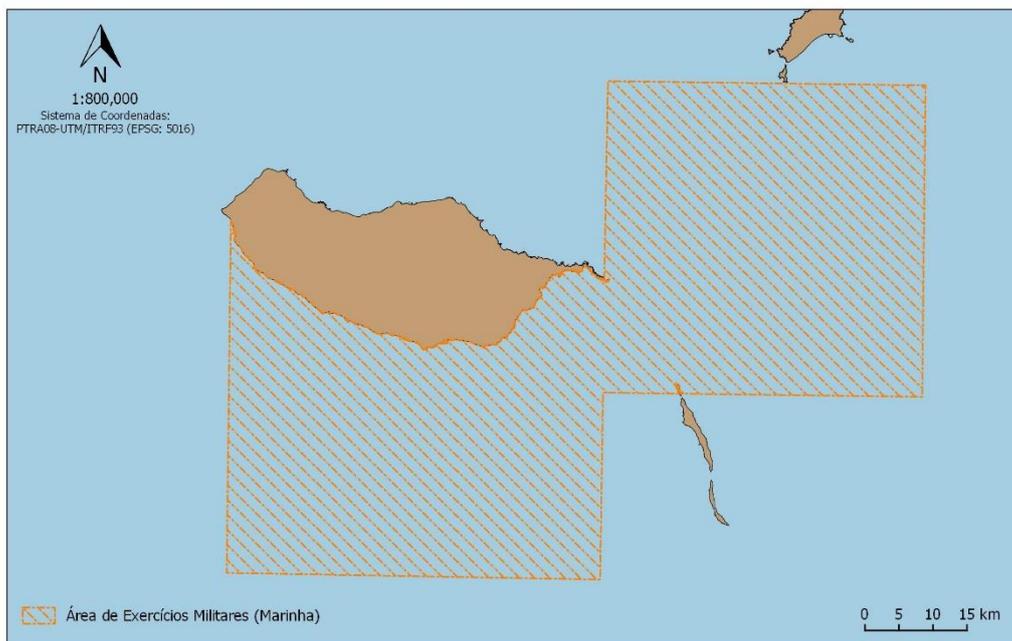


Figure 38 - Area of military exercises performed at sea. Source: Hydrographic Institute

9. Airport services

Areas bordering civil airfields and civil aviation support facilities are subject to military and or aeronautical services, so certain uses or activities in the maritime area are subject to the opinion of the airport authority.

Regional Regulatory Decree No. 1/2014/M of January 30, delimits and regulates the port servitude area of Funchal airport. The delimitation of this area takes into account the requirements set out in Annex 14 to the International Convention on Civil Aviation, approved by the International Civil Aviation Organisation (ICAO).

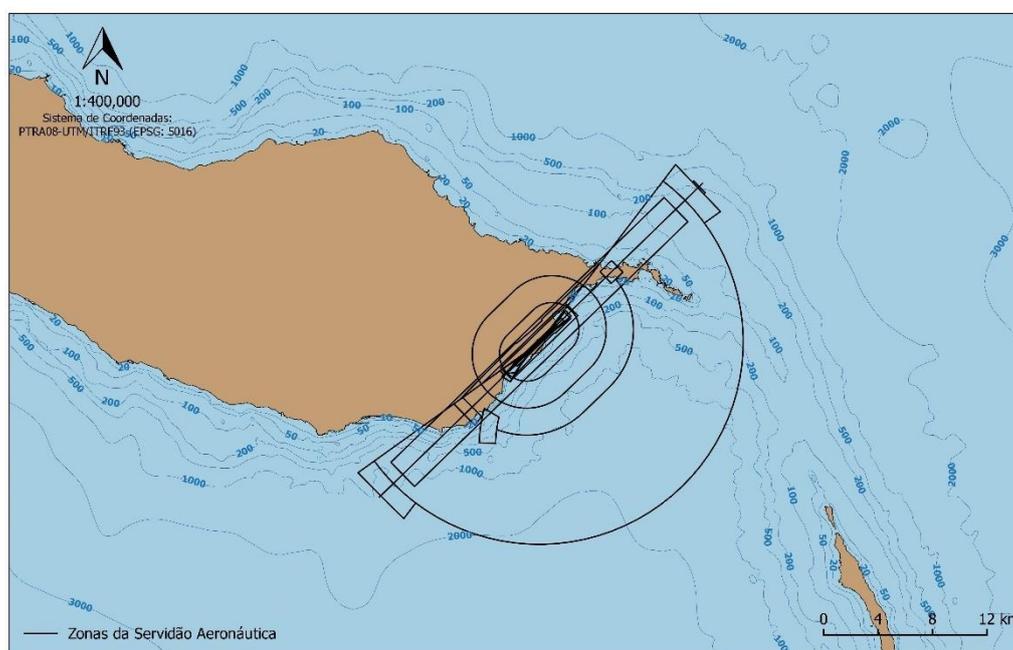


Figure 39 - Aeronautical services. Source: Regional Regulatory Decree No. 1/2014/M of January 30.

10. Underwater cultural heritage

The UNESCO Convention 2001 on the Protection of Underwater Cultural Heritage, ratified in 2006 by Portugal (Decree- Law No. 289/93 of August 21, Resolution of the Assembly of the Republic No. 51/2006; Decree of the President of the Republic No. 65/2006, republished by Warning No 6/2012 of 26 March), considers it to be up to the Scope of the Underwater Cultural Heritage any trace of human work, of cultural, historical or archaeological character, which is partially or totally, periodically or continuously, submerged, for at least one hundred years, namely:

- Sites, structures, buildings, artifacts and human remains, as well as their archaeological and natural context
- Ships, aircraft and other vehicles, or part of them, their cargo or other content, as well as their archaeological and natural context
- Prehistoric artifacts

The United Nations Convention on the *Law of the Sea* contains two general articles on underwater cultural heritage. Article 149 referring to historical and archaeological objects, it is said that *todos the objects of archaeological and historical nature found in the area should be preserved and special attention should be paid to the preferential rights of the State or country of origin, the State of cultural, historical origin and archaeological origin*. Article 303 states that States have a duty to *protect objects from an archaeological area and historical nature found at sea*, and it is effective by Article 33 to the limits of the continuous zone, i.e. up to 24 miles from the coast. The underwater cultural goods existing beyond this range are not properly protected.

The 2001 United Nations Convention on Education, Science and Culture recognizes the importance of underwater cultural heritage as an integral part of humanity's cultural heritage and a particularly important element in the history of *peoples, nations and their mutual relations with regard to their common heritage explicitly prohibiting commercial exploitation, especially activities aimed at selling, acquiring and exchanging elements of heritage underwater cultural heritage in all maritime areas, strengthening the internal law of states by recognizing their ability to protect the underwater cultural heritage beyond the contiguous area (EEz and continental shelf)*.

As regards national law, Decree-Law No 416/70 must be referred to, of September 1, amended by Decree – Law No. 577/76 of July 21, in which *the objects without known owner found at sea, at the bottom of the sea or by these dashing, including spoils of shipwrecks of ships, aircraft or any floating structure and fragments of them or their cargoes and equipment, which have an interest to the State, constitute their property.* They were equipped with the objects without known owner those who are not recovered by the owner within five years of the date they were lost, abandoned or separated from them.

Decree-Law No. 289/93 of August 21 sets out the rules on underwater archaeological cultural heritage consisting of recovered goods that, once classified as cultural value, are part of portuguese cultural heritage.

Ordinance No. 568/95, of June 16, approves the regulation of underwater archaeological works.

Decree-Law No. 164/97 of July 27 harmonises legislation governing archaeological activity in an underwater environment with the applicable to archaeological activity in terrestrial environment.

Law No 24/2013 of 20 March proves the legal regime applicable to recreational diving throughout the national territory. Article 4(2) states that *divers are not allowed to collect elements of cultural, archaeological heritage or carry out any other activities that may cause damage or alter the place where they are.*

Decree-Law No. 164/2014, of November 4, adopts a new regulation for archaeological work in order not to cause significant changes in nature and reinforce the idea that all archaeological work aims at the production of historical knowledge, and as such, should be developed in respect for the premises and procedures of scientific research. With this diploma, the policies of management of estate and dissemination of the results of archaeological works, in the aspects of scientific publication, awareness raising and patrimonial education, are clarified.

The protection of underwater cultural resources is the competence of the maritime¹ authority system, ensuring compliance with the law, within the scope of internal and international rights.

¹ Point (c) article 6 of decree - Law No. 43/2002 of 2 March

This provision is further reinforced with the powers of the port captain, ensuring the supervision and promotion of precautionary measures that ensure the preservation and defense of underwater cultural heritage, without prejudice to the powers legally conferred on other guardianship bodies.

In RAM, the existing underwater cultural heritage is essentially intended for recreational diving activities, which resulted in a diving itinerary entitled *Diving Itinerary in Shipwrecks in²Madeira*.



Figure 40 - Underwater cultural heritage on the Southeast coast of Madeira Island.

² Freitas, Mafalda (2016), *Diving Itinerary in Madeira Shipwrecks*, Annual Magazine of the Naval Club of Funchal.

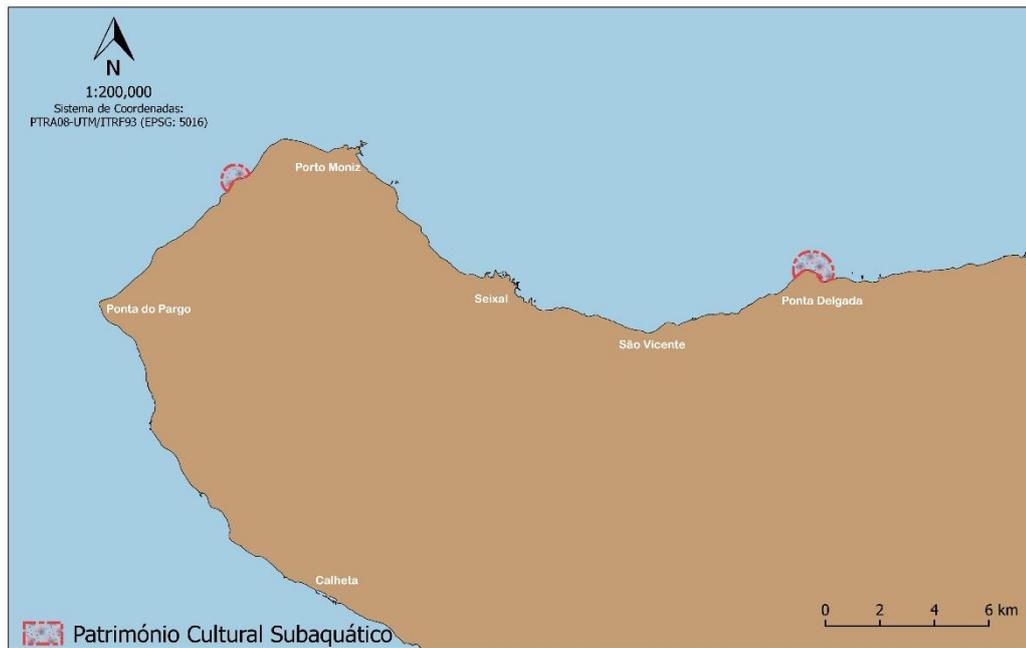


Figure 41 Underwater cultural heritage on the west coast of madeira island.

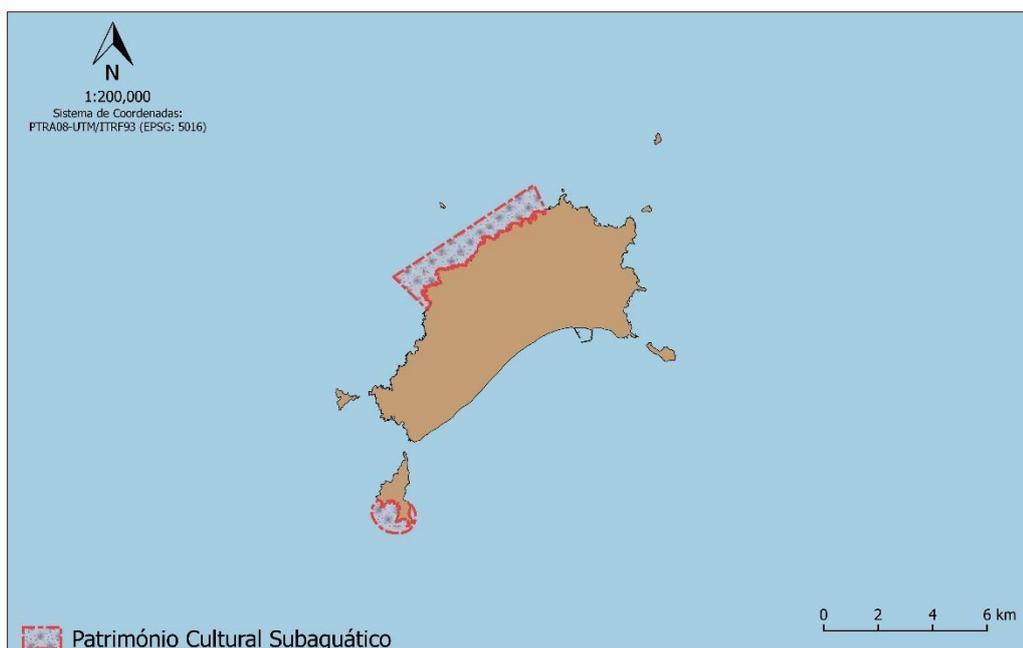


Figure 42 - Underwater cultural heritage existing on the island of Porto Santo. Source: Regional Secretariat of Tourism and Culture and General Direction of Cultural Heritage.

The areas that, consigned by underwater cultural heritage, constitute themselves as areas of administrative servitude. Activities or uses, of a private or common nature, which may be developed in the same area, must be compatible with this servitude, so as not to compromise the existing underwater cultural heritage.

For this area, above all, archaeological research work is valued, following the principles defined by current national and international diplomas.

The installation of new uses or activities of a private nature, in places identified as underwater³cultural heritage, should be accompanied by the performance of updated archaeology work.

If archaeological remains are found during the installation of an activity in the maritime space, immediate stopping of work and reporting the occurrence to the responsible entity is mandatory.

³ Decree - Law No. 164/97 of June 27 and Decree - Law No. 164/2014 of November 4

11.Land anchor areas: allowed and prohibited

The land anchor areas were defined by the National Maritime Authority in its notice and are included in the Special Standards of Port Maritime Security.

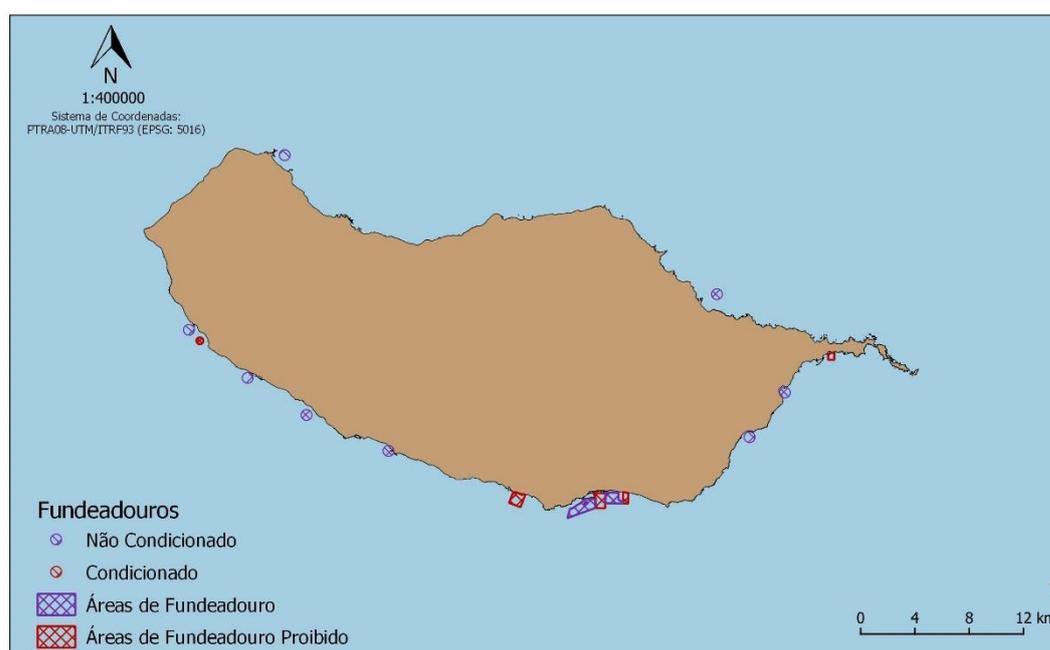


Figure 43 - Existing land anchor areas on the island of Madeira. Source: Hydrographic Institute

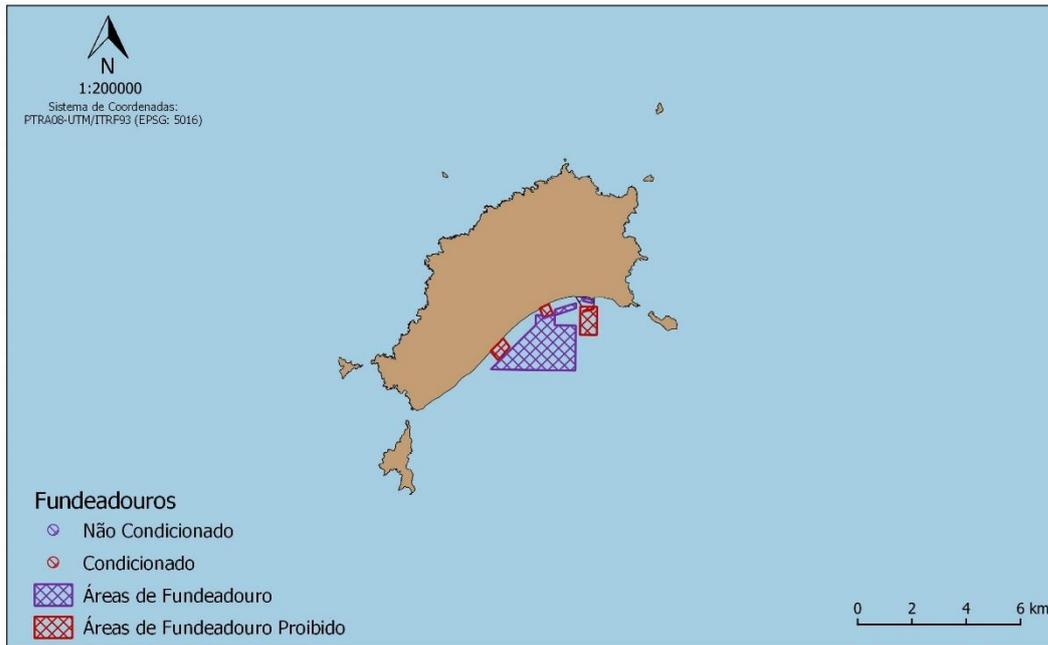
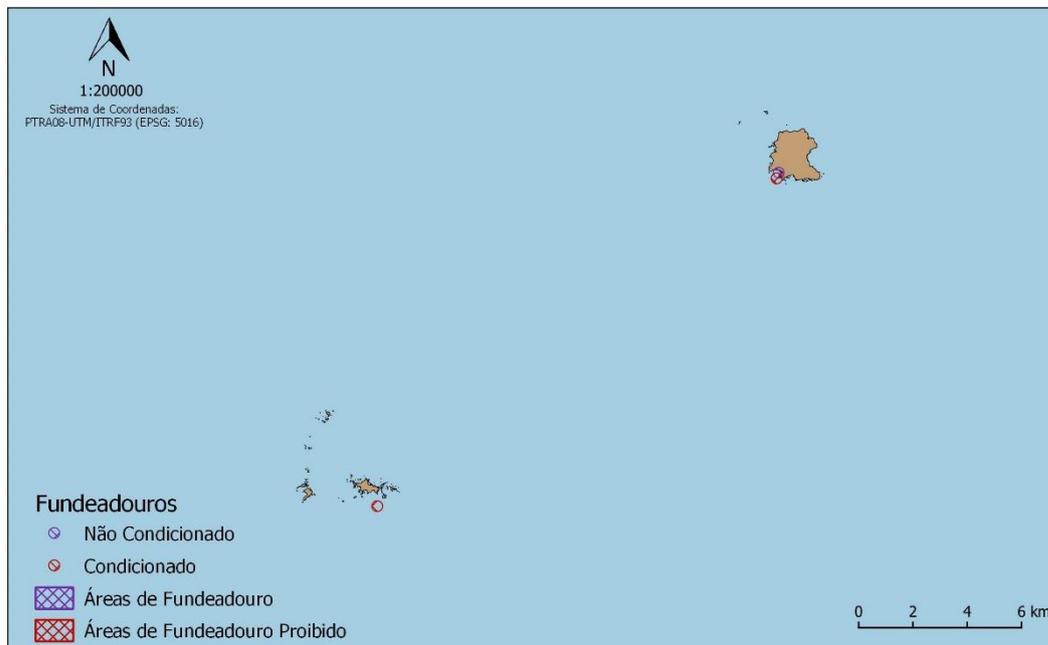


Figure 44 - Existing land extinguishing areas on the island of Holy Port. Source: Hydrographic Institute.



Erro! Marcador não definido. - Existing landhouse areas on the wild islands. Source: Hydrographic Institute.

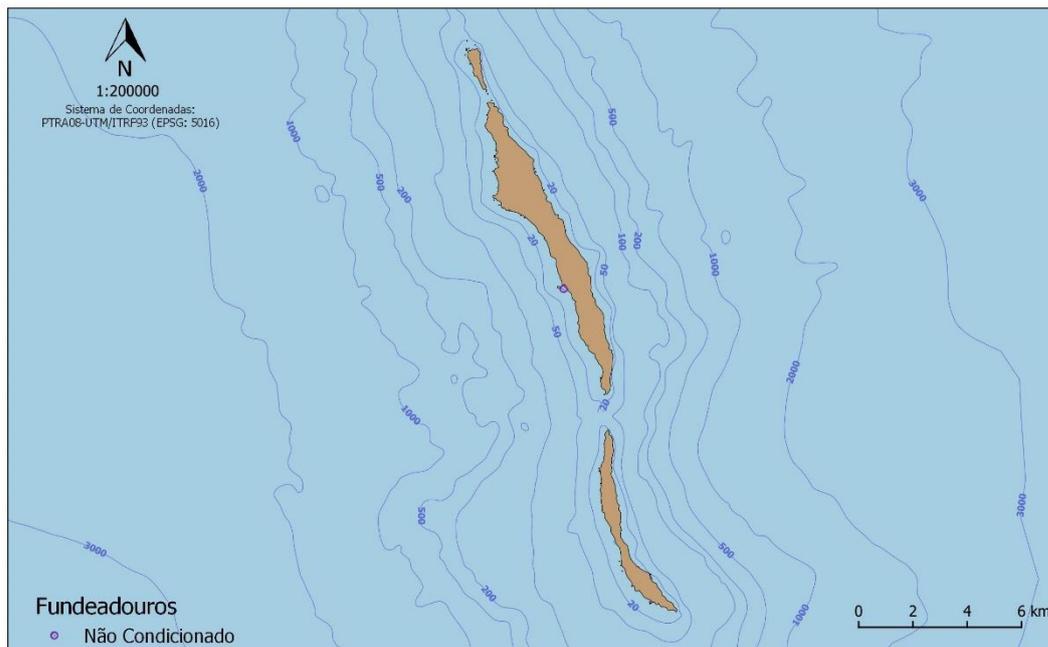


Figure 45 - Existing landhouse areas in the Desertislands. Source: Hydrographic Institute.

On the island of Madeira, the land extinguishing areas are located essentially on the south coast of the island of Madeira and Porto Santo, where the wave is weaker, and next to the port areas.

The forbidden land extinguishing areas are located along the entire coast of the island of Madeira and on the south coast of Porto Santo. Areas that can pose some kind of danger to the foundation, such as rocks, islets, currents, ripple, among other factors are considered.

Vessels that demand the Wild Islands to merge into them should take into account the indications contained in the updated version of the Route of the Coast of Portugal – Madeira Archipelago. For the purposes of the navigation control practicing this area of maritime jurisdiction, vessels are authorised to practice in the fundeadours presented in Figure 45, safeguarding the own competences of IFCN IP RAM.

In the Desertas Islands there is an unconditioned anchor.

12.Submarine, emissaries and ducts

The Situation Plan identified submarine cables, emissaries and submarine ducts. Each of these structures is associated with a number of constraints that must be referred to. With regard to submarine cables, Decree-Law No. 507/72 of December 12 identifies prohibited and sanctionable practices to be respected in the areas where submarine cables pass.

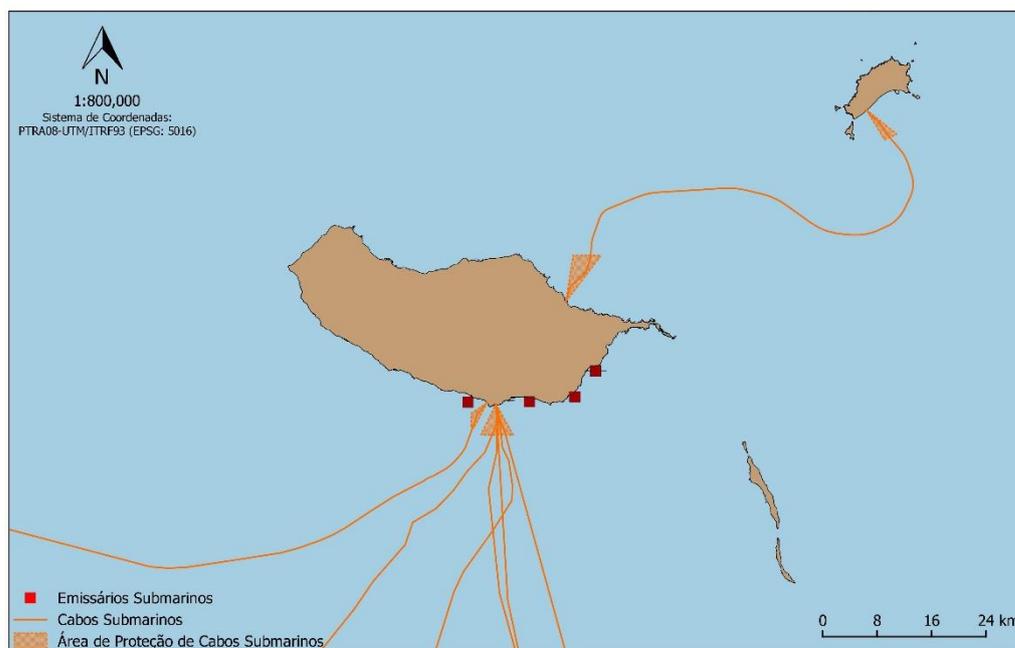


Figure 46 - Emissaries and submarine cables - island wood. Source: PGRH 2016 - 2021 and Hydrographic Institute.

Existing submarine emissaries are located on the southern coast of Madeira island and Porto Santo, where there is greater demographic pressure (See, plug 6 - cables, emissaries and submarine ducts).

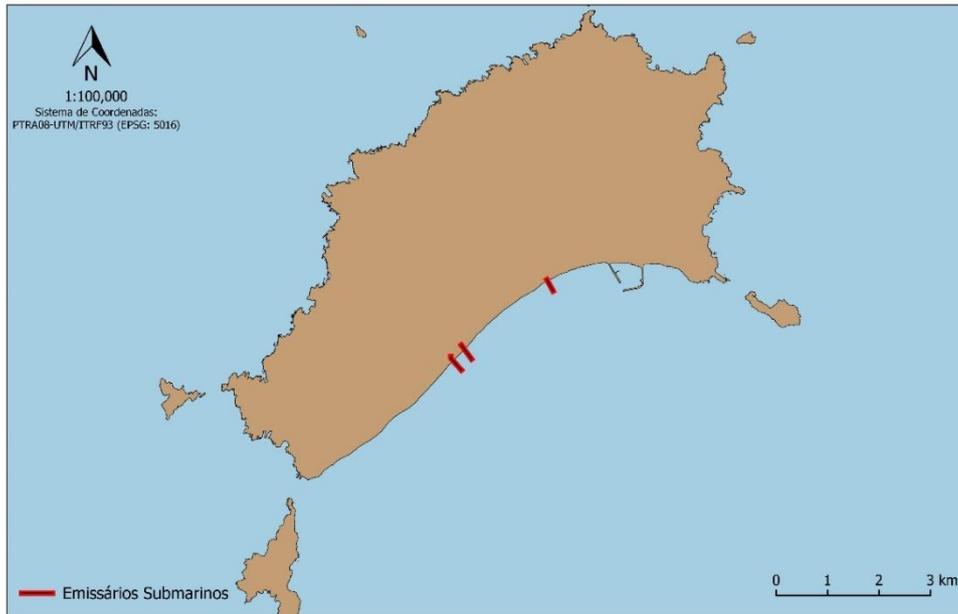


Figure 47 - Emissaries and submarine cables - island of Porto Santo. Source: Waters and Waste of Madeira, S.A.

The existing submarine duct is located in Caniçal, next to the fuel terminal.

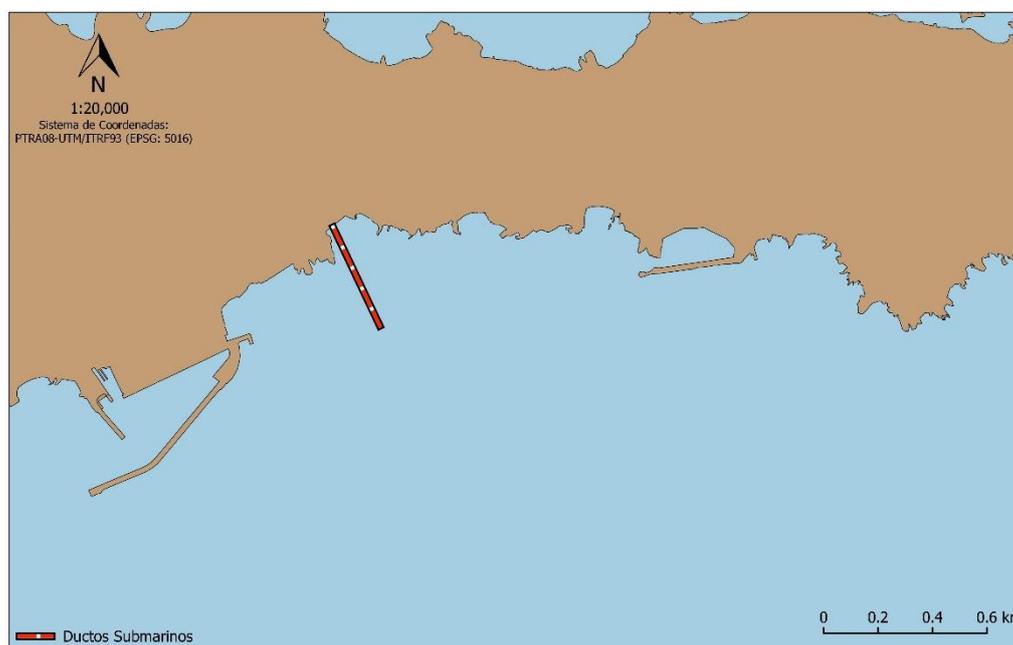


Figure 48 - Location of the submarine duct. Source: APRAM, S.A.

13.Dredge dipping

Dredger immersion areas are characterized by areas subject to restrictions, and their exploitation is not possible for commercial purposes and are prohibited from the installation of activities in the water column that may impair the end so that they have been Created.

The immersion of dredgers is governed by Ordinance No. 1450/2007 of November 12, which sets the rules for the use of water resources. Article 60, Section V, of Decree-Law No. 226-A/2007 of May 31 defines the specific requirements for waste immersion.

In RAM, the immersion of materials in the sea stems from dredging and maintenance operations of port areas, especially the port of Funchal, the port of Porto Novo, the pier of Machico and the port of Porto Santo.

The area determined for the deposition of dredgers is located on the south coast of the island, in the following geographical coordinates: 322500.84 and - 3609601.48.

In the case of the island of Porto Santo, the dredging of the port is intended for the feeding of the beach. In this case, Ordinance No. 1450/2007 of November 12, provides that only

materials that fall into quality class one, considered clean dredge material that can be deposited in the aquatic environment or replaced in places subject to erosion or used for beach feeding without restrictive standards.

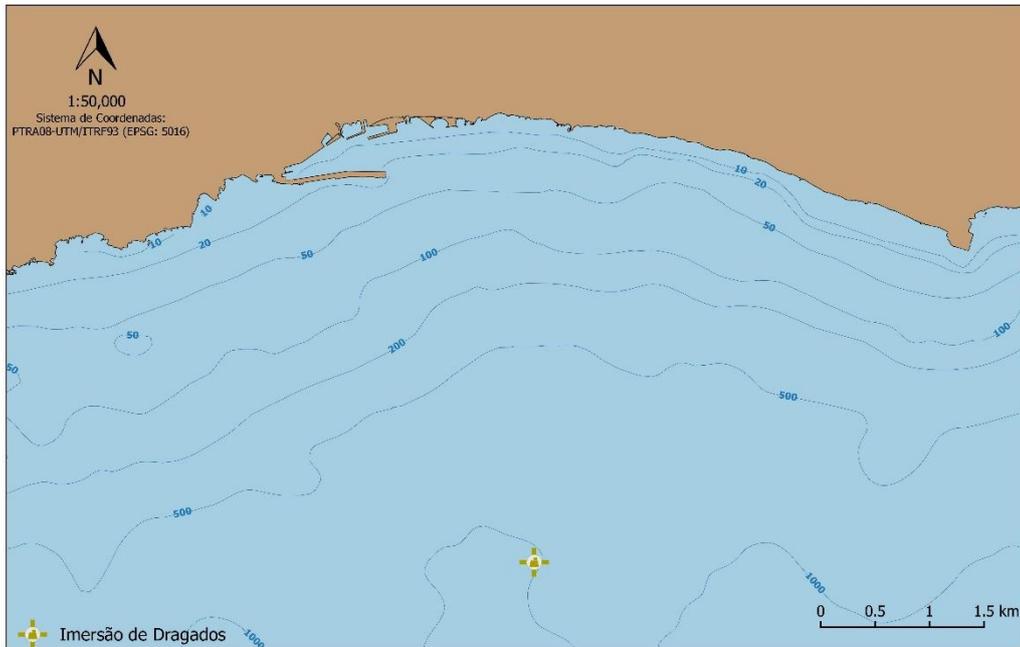


Figure 49 - Place for dredger immersion. Source: APRAM, S.A.

13. Loan stains for artificial coastal power

The Situation Plan identifies loan stains for artificial coastal feeding, as restricted areas, and it is not possible to operate for commercial purposes or being prohibited from the installation of activities in the water column that may undermine the end for which they were created.

The National Laboratory of Civil Engineering (LNEC), through the *Study of Maintenance and Improvement of Porto Sant Beacho* and the study developed by the Faculty of Sciences of the University of Lisbon, entitled, *Study of the sedimentary dynamics of porto santo beach*, proposed a prospection area for the extraction of sand located on the southern coast of the island of Porto Santo, based on bathymetry and geomorphology of the seabed. Although it is still a proposal, it should be properly identified in the Situation Plan, as it is a restriction area.



Figure 50 - - Proposal for loan stain for the artificialization of the beach of port od Porto Santo.

14.Coastal Defense Works

The coastal area is increasingly important in environmental, economic, social, cultural and recreational terms, but is also affected by various anthropic pressures that call into question its environmental sustainability. Proper management of the intersectoral territory between the land and maritime environment is therefore essential. Coastal defense works, although

they do not constitute administrative services or restrictions, nor private uses of maritime space, must be identified in the Situation Plan. This identification is described in Volume IV - *Characterization Report for the Subdivision of Madeira*.

6. Current and potential maritime uses, activities and constraints in Madeira

6.1. Fisheries

6.1.1. Sector characterization

The fisheries sector in the Autonomous Region of Madeira (ARM) is influenced by a set of factors that condition it, such as:

- The environmental characteristics of marine ecosystems and the fishing communities that develop there;
- The abundance of available fishing resources;
- The practice of the activity, restricting fishing methodologies that can be used efficiently by the fishing fleet and, consequently, the type of economically viable fisheries that can develop;
- The fact that the islands are surrounded by oligotrophic waters;
- The volcanic origin of the islands of the archipelago, characterized by the narrowness of the insular platform until the bathymetric of the 200 meters.

The fishing activity is a very old activity in the ARM, being rooted in the island lifestyle that includes fishing communities that depend directly on this activity, as is the case of Câmara de Lobos and Caniçal. The low by-catch rate, the impact of fishing on adult species as well as the low environmental impact due to the ban on trawling, determine their artisanal, selective and sustainable character. In spite of the extensive oceanic area, the oligotrophic waters oblige the fishermen to carry out their activity in other areas, such as the Canaries for example.

In the ARM the fishing is based on two great activities, in the fishing of tunas and the fishing of the black swordfish, being the species more captured. Tuna and similar were the most abundant species in 2016, reaching 2,722.6 tons (corresponding to around 47% of the main species caught) and a catch value of 7.4 million euros (corresponding to around 48% of the main species caught). The black swordfish was the second most caught species, reaching 1 916.5 tons in quantity (corresponding to about 33% of the species caught) and 6.9 million euros in value (corresponding to 44% of the main species caught).

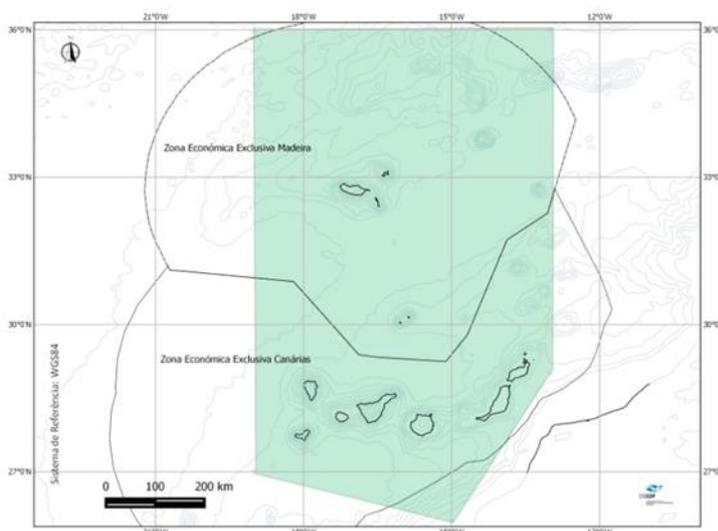
The main species captured in the Region will be presented below.

Deep Sea Fishing (Black Swordfish)

The deep-sea fishing carried out with other more aggressive fishing methods, such as bottom-set gillnets and bottom trawls, are prohibited on the slopes of the Madeira-Canary and Azores area, below 200 m depth, in order to protect coral reefs and deep-sea habitats of the effects of fishing, including those in underwater elevations.

The life cycle of black scabbardfish occurs along the Northeast Atlantic, with immature fishes off the British Isles, France and Portugal (Sesimbra), where the adult reproductive specimens are found off the Macaronesian Islands. Fishing is practiced in an artisanal way with the capture of adult black swordfish, with by-catch being usually small and consisting mainly of species of no commercial value, with the exception of deep-sea sharks.

By 2015 there were about 23 fishing vessels predominantly dedicated to the "deep species" metier, using the deep-sea longline.



Graphic 1 - Madeira-Canary Islands (shaded) area, prohibited by the use of bottom-set gillnets and bottom trawls by Community vessels, below the 200 m bathymetric

Source: Secretaria Regional da Agricultura e Pescas – Direção Regional de Pescas

Tuna fishing

Tuna fishing mainly comprises the fishing of the Patudo tuna by vessels using the live bait. In recent years, it has changed the capture methodology in which it favors the concentration of fish in "stains" which allow a much more efficient use of journeys and sea days, decreasing the time of searching for the tuna schools by the vessels. This method implies a "cooperative" fisheries with several vessels fishing the common shoal. They are an important resource of traditional fisheries in the ARM, constituting as an economic activity of the primary sector traditionally developed in the region and contributing to local consumption of fishing and to the socio-economic value created in the fishing row.

Characterized by pronounced inter-annual fluctuations of their catches, strongly influenced by the variability of environmental oceanic conditions that, directly or through their influence on the abundance of food determine the routes Migratory characteristics of these species and their greater or lesser accessibility to the fishing fleet in this Atlantic area.

The harvest of tuna in Madeira is seasonal, usually starting in March of each year, with the appearance of the *Thunnus obesus* that reaches the maximum capture around the month of May. From June these catches decrease significantly due to the lower abundance of bigeye in the area. At this time of year the *katsuwonus pelamis* becomes the target species of the fishery, with maximum concentrations in September and October.

Purse seine

Is an activity carried out by a small number of vessels. Its main target is the capture of a set of fish species, small pelagic, designated locally by "Ruama", in which they stand out, depending on the quantities captured and the economic value provided such the *Trachurus picturatus* or the *scomber colias*.

The fishing of siege is carried out in fisheries located in the coastal strip, as a rule at distances from 1 to 2 miles, especially on the south coast of Madeira, being particularly important in front of Cabo Girão and the area between Calheta and Paul do Mar.

The fencing net can reach a height and maximum length of 120 m and 700 m respectively, with mesh size never less than 16 mm, except for the onboard enclosure with mesh size equal

to or greater than 8 mm and length up to 400 m, measured in the tenements and maximum height of 70 m.

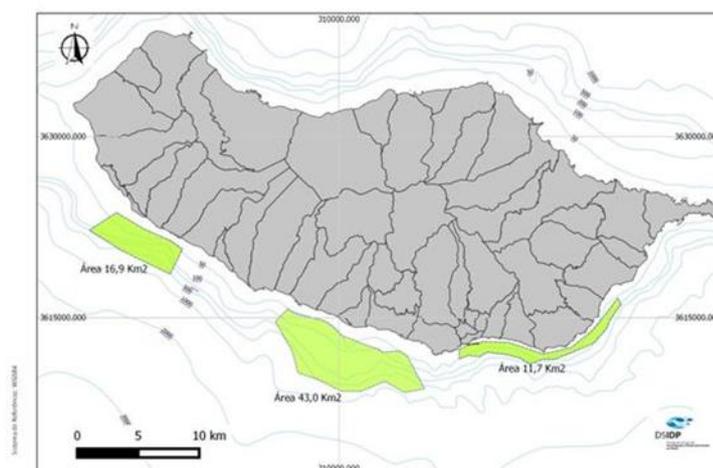
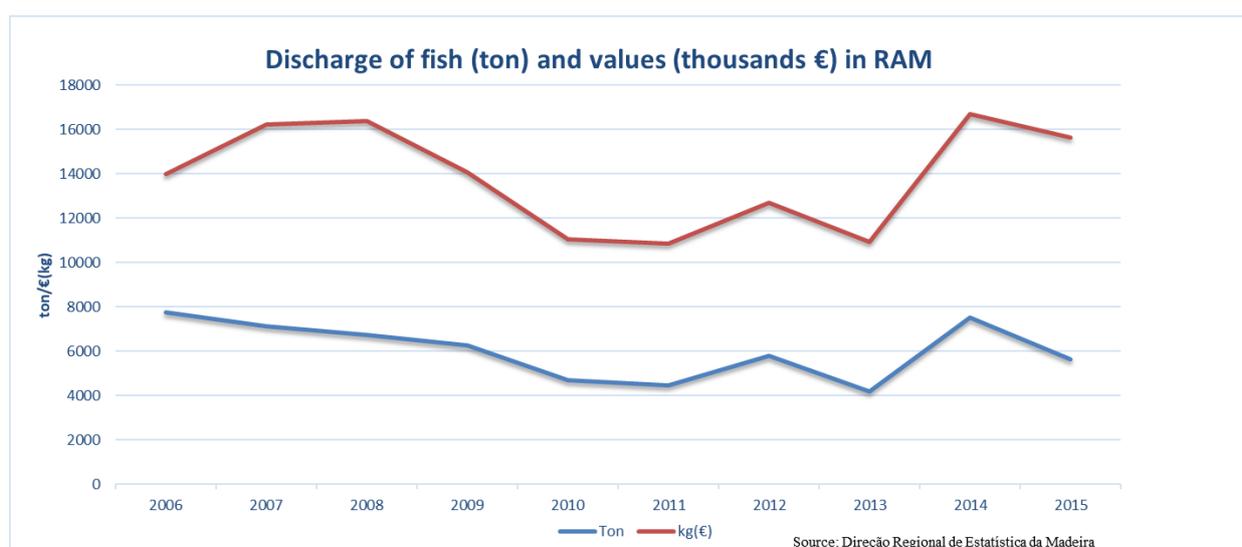


Figure 51 - Geographical distribution of the main fishing areas of purse-seine fishing by the fleet registered in Madeira in 2015

Source: Secretaria Regional da Agricultura e Pescas – Direção Regional das Pescas

6.1.1.1. Statistical information

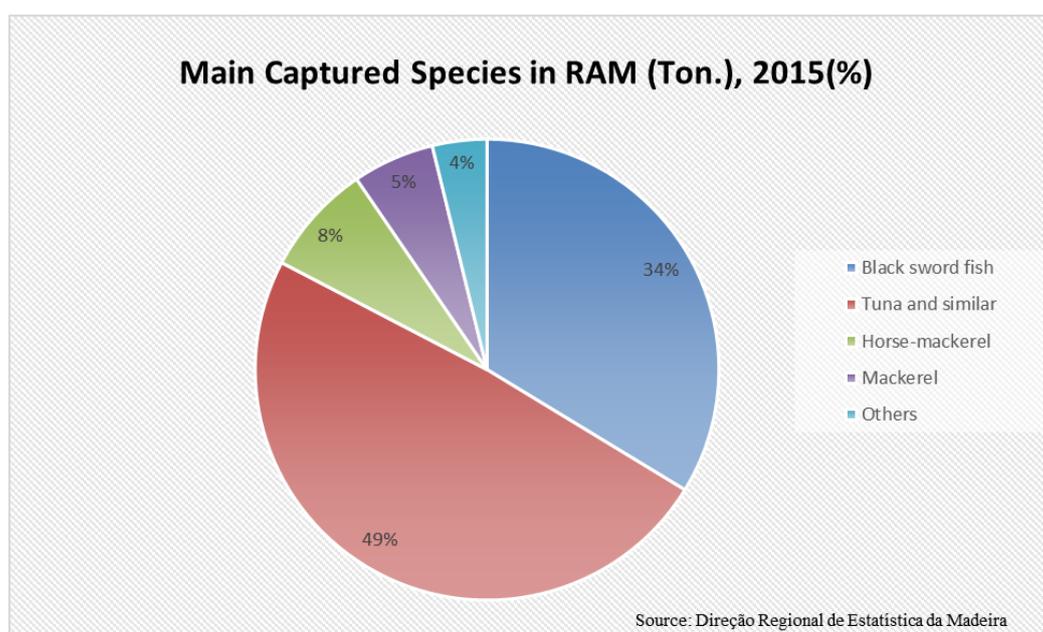
In 2015, 5641 tonnes of fresh and chilled fish were traded with an average value of € 2.84 kg, corresponding to € 15.6 million.



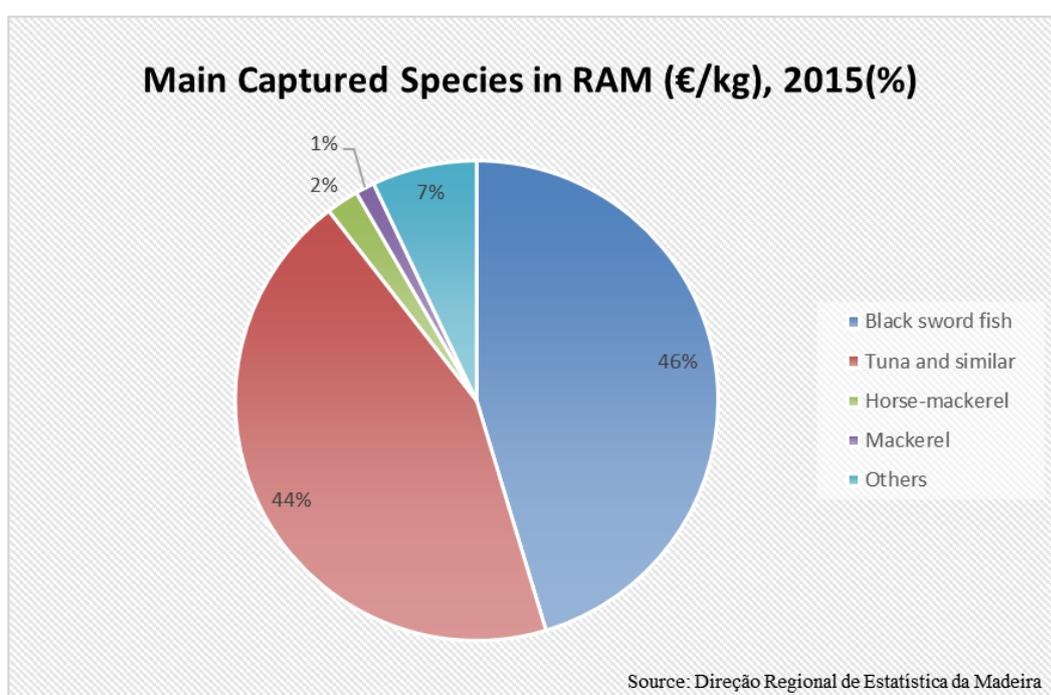
Graphic 2 - Discharge of fish (ton) and values (thousands €) in RAM

Source: Direção Regional de Estatística da Madeira

The following graphs correspond to the landing of several dozen marine species in 2015, in the three auctions (Funchal, Caniçal and Porto Santo) and four fish reception stations (Câmara de Lobos, Madalena and Paul do Mar and Porto Moniz). Currently operating in the islands of Madeira and Porto Santo.



Graphic 3 - Main captured species in RAM (ton) 2015 (%)
 Source: Direção Regional de Estatística da Madeira



Graphic 4 - Main captured species in RAM (€/kg), 2015 (%)
 Source: Direção Regional de Estatística da Madeira

6.1.1.2. Legal framework and constraints

6.1.1.2.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Secretaria Regional da Agricultura e Pescas - Direção Regional de Pescas.

6.1.1.2.2. Normative basis and instruments

- Council Regulation (EC) No 1568/2005 of 20 September 2005
- Common Fisheries Policy

6.1.1.3. Current spatial distribution

This activity is permitted throughout the regional maritime space, with the exception of places where this activity is prohibited and conditioned by other activities or protection of natural, cultural or other values.

6.1.1.4. Analysis of interactions

6.1.1.4.1. Interaction with other sectors

The fisheries activity is not compatible with activities that depend of infrastructures (e.g. aquaculture).

6.1.1.5. Land-sea interaction

This activity is dependent of some terrestrial infrastructures such ports areas.

6.1.1.6. Interaction with the environment

Once this activity is developed in an artisanal, selective and sustainable way, doesn't have implications with the fishing stock species or with the seabed.

6.2. Aquaculture

6.2.1. Sector characterization

Aquaculture should be defined as the production in captivity of animals or plants which have a predominantly aquatic habitat in at least one stage of their life and which have undergone some form of human intervention. The main objective is to increase production through practices such as compound feeding, protection against predators, integration with other species or population control.

According to the FAO (2014) aquaculture production has shown a remarkable growth in the last three decades - increase of 7% to 8% per year - having in 2012 reached a contribution of about 50% for the production of aquatic species used in food. It recognizes that, given the impossibility of increasing catches of wild fish that have stabilized over the last two decades, aquaculture is the best way to meet fish needs for a growing world population. Aquaculture, in addition to contributing to food security, has a vital role to play in creating jobs and developing coastal communities and their economic resilience.

In 2009, the European Commission in its Communication to the European Parliament, *Building a sustainable future for aquaculture - A new impetus for the strategy for the sustainable development of aquaculture, assesses the major constraints to the development of the activity in the European Union*, recommend and appeal to the various European governments to focus on the activity.

Subsequently, in 2013 the European Commission will again provide strategic guidelines for the strategic development of aquaculture in the EU (EC, 2013), proposing to Member States the implementation of Multiannual Strategic Plans, which served as reference for the implementation of the Strategic Plan for Portuguese Aquaculture 2014 -2020 (DGRM, 2014), which is essential for the approval of the National Operational Program and for the implementation of the European Maritime and Fisheries Fund (EMFF).

6.2.1.1. Present Situation

The ARM has great potential for the development of aquaculture, due to excellent physical and environmental conditions such as average sea temperature, higher than in continental Europe (monthly averages between 18 and 24°C), stable salinity (between 36.6 ‰ and 36.8 ‰) and weak to moderate undulation on the south coast of the island of Madeira (Torres and Andrade, 2010). In addition to these favorable conditions, ARM has a maternity and research center, qualified personnel, good port infrastructures, good terrestrial accessibility and ease of disposal of the product (Andrade and Gouveia, 2008; Torres e Andrade, 2010).

The activity of marine aquaculture in the region began in 1996, through a pilot aquaculture project in floating cages in Baía d'Abra, in Caniçal for the cultivation of *sparus aurata*. This project aimed to assess the technical and financial viability of offshore aquaculture production.

The South coast of Madeira, due to environmental and physical conditions, presents great potential for the development of aquaculture in floating culture systems.

Aware that the access and use of maritime space for aquaculture and its integration into the various coastal socio-economic activities are fundamental aspects for the sustainable development of the activity, the Madeira Regional Government has developed the *Plano de Ordenamento para a Aquicultura Marinha da Região Autónoma da Madeira* (POAMAR in Portuguese).

POAMAR follows the ecosystem principles recommended by the FAO (Soto et al., 2008) and was based on a scientific article entitled *Process of decision of spatial analysis in the selection of optimal areas for marine aquaculture: the example of Madeira Island*, which identified the areas with the greatest potential for marine aquaculture in the ARM open sea (Torres and Andrade, 2010).

The areas created through POAMAR and placed in the Situation Plan for the installation of floating fish farms in the open sea also allow the cultivation of other species in integrated systems and seem to correspond to the interest of potential investors.

At POAMAR there are five areas of interest for aquaculture on the south coast of Madeira, which are subdivided into several licensing areas: Baía d'Abra, Cabo Girão, Anjos, Arco da

Calheta, Calheta - Jardim do Mar / Paul do Mar. The delimitation of these areas took into account the following assumptions:

- Divisions are between the 20 m and 80 m deep bathymetry and are close to the coast (mostly less than 1 000 m)
- These areas consist of divisions of about 1 km², including the navigation corridors to move to the cages and a safe area for aquaculture production
- The areas are not located in areas that coincide with other uses and activities that use the seabed (e.g. aggregate extraction)
- The areas are not in corridors for access to ports and marinas
- Some of the areas are close to the Centro de Maricultura da Calheta, which allows for the development of research activities
- Areas do not coincide with relevant fishing areas or identified as being of vital importance by local fishing communities.

6.2.1.2. Potential Situation

Some of the areas of the ZIA are still available for licensing, while others, although licensed to companies for use of maritime domain space, have not continued the licensing process for installation and operation. Aquaculture lots may carry out scientific research activities with the authorization of the management entity.

Future development of the sector will depend on the performance of current culture establishments and the interest in setting up new ventures. The total production capacity of the consigned areas in POAMAR is very significant and corresponds to 15.6 thousand tons of fish per year, which corresponds to about 159% of all national production of marine and brackish aquaculture in the year. 2012, including fish and shellfish (DGRM, 2014).

However, if the sustained development of the sector implies the need to increase production in the current POAMAR areas (due to be reviewed within 4 years), there are two strategies for this, namely an increase in each licensed area and / or selection of new areas to be included in POAMAR and consequently new areas to be admitted to the Situation Plan.

It should be borne in mind that technological developments in the sector in the long term point to a trend towards the development of appropriate culture systems for areas further

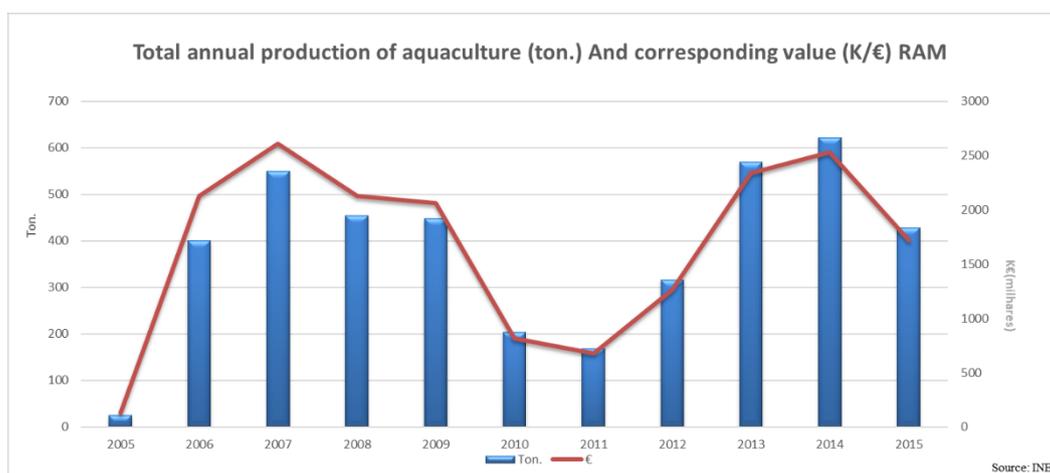
from the coast that will allow for less competition and / or conflict with other uses and activities of maritime space.

Finally, the compatibility of aquaculture production with other activities or uses, especially with regard to marine protected areas, is defined by the International Union for Conservation of Nature, and in categories IV, V and VI some form of aquaculture (Le Gouvello et. al., 2017). Reference should also be made to the Strategic Plan for Portuguese Aquaculture 2014-2020 and the National Sea Strategy (ENM 2016-2020) whose main objectives are:

- Identify areas with potential for the establishment of open sea aquaculture facilities, taking into account not only the existing natural conditions but also the interaction of this activity with other activities taking place in the marine environment;
- Improve the business organization of the sector by promoting associativism, ensuring the circulation of scientific and technical information and access to adequate sources of funding, including Community funds;
- Ensure the implementation of recent legislative changes concerning the issuance of titles for private use of domain areas and the simplification of the licensing process for aquaculture establishments;
- Promote a significant increase in production in open sea aquaculture, both of shellfish and fish, aiming at supplying populations with quality and sustainable fish.

6.1.2.3. Statistical information

In the next graph, it is possible to observe the evolution of the aquaculture activity in the ARM since the beginning of the production, in tons (ton.) and per unit value (€ / kg).



Graphic 5 - Total annual production of aquaculture (ton) and corresponding value (kg/€) in the RAM
Source:INE

6.1.2.4. Legal framework and constraints

6.1.2.4.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Secretaria Regional da Agricultura e Pescas - Direção Regional de Pescas.

6.1.2.4.2. Normative basis and instruments

Plano de Ordenamento para a Aquicultura Marinha da Região Autónoma da Madeira (POAMAR) - Resolution no. 1025/2016, JORAM of December 28, 2016

6.1.2.5. Current spatial distribution



Figure 52 – Aquaculture áreas. Source: DRP.

6.1.2.6. Potential spatial distribution

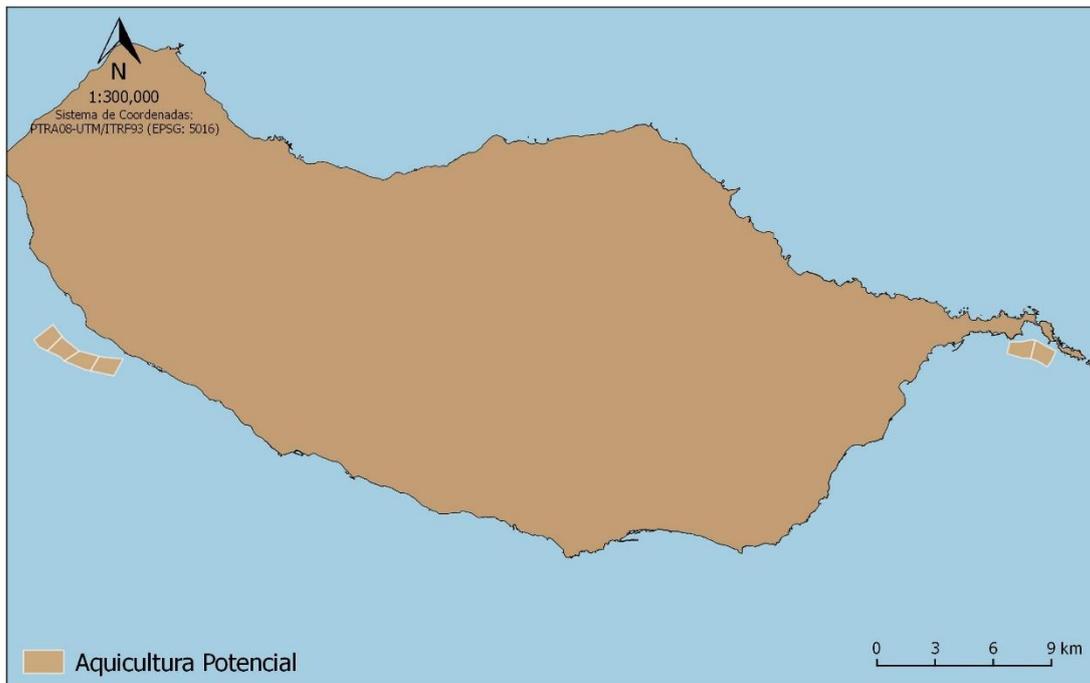


Figure 53 Potential aquaculture areas. Source: DRP

6.1.2.7. Analysis of interactions

6.1.2.7.1. Interaction with other sectors

The compatibility of the aquaculture activity with other activities of common use is also one of the objectives of the planning of the maritime space.

At POAMAR, aquaculture are compatible with the following activities:

- Diving
- Maritime-tourist activities (visitation and observation of cages)
- Wind energy (floating platforms are used in wind energy which, by their dimensions, allow the simultaneous installation of fish production structures without harming the buoyancy and safety of the platforms)
- Scientific investigation

At POAMAR, aquaculture are incompatible with the following activities:

- Extraction of other mineral resources
- Anchorage areas
- Navigation Routes
- Cableways outfalls and underwater pipelines

6.1.2.7.2.Land-sea interaction

This activity is dependent of some terrestrial infrastructures such ports areas and also a investigation center, the Centro de Maricultura da Calheta.

6.1.2.7.3.Interaction with the environment

Location

The location of an aquaculture unit on the open sea, by its impact, can make the difference between a strong challenge from local communities and an environmentally and socio-economically sustainable unit. However, a good site does not replace good farm management and proper regulation but is rather a key part of an environmentally friendly marine aquaculture.

For this to happen it is necessary:

- Analyze potential conflicts with potential ocean users for commercial, recreational or other
- Assess the area's capacity to disperse or assimilate excess nutrients and other effluents from a production unit in real time, but also taking into account its possible accumulation
- Assess their proximity to sensitive habitats, including marine protected areas
- Consider the potential risk of leakage and its interaction with wild populations
- Assess the risk of disease dispersion between production units and of these to wild populations
- Assess interaction with marine life

Escapes

In order to minimize the impact of this occurrence, aquaculture units must:

- Use localization criteria and the most appropriate operating management procedures in order to minimize the risks to the ecosystem of possible animal leakage or release of viable gametes and to support and promote studies aimed at minimizing these risks

Diseases

In order to control and prevent outbreaks of serious diseases, shall be:

- Establish and maintain a database on pathologies and parasites in the marine environment to support decision-making
- To carry out a sanitary classification of aquaculture areas in the open sea
- Assess the location of the units so as to eliminate or reduce the impact of pathologies in aquaculture and wild populations whenever possible
- Minimize the use of drugs and therapeutic chemicals and, when necessary, their prescription should be made by competent personnel
- Support and strengthen studies to improve the health management of farms and the implementation of mitigation and control strategies for pathogens

Effluents

The criteria and limit values for the emission of the various effluents from aquaculture should be clear and take into account the possible expansion of the activity on a national scale. The regulation and implementation of water quality standards and the emission of effluents by the units should ensure that the impact of such pollution is sustainable by the ecosystem in a long-term perspective and activity expansion.

Activity control

Aquaculture monitoring and regulation should:

- Ensure that this activity does not exceed the load capacity limits of the ecosystems where it is installed
- Be flexible and adaptable in order to respond to the evolution of cultivation methods and techniques or to environmental changes
- Operators should be held accountable for possible environmental repairs, restoration and possible economic losses.

6.3. Marine Biotechnology

6.3.1. Sector characterization

Under the Convention on Biological Diversity, ratified by Portugal in 1993, biotechnology means any technological application using biological systems, living organisms or their derivatives, to produce or modify products or processes for specific use.

The economic importance of this activity, taking into account the geographical context of Portugal and the proposed extension of the platform presented to the United Nations, should increase to the extent that the regulated intensification of marine bioprospecting and the development of modern biotechnologies will increasingly enrichment of the communities involved.

Portugal, within the framework of the evaluation process and the necessary studies to support the proposal to extend the platform (EMEPC, 2009), the recent focus on blue economy development (DGPM, 2017) and the framework provided by the National Strategy for the Sea (ENM2013-2020), has gathered the knowledge and means to be on the forefront of ocean biotechnology exploration.

6.3.1.1. Legal framework and constraints

6.3.1.1.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Secretaria Regional da Agricultura e Pescas - Direção Regional de Pescas.

6.3.1.1.2. Normative basis and instruments

This activity is under development so until this moment, the Region don't have normative basis or instruments.

6.3.1.2. Analysis of interactions

6.3.1.2.1. Interaction with other sectors

Biotechnology is compatible with the following activities:

- Diving

- Scientific investigation

This activity is incompatible with the following activities:

- Extraction of other mineral resources
- Areas of anchorage
- Navigation Routes
- Fishing
- Submarine cables, outfalls and underwater pipelines

3.2.2. Land-sea interaction

This activity is dependent of some terrestrial infrastructures such port areas.

6.3.1.3. Interaction with the environment

Following the adoption of the Nagoya Protocol and the national regulations of the measures provided for therein and subsequent Community regulations, through Decree-law no. 122/2017, Portugal has established standards and defined the national authority responsible for implementing them.

The rules set out are intended to ensure that users exercise due diligence in accessing, transferring and using genetic resources, that safe conditions for public health are safeguarded and that the conditions necessary for effective monitoring and control by the competent authority are created. Norms for the holding and registration of collections, as well as good practices, including recognition, are also laid down.

In Community terms, the Guidance Document, published under no. 2016/C 313/01, in the Official Journal of the European Union on 08/27/2016, which sets out the obligations and conditions for the application of Regulation) no 511/2014 of 16 April and of Implementing Regulation (EU) 2015/1866 of 13 October laying down guidelines for good practice on the part of those concerned to obtain benefits arising from genetic Community area.

6.4. Mineral extraction

6.4.1. Sector characterization

Since the middle of the 20th century it became clear the existence of new resources in the oceanic domains. The main exploration effort was focused on the search for hydrocarbons in continental geological platforms at depths below 200 m and mineral occurrences in coastal or platform areas. The remaining deeper oceanic realms remained totally inaccessible with existing technology. The development of new technologies applicable to the exploitation of the sea, especially in the second half of the century. XX, made it possible to make vast areas of ocean basins accessible, especially in regions of great depth. The exploration of these unknown territories, especially since the 1970s, has revealed a wealth of new resources whose economic potential is still immeasurable, making these areas of soil and subsoil a new patrimony for the coastal State.

At present, and on a global scale, there is a growing interest in the metallic and non-metallic mineral resources in the soil and subsoil, accompanied by concrete initiatives for the exploration and in some cases exploitation of these resources. For example, it is noted that the safe distribution of drinking water to populations or the development of technologies capable of supplying energy from renewable sources increasingly require the use of metals which are in some cases scarce or difficult to and others are a monopoly of a small number of countries that control the international market.

Thus, the sustainable exploitation of existing resources in the maritime space requires, in a fundamental way, the deepening of the knowledge of marine geodiversity. This knowledge can be obtained either through academic-scientific studies or through exploration and research actions, aiming at the eventual exploration of a given resource. As far as mineral resources are concerned, no systematic prospective study has yet been carried out with a view to assessing the existing economic potential and any reservations contained in the Portuguese continental shelf. However, at the scientific level, and within the scope of the process of extension of the continental shelf by the Mission Structure for the Extension of the Continental Shelf (EMEPC), with the allocation of the national hydrographic vessels of specific equipment for the characterization of the bottom morphology as well as for magnetic and

gravimetric surveys and all the scientific work developed by EMEPC, LNEG and IPMA, it was possible to acquire very relevant data about seabed geology and consequently its resources.

The existence of metallic mineral resources in the Portuguese EEZ has been known for several decades. Among the known resources are polymetallic sulphides, polymetallic nodules and cobalt-rich ferromanganese crusts. With the extension of the Portuguese continental shelf, the estimates of the types of known metallic resources are widely increased, opening doors for the discovery of new types of potential resources (EMEPC, 2014).

In this document are presented the main metallic mineral resources already recognized in the national maritime space, or that are associated with a geological context favorable to its occurrence. It should be noted that, in this context, classification as a resource does not include any implicit consideration of the feasibility of its exploitation at present, nor its constitution as a reserve with economic value.

According to the available data, the main known metallic mineral resources occur in deep oceanic areas, located essentially in continental shelf areas beyond 200 nautical miles, as well as in some areas of the economic exclusive zone (EEZ).

Also included in this sheet are the heavy minerals of detrital origin, originated from the breakdown of all types of rocks. The study of these minerals has been carried out at the level of several areas of geology, of which economic geology stands out, since its concentration can become economically viable for exploration.

Polymetallic Sulphides

Current occurrences of polymetallic sulphides result from the precipitation of metals from the discharge of hydrothermal fluids into the ocean floor, in particular along the young oceanic crust, created in divergent boundary plate regions (oceanic crests). The sea water, when crossing the oceanic crust, gradually heats and reacts with the rocks through which it circulates. This interaction results in chemical exchanges between rock and sea water, which becomes progressively enriched in metals and silica. These fluids, with temperatures that can reach 400°C, are expelled from the black smokers. Contact with the cold sea water enhances the precipitation of metals. These occurrences contain base metals (iron, copper, zinc and

lead), and precious metals (gold and silver), with high potential in high-tech metals (eg indium, selenium and tin).

During the last two decades, the Mid-Atlantic Ridge in the Azores region has been targeting international campaigns aimed at finding active hydrothermal systems. In the Azores region five hydrothermal fields, Menez Gwen, Lucky Strike, and Saldanha, located inside the EEZ, and the Moytirra and Rainbow fields, located on the continental shelf beyond 200 nautical miles, have been discovered so far. After its discovery, some of these fields have been studied in a multidisciplinary way and systematically mapped.

These mineral deposits, depending on their age and geological location, can occur on the surface of the marine soil or the small depth, being this important factor in the eventual economic feasibility of the deposit. Until a few years ago it would be economically impossible to exploit mineral resources at 1500 m depth in the seabed, however, gold, copper and silver extraction is in the process of being made at the bottom of the Pacific Ocean. Thus, the economic viability for the mining of this resource can be proven, at least as long as the growing tendency for its demand continues (EMEPC, 2014).

Explorable metals are the base metals (iron, copper, zinc and lead), precious metals (gold and silver) and high-tech metals (indium, selenium and tin). The probable sites for its occurrence are the Atlantic-Middle Crest north of the Azores - Maxwell Fracture Zone, the Mid-Atlantic Crest south of the Azores - Hayes Fracture Zone, and the Rift da Terceira.

The possible exploitation of these deposits will have different impacts, depending on whether the systems are active or inactive, but the most common will be the impact of the removal of the organisms, the feathers generated by the extraction equipment, the ore washing water, the potential leaching and solubilization of the metals that make up the minerals making them toxic, light, noise and, indirectly, the reduction of populations, the reduction or breakdown of connectivity between populations and the reduction of ecosystem functions and services (Colaço et al. 2017).

Polymetallic Nodules

Manganese-rich polymetallic nodules are concretions formed by concentric layers of iron and manganese hydroxides resulting from the combination of the precipitation of metals from

seawater and the incorporation of metals present in the sediments where the nodules are formed. They have growth rates of a few millimetres per million years. Typically, the nodules have dimensions between 5 and 10 cm in diameter, and can reach 20 cm. Polymetallic nodules occur in a wide variety of underwater geological environments, being more common in the abyssal plains and ocean platforms between 4000 and 6000 m in depth and may occur, depending on their age and geological location, on the surface of the marine soil or the small depth, being this important factor in the eventual economic feasibility of the deposit.

Occurrences of polymetallic nodules arise in the abyssal plain of Madeira and in the areas adjacent to the Great Meteor underwater mound. There are more areas under Portuguese jurisdiction with great potential, but not yet characterized, this being the metallic resource on which less knowledge is held.

The exploitable metals are nickel, cobalt and copper as major metals, and platinum, tantalum and rare earth elements (REE) as by-products, with abyssal plains having depths greater than 3500 m likely to occur.

The eventual exploitation of this resource, which involves the extraction of the nodules in very extensive areas, raising a thin layer of abyssal sediments, usually referred to as plume, leads to the consequent precipitation of the fine particles that make up the sediment on the bottom, feel many miles away. The deposition of these feathers on the organisms that live in the affected environments, as well as the sediment compaction by the machines, are two of the great environmental impacts that this activity will have in large extensions of the seafloor (Colaço *et al.*, 2017).

Cobalt-rich ferromanganese crusts

Cobalt-rich ferromanganese crusts (Fe-Mn crusts) are formed by the direct precipitation of the metallic elements present in the water column after transport in an oxygen-rich environment (hydrogen-organic precipitation). They can reach about 250 mm thick and the crusts most enriched in metals of economic interest occur preferably in the depth range between 800 and 2500 m, deposited on the rocky substrate on the flanks of seamounts and oceanic ridges.

Hydrogenic precipitation is characterized by very slow growth rates, 1-10 mm / Ma (mm per million years), which enhances the concentration of metallic elements of economic interest, such as cobalt, copper, REE, tellurium, molybdenum, titanium, vanadium and elements of the platinum group. Hydrogenic deposits are thus considered potential resources for iron and manganese, but especially for those metallic elements.

The recognized occurrences of cobalt-rich Fe-Mn crusts are located in the seamounts south of the Azores and in the Madeira-Tore crest between approximately 700 and 4600 m depth. The deposits of the Madeira-Tore Crest (Muiños et al., 2013) show values in metals, such as cobalt, cerium, tellurium, platinum and nickel, comparable to the values of Fe-Mn deposits in the Central Pacific Ocean and which are considered potentially exploitable (Hein et al., 2009).

The exploitable metals are cobalt, nickel and manganese, as major metals and REE, platinum, tellurium and platinum, as by-products. The areas where potential can occur are seamounts south of the Azores, including the Great Meteor chain (EMEPC, 2014), and Madeira-Tore Crest (Muiños et al., 2013; EMEPC, 2014).

The high levels of cobalt in the Fe-Mn crusts, which are about ten times higher than the concentrations found in terrestrial ores, enhance the economic interest of these crusts.

The possible exploitation of this resource causes, as it does in the eventual extraction of the nodules, the need to extract the crusts in a large area of the seabed. The technology that may be developed in the future for crust exploitation will determine the type of impact on the marine environment. However, some authors argue that the burial caused by the precipitation of sediments from the plumes and the ore washing waters are some of the potential impacts that, due to the physiography of the bottom and the hydrodynamic regime, may have effects in a very extensive area (Colaço et al. al., 2017). This is the type of resource in which the development of exploitation technology is more delayed, and there is still no efficient technology for its extraction. The great technological complexity is due to the reduced thickness of the crusts (less than 20 cm), and to the difficulty of separating the crusts from the substrate where they are deposited (Hein & Koschinsky, 2014).

Heavy minerals

Heavy minerals are detrital minerals, with a density of more than 2.85 g / cm³, originating from the disintegration of all types of rocks, and can become economically viable for exploitation, when they constitute the deposits commonly known as placers. These sedimentary accumulations include several minerals of economic interest, among which diamond, gold, silver, platinum, cassiterite, ilmenite, rutile, zircon, monazite and magnetite. These minerals are sources of titanium, thorium, zinc, tin, among other strategic metals of economic interest.

The minerals that come most easily to the coastal zones are ilmenite, rútilo, zircon, monazite and magnetite (Silva, 2000), all these minerals known in the mineralogical procession of the rocks of the Portuguese territory. When there is potential mining in the geological lands crossed by rivers, the economic potential of the platforms for this type of deposits can become significant. In this perspective, the sedimentation of the Douro, Mondego, Tejo, Sado and Guadiana rivers is highlighted for the continental shelf, which for millions of years has dismantled not only a varied range of rocks but also mineral deposits there, sectors of the river mouths and coastal strips south of them (in the case of the west coast), a greater potential for pleasure-type deposits.

There is currently no assessment of the potential of our platform in terms of heavy minerals. However, studies have recently begun under the MINEPLAT project, which will allow an assessment of the potential of these minerals on the continental shelf off the Alentejo (Noiva et al., 2017).

It should be noted that, in this context, the potential in heavy minerals can be regarded as a potential resource of pleasure type, as an economic interest per se or as a by-product of inert holdings, as referred to in the non-metallic mineral chapter.

6.4.1.1. Legal framework and constraints

6.4.1.1.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Secretaria Regional do Ambiente e Recursos Naturais – Direção Regional de Pescas

6.4.1.1.2. Normative basis and instruments

This activity is under development so until this moment, the Region don't have normative basis or instruments.

6.4.1.2. Current spatial distribution

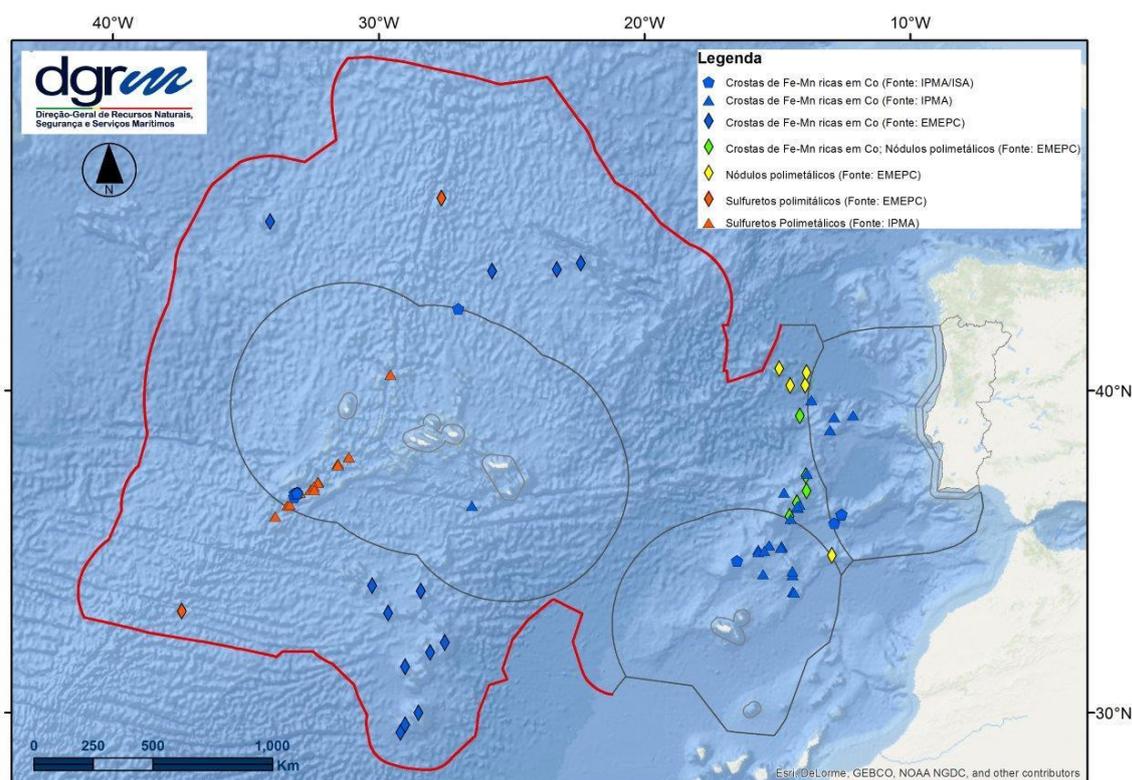


Figure 54 - Occurrence of metallic minerals in the national maritime space.

6.4.1.3. Analysis of interactions

6.4.1.3.1. Interaction with other sectors

This activity can hardly be compatible with others. Probably the dredging and the exploitation of nonmetallic resources may in theory be seen. However, it must be borne in mind that the exploitation of metallic mineral resources is carried out in marine areas which, because of their depth and distance to the coast, would be difficult to access either by immersing dredgers or by exploiting sands and gravels which are generally the resources.

6.4.1.3.2.Land-sea interaction

With the port areas.

6.4.1.3.3.Interaction with the environment

In order to understand the potential impacts of marine mining, EU-funded projects (EU-FP7): MIDAS (Managing Impacts of Deep Sea Resource Exploitation; www.eu-midas.net) and JPI-Oceans (Ecological Aspects of Deep-Sea Mining; www.jpi-oceans.eu).

In the particular case of Polimetallic Sulphides, Nautilus Minerals carried out a study of the potential mining impacts for the Solwara 1 deposit, which can be found at <http://www.cares.nautilusminerals.com/irm/content/solwara-1-project.aspx?RID=339>

It is also worth mentioning that the International Marine Minerals Society (IMMS), advised by ISA, has developed the IMMS Code for Environmental Management of Marine Mining, which can be consulted at http://www.immsoc.org/IMMS_code.htm

ISA also makes available on its website the regulations already approved for the prospection of marine mineral resources www.isa.org

GRID-Arendal established between Norway and the United Nations Environment Program, which provides environmental information, communication and capacity-building services, with the aim of making scientific knowledge comprehensible to the general public and supporting the sustainable development, it also makes relevant information available on its website <http://www.grida.no>

6.5. Non-Metallic Mineral Resources

6.5.1. Sector characterization

Non-metallic mineral resources include minerals whose potential interest as raw material is not motivated by their metallic content, although they have metals in their composition. Examples of non-metallic mineral resources are sand and gravel, kaolin, clay, gypsum and salt. Depending on its economic potential, the content of constituent metal minerals, for example sands, may be regarded as a by-product of the aggregate's extraction.

In the Portuguese continental shelf, in the Madeira subdivision, a study was carried out by the Hydrographic Institute on the south coast of the island of Madeira and Porto Santo regarding the geomorphology of the sea bottoms that includes the nonmetallic mineral resources.

6.5.1.1. Present Situation

In the ARM the aggregate's extraction is carried out by dredging the seabed on the south coast of the island of Madeira, being unloaded in the maritime terminal of Porto Novo and in the Anjos terminal.

There are also records of discharges at the Ribeira Brava, at the Porto Moniz and, in very exceptional situations, at the ports of Funchal and Caniçal. The volumes handled decreased significantly in recent years, accompanying the reduction in activity in the construction of large public works in the region.

Aggregate's extraction is carried out in the seabed on the south coast of the island of Madeira, particularly in the western sector, between Paul do Mar and Cabo Girão - Ponta do Leão, Madalena do Mar and Lugar de Baixo / Tabua. The extractive zones of Campanário and Ribeira Brava were decommissioned after the establishment of the fish farm and the construction of the Ribeira Brava bathing area, respectively. These zones were reactivated for emergency reasons briefly in 2010.

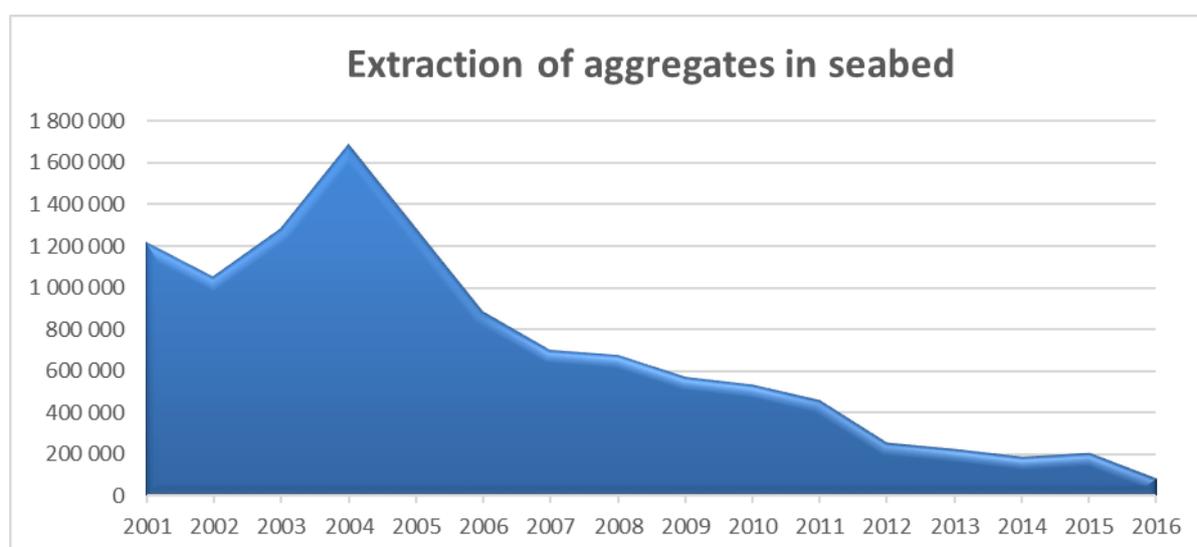
Experimental zones (Ponta da Galé / Jardim do Mar / Paul do Mar) and emergency zones were also used due to the extreme winter weather events of 2009/2010 (Caniço, Gaula and Caniçal areas).

The extraction of aggregates is monitored by the Secretaria Regional do Ambiente e Recursos Naturais – Direção Regional do Ordenamento do Território e Ambiente, through AIS devices installed on board and an own computer platform that allows to see the geographical location of the vessels.

The Regional Legislative Decree no. 22/2018 / M, of December 12, establishes the legal regime for the commercial extraction of aggregate’s materials in the bed of coastal waters, territorial waters and inland waters subject to the influence of the ARM tides.

6.5.1.2. Statistical information

The aggregates volumes have declined substantially in recent years, following the boom in public works witnessed at the beginning of this century (Lopes,2016).



Graphic 6 - Extraction of aggregates in seabed
Source: APRAM, S.A.

6.5.1.3. Legal framework and constraints

6.5.1.3.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Secretaria Regional do Ambiente e Recursos Naturais – Direção Regional do Ordenamento do Território e Ambiente.

6.5.1.3.2. Normative basis and instruments

The normative basis is the following:

- Regional Legislative Decree no. 28/2008 / M, which establishes the legal regime for the protection and extraction and dredging of aggregate materials from the coastal zone in the Autonomous Region of Madeira, on 12th August. Portugal: Autonomous Region of Madeira, Legislative Assembly, Diário da República, 1st series - no. 155, pp. 5528-5531.
- Regional Legislative Decree no. 14/2013/M alters Regional Legislative Decree no. 28/2008/M, of 12th August, which establishes the legal regime for the protection and extraction and dredging of aggregate materials from the coastal zone in the Autonomous Region of Madeira. of 12th of April. Portugal, Autonomous Region of Madeira, Legislative Assembly, Diário da República, 1st series - no. 72, pp. 2151-2153.
- Regional Legislative Decree no. 17/2016/M, second amendment to Regional Legislative Decree no. 28/2008 / M, of 12th August, which establishes the legal regime for protection and extraction and dredging of aggregate's materials from the coastline in the Autonomous Region of Madeira. Portugal, Autonomous Region of Madeira, Legislative Assembly, Diário da República, 1st series - No. 58, p.949.
- Regional Legislative Decree 22/2018/M, of 12th December, establishes the legal regime for the commercial extraction of aggregate's materials in the coastal, territorial waters and inland waters subject to the influence of the tides of the Autonomous Region of Madeira, Diário da República at the. 239/2018, Series I, 2018-12-12.
- Law no. 49/2006, establishes measures of protection of the coast, of 29th of August. Portugal, Autonomous Region of Madeira, Legislative Assembly, Diário da República, 1st Series. No. 166/2006.
- Ordinance no. no 510/2017 fixing the fees payable for the extraction of aggregate's materials in the seabed and for the collection of rolled pebbles to be in force during the year 2018 of 29th of December. Portugal, Autonomous Region of Madeira, Vice-Presidency of the Regional Government and Regional Secretariat for the Environment and Natural Resources, Official Journal of the Autonomous Region of Madeira, 1st series, nº222, p 2.

6.5.1.4. Current spatial distribution



Figure 55 - Location of inert extraction areas. Source: Regional Secretariat for the Environment and Natural Resources - Regional Directorate for Spatial Planning and Environment

6.5.1.5. Analysis of interactions

6.5.1.5.1. Interaction with other sectors

Regarding the extraction of aggregates, this activity is high incompatible with the aquacultures since it is a physical structure and because and also, the suspended sediments can have harmful effects on aquaculture species.

Also, the aggregate's extraction is also incompatible with the following activities:

- Underwater cultural heritage
- Artificial reefs
- Marine protected areas
- Cableways, emissaries and underwater pipelines

On the other hand, the aggregate's extraction is compatible with the following activities:

- Diving (when the boat is not extracting)

- Touristic and sport activities (when the boat is not extracting)
- Navigation (when the boat is not extracting)

6.5.1.5.2. Land-sea interaction

This activity is highly dependent of the ports or wharf areas. In this moment, in the Region, the aggregate's extraction is discharged at port terminal of Porto Novo and Anjos wharf.

6.5.1.5.3. Interaction with the environment

The extraction of aggregate's materials in the seabed can only be carried out as a necessary measure for the economic sustainability of the Region, being only destined to the needs of regional consumption and sustained in studies of sedimentary quantification, qualification and dynamics of the seabed.

The ARM created a set of rules, of a regulatory nature, transposed to the permits that consubstantiate the licenses of extraction of aggregate's materials, however granted. These allow the environmental parameters to be met, based on the rational and balanced use of existing resources, as well as effective monitoring and management.

The Regional Legislative Decree 28/2008/M of April 12th aims to regulate the economic exploitation of the territorial sea of the ARM, which has a relevant economic interest in the regional market, while creating an indispensable discipline to ensure sustainable management of its resources.

In the island of Porto Santo, the dredging of aggregate's materials on the beach and sea bed is only destined to artificial feeding of the beach. The extraction of aggregate's materials is forbidden in the seabed and when carried out from a distance of up to 200 m inland from the baseline.

According to Regional Legislative Decree nº14/2013/M, of April 12th, article 3, paragraph 3, the activities of extraction and dredging of aggregate's materials are subject to environmental impact assessment under the terms and in accordance with Decree-Law no. 69/2000, of May 3, in its current version. Licensees shall adopt a monitoring program to be defined by the licensing authority. Charges arising from the installation and operation of the monitoring program are the responsibility of the licensee.

The Regional Legislative Decree no. 22/2018/M, of December 12th, establishes the new legal regime for the commercial extraction of aggregate's materials in the coastal, territorial and inland water. According with this law, to ensure the sustainable use of aggregate's resources in conjunction with a high level of protection of the coastline, it is defined annually the overall quota and value for aggregate's extraction.

Also, regarding the coastal protection, the Hydrographic Institute study, also says, that the exploration of the aggregate's extraction must be done from the 15 meters bathymetric. In this way, this activity will not interfere with the stability of the coast and the cliffs.

6.6. Renewable Energy

6.6.1. Sector characterization

The ARM as an outermost island region, far from major continental energy networks, has high costs for energy supply and conversion due to transport and the smaller scale of the market.

According to the Madeira Island Sustainable Energy Action Plan and the 2012 Porto Santo Sustainable Action Plan for Energy, ARM is heavily dependent on fossil fuels. Although the region has pursued an energy policy aimed at reducing external dependence and minimizing negative environmental impacts associated with fossil fuels, demand growth has increased in the last decades and is largely supported by imported fossil fuels. In the European Union, one of the measures contemplated in Blue Growth is the enhancement of offshore renewable energies. This sector can contribute to fostering the exploitation of endogenous energy resources, minimizing the use of land by the energy sector and reducing greenhouse gas emissions.

6.6.1.1. Present Situation

In this moment, the information about the energy resources in the oceanic environment in the Madeira archipelago are currently very scarce. The *Madeira Waves Atlas*, promoted by the Agência Regional da Energia e Ambiente da Região Autónoma da Madeira (AREAM) in 2005, contains a mapping of the energy of the waves in 33 points of the coast in the islands of Madeira and Porto Santo, in waters of low depth (up to 50 m), based on climate statistics and numerical modeling.

AREAM is currently evaluating the densities of three marine energy resources (ripples, local sea currents and wind) in order to assess the potential available based on the climatic series of the last 30 years around the islands of Madeira and Porto Santo.

6.6.1.2. Potential situation

With reference to the long-term goals of the RAM under the Global Climate Leadership Memorandum of Understanding (MOU), subscribed to 2015, which aims to reduce carbon dioxide emissions by 80% to 95% up to 2050, taking into Consideration that the most suitable renewable energy resources for land in the terrestrial environment, such as wind, water and

solar energy, have limitations due to the high competition of uses and exiguity of available land space, the valorisation of Ocean Energy resources is key to achieving regional energy and climate targets.

Given the existing knowledge of local conditions and recent technological developments and prospects for the coming years, renewable energy resources in the oceanic environment with greater interest in the Madeira archipelago are:

- Offshore Wind energy in deep water (floating platform technology)
- Wave energy
- Energy of maritime currents

Although studies assessing ocean energy resources have not yet been completed, some areas with greater potential are identified, depending on the technologies and the surrounding conditions, namely:

- Offshore wind power production -The most favorable areas are the northwest and northeast extremes of Madeira Island and the north-northwest area of the island of Porto Santo, due to the absence of significant obstacles in the direction of prevailing winds, Mainly upstream but also downstream
- Energy production from the waves-is more favorable on the north coast of the islands of Madeira and Porto Santo, due to the predominant ripple of the North Quadrant
- Energy production from ocean currents is more favorable in the west-northwest and east-northeast extremes of the islands of Madeira and Porto Santo, taking advantage of the predominant northern quadrant, dictated by the standard of circulation of the Gulf Stream and by Effect of concentration on the extremes of the islands

In RAM, up to 2020 is not predictable the installation of commercial-scale electric power plants based on ocean energy resources, because energy storage infrastructures are needed in the electrical system to enable Reception of energy produced.

Therefore, up to 2020, the actions to be developed are mainly inventorying and evaluating resources, based on modelling and measurement of critical parameters for the characterization of the potential of wind energy, wave energy and current energy Maritime.

However, pilot projects for experimental application of new technologies can be promoted, mainly for research, development and demonstration purposes.

The productivity of wind energy is much higher in the sea and, with the ripening of the technology of floating wind turbines, will be a viable option to implement in the region. It is estimated that within a decade it is possible, with only five or six turbines at sea, to have a production superior to all the wind farms of Paul da Serra (about 40 turbines).

Despite the size of areas destined for renewable energies, only a small percentage will be occupied. The dimension of these areas is due to the need to develop more studies and pilot projects.

6.6.1.3. Legal framework and constraints

6.6.1.3.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Agência Regional da Energia e Ambiente da Região Autónoma da Madeira.

6.6.1.3.2. Normative basis and instruments

This activity is under development so until this moment, the Region don't have normative basis or instruments.

However, we can highlight the publication of Madeira Waves Atlas, which reflects the first effort to implement this type of energy in the Region.

6.6.1.3.3. Current spatial distribution

In this moment this activity is not developed in the Region.

6.6.1.4. Potential spatial distribution

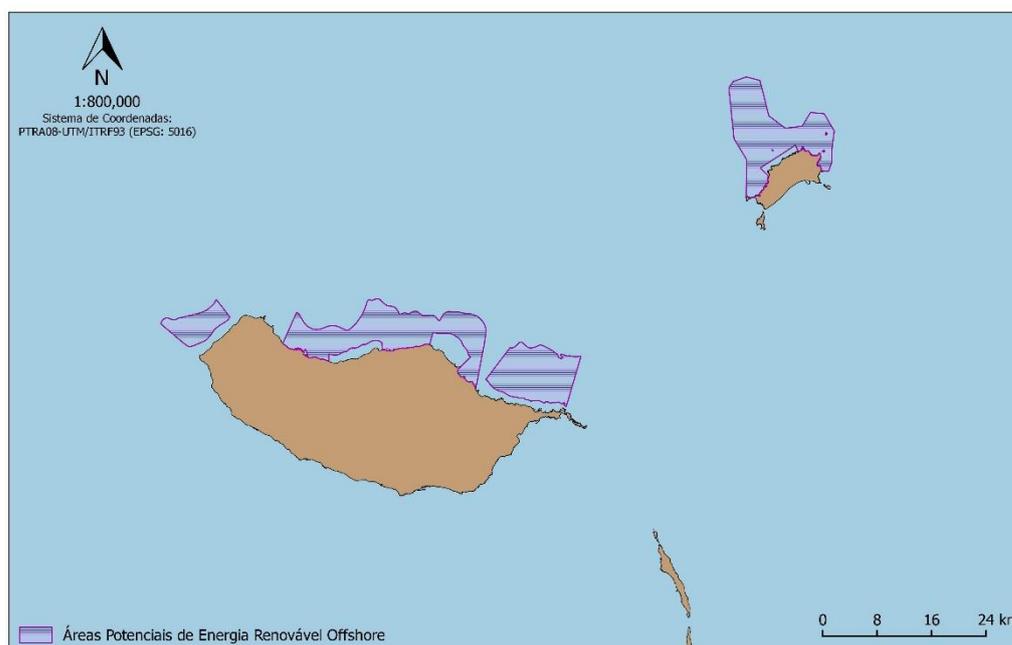


Figure 56 – Potential areas for renewable energies. Source: AREAM

6.6.1.5. Analysis of interactions

6.6.1.5.1. Interaction with other sectors

Given the difference in the maturity of systems for producing electricity from renewable sources in the ocean environment, as well as the multiplicity of technological solutions, the use compatibility analysis was carried out in a generic way, based on the knowledge of the most promising technologies in the current context.

As floating offshore wind systems have the highest degree of maturity, the analysis of the compatibility of uses will be indicated mainly for the use of this energy resource, although it may also be applicable to other floating structures. The offshore wind systems and other floating energy structures are compatible with the following activities or uses:

- Aquaculture
- Artificial reefs
- Diving and underwater marine sports

The offshore wind systems and other floating energy structures are weakly compatible or incompatible with the following activities and uses:

- Navigation routes
- Low altitude aerial navigation
- Navigation routes
- Exploration of aggregates or mineral resources

6.6.1.5.2. Land-sea interaction

This activity is dependent of some terrestrial infrastructures (e.g. to store the energy produced.

6.6.1.5.3. Interaction with the environment

The best practices to be developed in renewable energy research, demonstration and exploitation projects are as follows:

- Design
- Licensing
- Installation and operation
- Decommissioning

As guidelines, in each of the phases, environmental sustainability must be safeguarded, the costs of not using common uses must be safeguarded, the safety of operators and third parties should be guaranteed, and the return of technical and scientific knowledge should be assured.

In this sense and in general terms, the following steps should be considered:

- Ensure the process of technological development complies with international standards of good practice
- To elaborate a study of characterization of the marine zone: biodiversity, physical and chemical characteristics and evaluation of the main impacts resulting from the activity, namely those susceptible to affect the conservation of habitats and species of flora and fauna
- Ensure in each project the safeguarding of the underwater archaeological heritage identified or to be found
- Ensure that the landscape is safeguarded
- Adopt the best maritime reporting practices in each project, considering the existence of other projects and uses in the area

- Prepare the decommissioning phase by ensuring that all works, infrastructures and equipment are removed, except if they are necessary for a new project, or if, in the meantime, the consolidation of the ecological system is more than costs related to its maintenance
- Implement marine monitoring programs
- Try to develop solutions that allow compatible uses to be implemented, in the same area projected to the surface, either in time or space
- Establish system of lessons learned

6.7. Submarine cables, ducts and outfalls

6.7.1. Sector characterization

Submarine Cables

Submarine cables are a submerged telecommunications infrastructure designed to transmit communications signals (circuits) between land-based telecommunications stations. They may include coaxial cables, fiber optic cables, amplification systems, power systems, and telemetry and management systems.

These cables can not only connect points of the same country but also connect points from different countries located in other continents, for example between Europe and South America or between Portugal mainland and the archipelagos.

These cables provide for the transmission of electronic communications data, in particular the internet, mobile data, as well as fixed-line communications.

The aggressions (cuts) made to submarine cables cause damages in the telecommunications infrastructures, causing the interruption of communications, which may affect not only communications in Portugal but also all intra and intercontinental communications. The submarine cables contain an electrified conductor, whose voltages can amount to thousands of volts, meaning that in case of cutting or drilling, high voltage can be fatal.

The United Nations Convention on the Law of the Sea (UNCLOS) of 10th December of 1982 (ratified by Presidential Decree no. 67 67 A/97 of October 14th) establishes, in accordance with Article no. 87, that the high seas are open to all States, inter alia, to lay submarine cables and pipelines. Placement of submarine cables and pipelines on the continental shelf is regulated by Article no. 79 and in which it is established that the route of the line for its installation is subject to the consent of the coastal State.

Outfalls

Outfalls are structures composed of wastewater discharge pipes pre-treated in the ocean. The submarine outfalls seek to mobilize the maximum self-purifying capacity of the medium, moving away the point of discharge from the shore, which ultimately minimizes the degree of pre-treatment required at Wastewater Treatment Stations. The use of properly dimensioned

submarine outfalls eliminates the need for tertiary treatment and decreases the required secondary treatment intensity.

The installation of these infrastructures should take into account the Decree-Law no. 38/2015 of March 12th, relative to the issuance of a private use title in the maritime space and Decree-Law no. 226 - A/2007, of May 31th, concerning the use of water resources.

Submarine Ducts

In the ARM, the submarine pipelines are destined to the transport and discharge of fuels and inert ones.

6.7.1.1. Present Situation

Submarine Cables

The ARM is equipped with a modern communications network, with high bandwidth and connectivity levels.

Due to its geographical position, Madeira archipelago is a strategic link between several submarine cables that connect the European continent with the American and African continents, which ensures connectivity with the rest of the world.

The ARM is connected to the rest of the world through the following cables:

- The cable Euráfrica, which connects ARM to Portugal mainland (Sesimbra), France (Saint-Ileire de Riez) and Morocco (Casablanca). Created in 1992 has a capacity of 560Mbits (4x140 Mbits)
- The SAT 2 cable connecting ARM to the Canary Islands, South Africa (Cape Town). Created in 1993 has a capacity of 2x560Mbits
- The Atlantis 2 cable is connecting ARM to Portugal mainland, Spain, Senegal, Cape Verde, Brazil and Argentina. Created in 2000 it has a DWDM capability and can be extended as needed

- The cable Continente - Azores - Madeira (CAM). Created in 2003 with DWDM capability and can be expanded as needed
- The cable Madeira - Porto Santo (CAM). Created in 2003 with DWDM capability and can be extended as needed
- The Africa Coast to Europe (ACE) cable that also passes in the ARM economic exclusive zone. It was installed in December of 2012
- The West African Cable System (WACS) cable that also passes the ARM economic exclusive zone. It was installed in May 2012.

Outfalls

On the Madeira island there are the following submarine outfalls:

- Câmara de Lobos outfall
- Funchal outfall
- Caniço outfall
- Santa Cruz outfall

On the Porto Santo island there are the following submarine outfalls:

- Ribeiro Salgado outfall
- Ribeiro Cochino outfall
- Penedo outfall

Submarine Ducts

In the ARM, the existent submarine pipelines are in the Caniçal fuel terminal and in the old terminal of the Anjos. In the first case, the entity responsible for the management of the pipelines is CLCM - Companhia Logística de Combustíveis de Madeira, S.A., and is intended for the discharge of fuels. In the second case, it is destined to the discharge of aggregates and is in the terminal of the Anjos, being a movable structure.

At the Caniçal fuel terminal, there are three submarine pipelines. Each of these pipelines consists of:

- 77m of underwater hoses;

- 1 x Marine Breakaway Coupling - system that is operated in case of overpressure or traction during ship unloading operations - inserted in the subsea hose assembly);
- 1 x Pipeline End Manifold - hydraulically and remotely controlled unit for the actuation of safety and operating valves - unit at 22m depth and which connects the underwater hoses to the carbon steel pipeline. for remote reading of physical characteristics of the products to be operated and instrumented functions of security.

In addition to the submarine pipelines, there are air ducts that, due to their importance or size that occupy in the maritime space, can conditionate the development of some activities or uses. The air pipeline of the Socorridos terminal is in full sea space and is intended for the discharge of cements. Until January 2015, this terminal also served to discharge fuel to the Empresa de Eletricidade da Madeira, S.A. In the Porto Santo island, the existing pipelines are aerial and are destined to the discharge of cement and fuels.

6.7.1.2. Potential Situation

Submarine cables

With regard to the installation of submarine cables, the following are being considered: • The power cable called “electric cable between the islands of Madeira and Porto Santo” will depart from the island of Madeira (Faial bay) to the island. from Porto Santo (Morena Cove). This connection will be operated at 60 kV with a nominal transport capacity of around 30MW and is expected to be installed in 2021 or 2022 • EllaLink cable connects Fortaleza (Brazil) to Sines. This cable will be installed this year and will pass in RAM ZEE

6.7.1.3. Legal framework and constraints

6.7.1.3.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Águas e Resíduos da Madeira and the APRAM, S.A. – Administração dos Portos da Região Autónoma da Madeira.

6.7.1.3.2. Normative basis and instruments

- Plano de Gestão da Região Hidrográfica do Arquipélago da Madeira (RH10)

6.7.1.4. Current spatial distribution

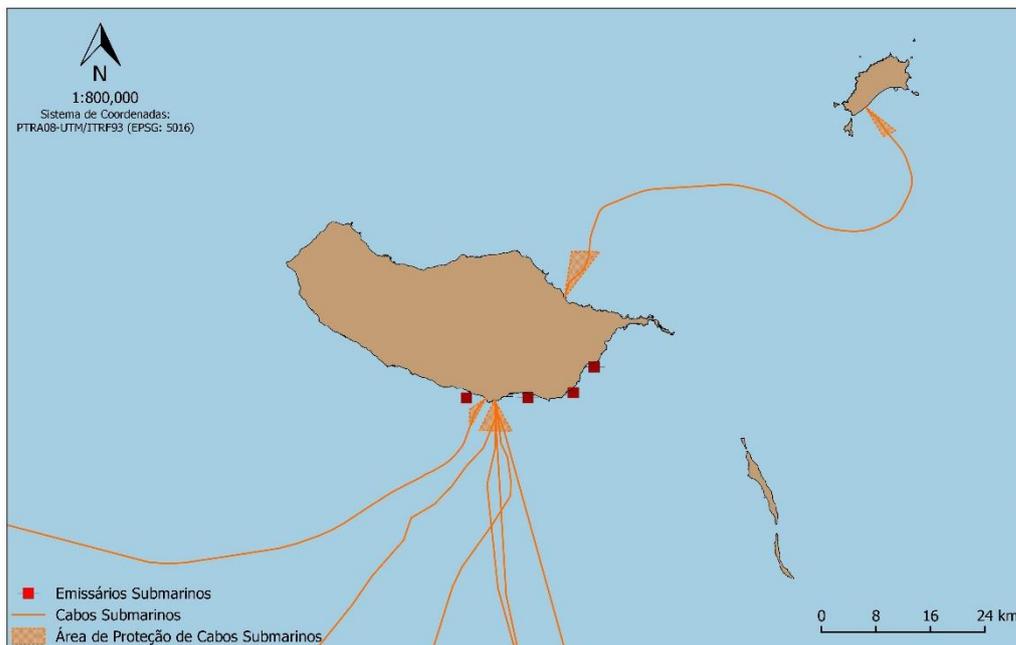


Figure 57 - Outfalls and submarine cables (island of Madeira). Source: PGRH 2016 - 2021 and Hydrographic Institute

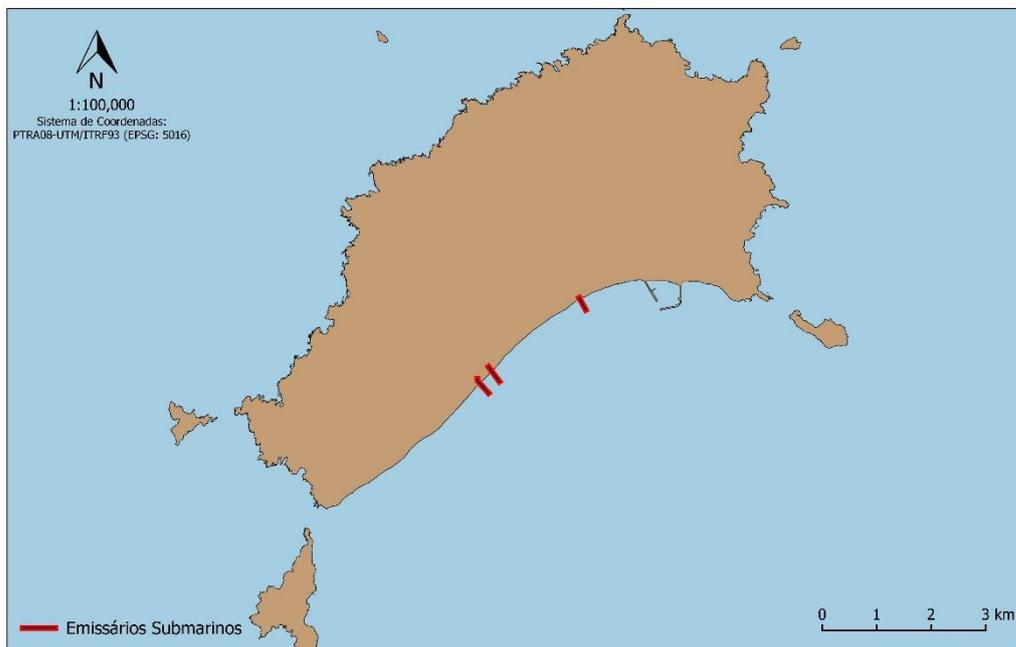


Figure 58 - Existing submarine outfalls on the island of Porto Santo. Source: Water and Waste from Madeira, S.A.

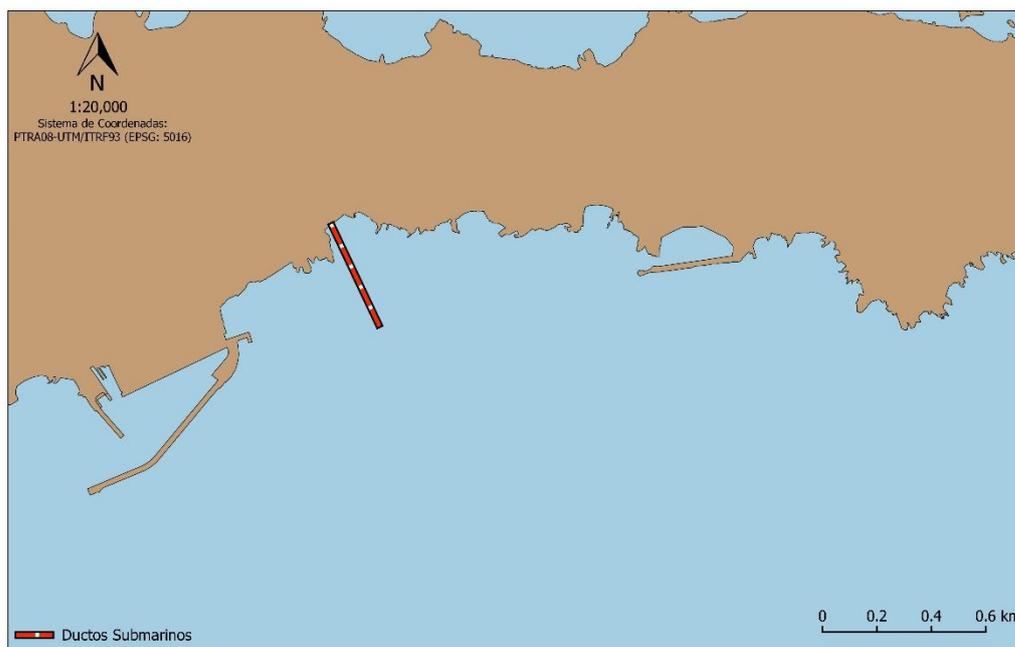


Figure 59 - Location of the submarine pipeline at the Caniçal terminal. Source: APRAM, S.A.

6.7.1.5. Analysis of interactions

6.7.1.5.1. Interaction with other sectors

Within the area of protection of submarine cables and their area of cables as well as outfalls and ducts, it is prohibited to carry out any activity that may damage submarine cables, such as:

- Aquaculture
- Aggregates extraction
- Dredging material
- Use any nets or fishing gears that reach the seafloor

The following uses and activities with submarine cables and emitters are compatible:

- Navigation and traffic routes
- Sports

6.7.1.5.2. Land-sea interaction

This kind of structures are dependent of some infrastructures (e.g. port areas, wastewater treatment).

6.7.1.6. Interaction with the environment

Submarine Cables

National and international legal regulations impose conditions for the use of the sea in areas where submarine cables pass, providing sanctions for those who violate these conditions and endanger the integrity of submarine cables and pipelines.

At national level, the Decree-Law no. 507/72, of December 12th, seeks to identify the forbidden and sanctionable practices, based on the United Nations Convention on the Law of the Sea.

The Hydrographic Institute has also contributed to the dissemination and enforcement of good practices through nautical charts, including electronic charts where it reproduces cartographically along the coast the maritime marks that indicate the orientation of submarine cables, as well as an area of protection, to a distance where a high depth is registered, from which it is not foreseen to carry out activities that put the integrity of the cables at risk.

The annual warnings to seafarers' groups include special warnings which contain information about submarine cables and the procedures to be followed in the immediate vicinity where they are located. One measure was the creation of zones of protection of the cables that allow to identify the areas more susceptible to the possibility of contact with the submarine cables.

Outfalls

The submarine outfalls are constantly monitored to assess the impacts they may have on the marine ecosystem. The Management Plan of the Hydrographic Region of the Madeira Archipelago analyze the impact of the discharge of the effluents resulting from the wastewater treatment in terms of microbiological contamination and in the trophic state of the marine environment.

Submarine Ducts

At the Caniçal terminal, in order to promote environmental safeguards, CLCM and Maritime Authority has the following means available to reduce the impacts in the ecosystem:

- In each of the mooring buoys were placed two bags with absorbent barriers, 25 meters each (50 meters in total), to close the area between the North buoys and the area between the South buoys, thus providing an even more intervention in case of a spill
- Maritime pollution control barriers placed on land will serve to cover and close the area to the West or the East
- CLCM-owned marine pollution control barriers and all auxiliary offshore equipment (Nofi Boom Bag and RO-BOOM 1300) are in a dedicated container at the end of the South Pier with the North Pier of 40 '. In this container there is also a RO-BOOM 2000 Pollution Control barrier owned by the Maritime Authority
- VHF communication means CLCM / ships and radios of the SIRESP network
- The Marine Breakaway Coupling, which is activated in the event of overpressure or traction during ship unloading operations, is inserted into the underwater hoses, acts as a fuse and is intended to mitigate marine pollution if it is exceeded the maximum pressure established for the unloading operation or the ship having to leave the mooring buoys with urgency without having time to loosen the mooring ropes. This device is actuated by isolating both ends of the hoses attached to it and the ship carries with it part of the hoses, allowing rapid exit from the mooring site
- In all hose handling operations (beginning and end of discharge operations), a team of professional divers accompanies the work
- Every 3 years and in accordance with the manufacturer's recommendations, the Marine Breakaway Coupling, is replaced by a factory refurbished. The hoses are ground tested (Cançal dock) and subjected to pressure testing, vacuum testing and electrical continuity testing. After reassembly of the subsea assembly, a new hydraulic test is carried out to check leaks
- The mooring system (buoys and chains) is subject to semi-annual underwater surveys, or whenever necessary and quarterly to dry zone inspections.

6.8. Scientific research

6.8.1. Sector characterization

The areas of scientific research are intended for the development of pilot projects, test and demonstration zones covering various areas of knowledge. Although scientific research can be developed throughout the regional maritime space, strategically, due to its oceanographic, geographic and proximity characteristics of terrestrial equipment and infrastructures, which foster the development of pilot projects or demonstration and testing zones.

6.8.1.1. Present Situation

In this moment, it's possible to develop this activity in all the Regional maritime space.

Due to the oceanographic, physical and geographic characteristics and mainly logistic, most of the research areas are mainly developed on the south coast of Madeira and Porto Santo and along the coast of the Desertas and Selvagens islands.

6.8.1.2. Potential situation

South coast of Madeira island

This coastal and oceanic area, is approximately 24 750 km² and is located between the island of Madeira and the SOUTHERN boundary of ZEE-Madeira, next to the Wild Islands, bounded to the northwest by Doca do Cavacas, to the north by the intertidal of Madeira and the northeast by A point with the coordinates 32 ° 42.1 ' N, 16 ° 21.5 ' W; Southwest by point 29 ° 17.5 ' N, 16 ° 07.3 ' W and southeast by point 29 ° 14.6 ' N, 15 ° 20.4 ' W.

This area is proposed as a classified area of scientific interest and encompasses the protected areas of the Garajau Nature Reserve, Desertas Islands Nature Reserve, Wild Islands nature reserve and the potential area of the Eco-marine Park of Funchal.

The interaction of the islands with the Oceanic (and atmospheric) flow incidents induce disturbances with a strong impact on the generation of oceanic circulation systems (Caldeira *et al.*, 2002). The flanks of the island of Madeira, namely the area between the Ponta de São Lourenço and the Desertas Islands are areas of great meteo-oceanographic dynamism

(Couvelard *et al.*, 2012; Caldeira and Tomé., 2013). Oceanic Turbians as well as recirculating cells, outcrop zones, oceanic fronts, etc., are some of the dynamic phenomena that result from this interaction and have been studied and documented in scientific papers published internationally (Caldeira *et al.*, 2001; Boiler and Sangrá, 2012; Caldeira *et al.*, 2014). These phenomena are also responsible for the outcrop of nutrients from the deep ocean to the surface, thus promoting a substantial increase in productivity along the coast of the islands, as is the case of eutrophication. The nutrients available in these areas can feed other distant areas and/or be responsible for feeding the main coastal species that inhabit the archipelago. On the south side of Madeira Island, preliminary observations of benthic communities populated by aggregations of glass sponges (*Hexactinellida Class*), some species of cold-water corals, including Gorgonias and Antipatarians, and populations of Decapod crustaceans and deep fishes (Reed and Pomponi, 1991).

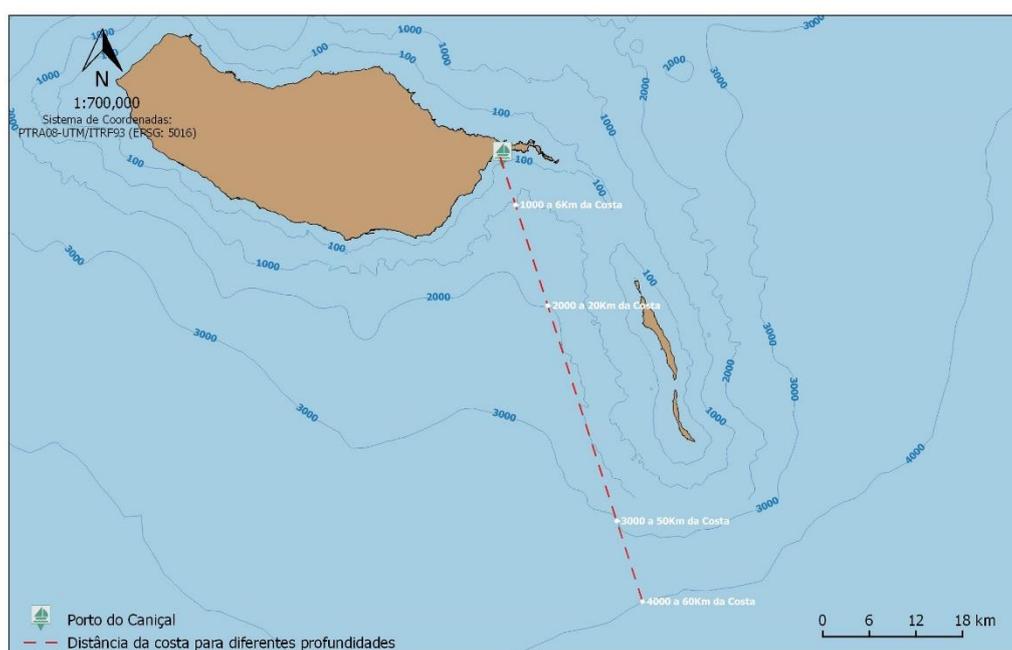


Figure 60 - Distance from the coast to different depths.

There are areas identified as longer permanence of turtles, that is, areas where their path is more sinuous and the speed of migration slower, which we interpret as the main areas of feeding. The turtles remain longer and seek more intensely areas with more chlorophyll and with lower depth, especially along the slopes of the seabed, as are the submarine banks and the slopes of the island platforms.

This area also has the potential for the development of studies or projects aimed at the knowledge of the deep sea. It is possible to access the deep and ultra deep sea a few miles from the coast.

Thus, the region holds unique conditions for the development of studies or projects aimed at increasing the knowledge of the deep sea. The advantages/positive points of access to the deep sea in a short period of time against the reduced coastal distances are as follows: lower operating, exploration and mapping costs for applied research and robotics activities as well as the Reduction of certain logistical and temporal factors that may hinder the sustainable exploitation of certain marine resources.

What distinguishes the deep sea is the fact that they are areas devoid of light or with reduced light penetration rates that compromise the realization of photosynthesis processes and consequently the primary production.

South coast of Madeira island – West area

Several published works have pointed the south coast of Madeira Island with physical and environmental characteristics of excellence for marine fish farming in cages systems for open sea (Andrade, C. A. P., 1995a; Andrade, 1995b; Andrade, 1996; Gouveia and Andrade, 1999; Andrade, Vlaminc, and Gouveia, 2000; Gouveia, Andrade and Gouveia, 2003; Andrade and Gouveia, 2008).

Torres and Andrade (2010) Using geographic information systems made the selection of some areas of the south coast of Madeira Island with interest for fish farming in open seas, with environmental, physical and logistic criteria. Basic work that served to elaborate the Management Plan for Aquaculture in Autonomous Region of Madeira.

Along the south coast of Madeira, and in particular in the West zone of the island, is the most ZIA. Of the three licensed areas and with open sea fish farms in operation, two are located in this area – Ribeira Brava and Arco da Calheta. The aquaculture industry has a range of suppliers of upstream goods, including culture equipment (cages, nets, buoys, moorings, feeders, etc.), environmental monitoring and others. The competitiveness of the sector is largely determined by the innovation that allows to lower production costs and ensure the diversification of products in the market. It is in the interests of the industry-producers and suppliers-that as a result of RTD projects & I, new equipment, goods and services are tested on a large scale and under conditions of operation of the culture establishments. Thus, the aim is to take advantage of the physical and oceanographic characteristics of the area, together with existing equipment and infrastructures on land.

South coast of Madeira island – Ribeira Brava

In the western area of Madeira Island, in the area called "Cannon of Ribeira Brava, new observations were made for the science of vulnerable marine ecosystems (VMEs) between 600 m and 2000 m deep, namely aggregations of sponges and coral reefs of Cold Waters (Braga-Henriques, 2018). Classified as priority habitats by the International Convention OSLO PARIS (OSPAR, 2010a, b) and structural components of ecological or biologically significant marine areas (EBBAs), these ecosystems contribute to the good environmental status of Oceans by promoting biodiversity, ecosystem services of regulation (CO₂ sequestration, formation of biological habitat, among others) and aggregations of fishery resources, including fish and crustaceans (Braga-Henriques, 2014; Roberts et al., 2009; Braga-Henriques et al., 2006; 2011a, b; 2012; 2013; de Matos et al., 2013; Yesson et al., 2018). However, by understanding species with reduced growth rates and fecundity and a high longevity (Dayton et al., 2013; Fallon et al., 2010; Roark et al., 2009; Carreiro-Silva et al., 2012), present a reduced resilience to potential human impacts and are therefore subject to protection and conservation measures by European directives (e.g. DQEM) and international organizations and conventions (e.g. the Convention of The United Nations on the law of the Sea, OSPAR, Convention on Biological Diversity, CITES).

Since this is an area rich in natural values (species, *habitats*, ecological processes and fishery resources) and with an interest in the knowledge of the seas and exploitation of existing resources in a sustainable way, we analysed the Existing or potential uses and activities. It was possible to detect that the art of fishing of the longline is exercised for the capture of the black swordfish. Compared to trawl or other fishing gear based on lines and hooks or traps (Watling and Norse, 1998; Koslow et al., 2001; Pham et al., 2014), the potential impacts caused by this type of derivant longline (operation in the pelagic zone) should be residual.

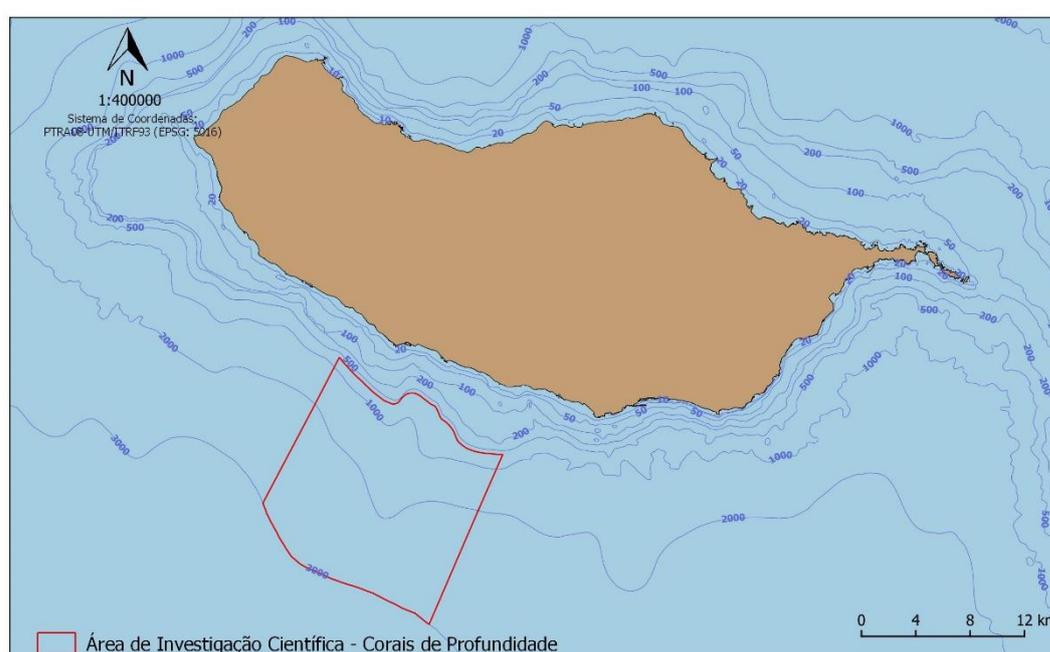


Figure 61 - Scientific research area – cold water corals. Source: Oceanic Observatory of Madeira

Machico bay area to the Ponta de São Lourenço

This area is located between the Bay of Machico and the Ponta de São Lourenço (32 ° 42 ' N; 16 ° 45 ' W at 32 ° 45 ' N 16 ° 46 ' W), from the intertidal to the bathymetric of the 150 m.

The whole area is identified as prone and of great interest to scientific research, by the various aspects that characterize it, listed below and mention the activities incompatible with the conservation of the identified *habitats*:

- Accessibility-ports and marinas that allow departure of boats (Port Recreio Machico, Caniçal and Marina of Quinta do Lorde), either of divers from Land (Cais de Machico, Pier of Pedra D'eira, pools of Caniçal, Praia do Quinta do Lorde complex)

- Favorable weather conditions, the sheltered character of this coastline allows in many days of the year to conduct sea campaigns for sampling
- Marine Habitats with Community interest: inlets and shallow bays (1160), reefs (1170), submerged sea caves or semi-flooded (8330)
- Habitat diversity -The coastal strip is characterized by a rocky coastline consisting of some pebble beaches and rocky platform areas that can extend into the subtidal and reach 30 m-40 m deep in some areas (see Alves *et al.*, 2001; Ribeiro, 2008). These habitats are vulnerable to anthropogenic impacts and are therefore subject to conservation and protection measures. ...
- Diversity of species-for this area are reported several species of Hydrozoaries, group for which there has been no systematic effort either of collections or identification (Medel and Vervoort, 2000; Wirtz, 2007), as well as species of Pennatulacea, group over which there are some taxonomic doubts and only with 3 coastal species referenced to Madeira (Brito and Ocaña, 2004; Ocaña and Wirtz, 2007). It should also be noted that in this area, collections have been made that led to the discovery of new species for science, namely polychaetes (Palmero *et al.*, 2008) and Bivalve (Gofas and Salas, 2008; Gould and Gulden, 2009), Copepods Harpacticoides (Packmor, 2013). Of equal importance and with considerable contribution to the marine biodiversity of this area of research interest is the occurrence of species of decapod crustaceans (Fransen and Wirz, 1997; Calado and Nogueira, 2004; Araújo and Wirtz, 2015), Tanaidaceans (Bamber, 2012) and, in the mobile substrate funds species of echinoderms (Jesus and Abreu, 1998). Other groups of marine invertebrates also present in the aforementioned area that may explore in the following references and another unreported bibliography, demanding for such a much deeper research and work (Wirtz, 1994, 2005; Ansín agís *et al.*, 2001 and Wirtz *et al.*, 2006; Freitas, 2009). In this area, according to Caldeira *et al.*,(2001) The Bay D'abra can function as an "environmentally safe" area by finding many eggs and larvae of fish (Ichthyoplankton)
- Invasive species-have already been marked for this area invasive species, and most of these are briozoaries, tunicates and polychaetes particularly associated with marinas (Wirtz and Canning-Clode, 2009; Canning-Clode *et al.* 2013)

- Projects carried out: At the oceanographic level, some projects have already been carried out (Caldeira *et al.*, 2014). Recently, the presence of black coral aggregations was registered in mesophytic environments (Braga-Henriques, 2017; 2018)

Area of Porto Moniz

This area is located in Porto Moniz (32 ° 52 ' N, 17 ° 11 ' W at 32 ° 51 ' N 17 ° 9 ' W), from the intertidal to the bathymetric of 150 m, including the lower of the Gerarda to the east in the area of the mouth Ribeira da Janela and the islet Mole (32 ° 52 ' N 17 ° 9 ' W) (see Figure 7m-2).

This area is identified as prone and of great interest to scientific research, by the various aspects that characterize it:

- Accessibility-port that allows the departure of boats (Port of Porto Moniz) and exit of divers from Land (Piscinas do Porto Moniz), as well as a dive center that can provide logistical support
- Marine Habitats with community interest-coves and shallow bays (1160); reefs (1170)
- Location-the flanks of the islands are very susceptible to the production of swirls and/or "upwellings" located that can be retained and transported to *offshore* by Whirlwinds that depart from the islands (Caldeira *et al.*, 2002). The sea, predominantly brave on the north and West coast of Madeira (Caldera and Lekou, 2000) can be a structuring factor in the subtidal habitats, and Alves *et al.* (2001), in a study on the spatial distribution of sea urchins and seaweed cover, suggests this factor as being responsible for the differences in the abundance of *diadema africanum* between the north and South coast, which was almost absent from the shallow coastal areas where the waves have great impact
- Diversity of species-due to the low sampling effort carried out in this area, little is known about the biodiversity of it. The following information represents only a few singular records, namely molluscs (Wirtz, 2005) and polychaetes (Pascual *et al.*, 2001)
- Projects-are summarized to studies carried out in the past at the level of theses of undergraduate degree (Alves *et al.*, 2001 and 2003), samples that were again repeated in 2008 and whose results continue to be analyzed (Alves *et al. in prep.*)

Submarine hills area

This area of the subsea hills of the Madeira-Tore complex, has about 87 817 km², being delimited by the following points: 34 ° 26.8 ' N, 16 ° 23.1 ' W; 33 ° 44.7 ' N, 14 ° 27.8 ' W; 34 ° 26.0 ' N, 12 ° 49.8 ' W; Limit of the ZEE-Madeira Subararea; 35 ° 46.0 ' N, 15 ° 31.1 ' W and encompasses the submarine Hills Josephine (southern part), Lion, Dragon, Unicorn, Seine and Ampère (west part).

The submarine hills occur in all oceans and constitute systems considered as *hot spots* of marine biodiversity, characterized by high diversity and rate of endemisms, supporting in many cases productive fisheries (Morato *et al.*, 2010). The submarine hills are places of interaction between currents and topography and between organisms and the physical environment, with implications in the Phyto and zooplankton, given that the injection of nutrients in the euphoric zone stimulates the biological productivity (Coelho and Santos, 2003). The subsea hills of the Madeira-Tore complex are an example of the above and as such should constitute an area, not only of great scientific interest, but also of protection.

Cabo Girão

This area is located in Cabo Girão (32 ° 39.1 ' n 17 ° 01 ' W at 32 ° 39 ' N 17th 00 ' W), from the intertidal to the bathimetric of 150 m (see figure 7m-2).

This area is identified as prone and of great interest to scientific research, by the various aspects that characterize it:

- Accessibility – The pier of Fajã dos Padres allows for divers ' departures from land and from vessels
- Climatic conditions-the sheltered character of this coast (SW), given the prevailing winds of N-NE (Caldeira *et al.*, 2002), allows in many days of the year, conduct sea campaigns for sampling, as well as good visibility of seawater in this area
- Marine Habitats with Community interest-reefs (1170)
- Diversity of species-due to the low sampling effort carried out in this area, along with the absence of bibliography, little is known about the biodiversity of this area.

Reis Magos Area

Coast area between the coordinates 32 ° 38 ' n 16 ° 49 ' W to 32 ° 39 ' n 16 ° 48 ' W, delimited by the lower limit and the batimetric of 150 m (see figure 7m-2).

The whole area is identified as prone and of great interest to scientific research, by the various aspects that characterize it, below Enunciations and mentions the activities incompatible with the conservation of the identified *habitats*:

- Accessibility-Outbound divers from land as well as a dive center that can provide logistical support
- Marine Habitats with community interest-inlets and shallow bays (1160), reefs (1170), submerged sea caves or semi-flooded (8330)
- *Habitats* -According to the existing knowledge at the date is the coastal area of the south coast of Madeira with greater abundance of macroalgae. According to Ferreira (2013) who studied the communities of Macroalgae in the intertidal of the south and north coast of Madeira Island, the Magi, on the south coast, is the locality with the highest number of rates with exclusive occurrence (10), area in which also found two new Logs for wood, namely *Ganonema farinosum* and *Grateloupia Aloe dichotoma*. In the same study, the most frequent occurrence of green algae than chestnuts and a higher number of dominant taxa in the other sites studied either on the south coast or on the north coast were verified in the Magi.
- Diversity-from the point of view of invertebrate fauna, it is known that in this area of research interest there are several species of decapod crustaceans (Fransen and Wirtz, 1997; Wirtz *et al.*, 1998; Araújo, 2002; Araújo e Freitas, 2003; Calado *et al.*, 2004; Dworschak and Wirtz, 2010, Araújo e Wirtz, 2015), Mysidaceans (Wittmann and Wirtz, 1998), Tanaidaceans (Bamber, 2012), Hydrozoaries (Wirtz, 2007), Opisthobranchi Molluscs (Wirtz, 1995) and other species of molluscs, including new species for science (Wirtz, 1994, 1998, 2006, 2013; Nishi and Núñez, 1999; Calado *et al.*, 2004; Santos *et al.*, 2008; Packmor, 2013), as well as other groups of marine invertebrates (Wirtz, 1994, 1998, 2006). Although the effort of sampling at the subtidal and circalittoral level in this area has been sporadic and practically composed of individual collections and observations, the information already published demonstrates the high potential of this

area for the study of Marine biodiversity of the subtidal of Madeira. As such, it is an area prone to scientific research, which can in the future with new researches/studies contribute to the validation of area of interest and conservation/protection for rare species and/or with high conservation value. As an example, one may refer to the occurrence of a species of seahorse, *Hippocampus Hippocampus* and MAËRL funds (C. Ribeiro *obs. pess.*)

- Threats-fortuitous fishing and underwater hunting, scuba diving, pollution, inert extraction and inert discharges
- Projects carried out-in the area concerned were already carried out some projects namely, *clip-climatic effects in the ecology of coastal fish; atranslatidinal and phenological rding, project Praxis XXI No. 3/3.2/EMG/ 1957/95*, whose main objectives were to develop work in the areas of biology and ecology of coastal fish communities in the national territory to allow the creation of global comparative databases between the various regions

Other areas

The island's buildings are the result of intraplacated vulcanism on the Nubian plate of slow motion, leading to a range of access point that extends to the NE (Geldmacher *et al.* , 2000).

Madeira is the youngest island, with volcanism extending from > 7 Ma to the Holocene (geldmacher *et al.*, 2000; Mata *et al.*, 2013; Ramalho *et al.* , 2015).

The island is an elongated shield volcano, which despite being highly dissected, is largely above 1 200 m, reaching a maximum elevation of 1 862 m in Pico Ruivo.

According to Quartau (2018), a study was conducted between the Hydrographic Institute and the mission structure for the extension of the Continental Shelf (EMPC) that analyzed the characteristics identified in the data sets of seismic reflection, bathymetry, Seismology, in which it was possible to map in detail the submarine flanks of the archipelago, from the coast up to-4500 meters.

From this study, it was possible to conclude that some of the reliefs existing in the maritime space near the city of Funchal correspond to an alignment of 60 km of length of submarine volcanic cones, called *the Volcanic Ridge of Funchal*.

Within this range it is possible to detect various features that exhibit irregular shapes, typical of blocks of a large debris avalanche tank. On land, the morphology corresponds to a wide amphitheatre. This characteristic was interpreted as a secondary scar of a flank collapse (called "Funchal Slip"), which was covered by the recent volcanism of the upper volcanic complex.

The marine fund consists of small V-shaped ravines, with a few hundred meters wide and up to 2-3 km long. They are usually organized in parallel networks, slightly convergent, dividing into several wider and deeper channels.

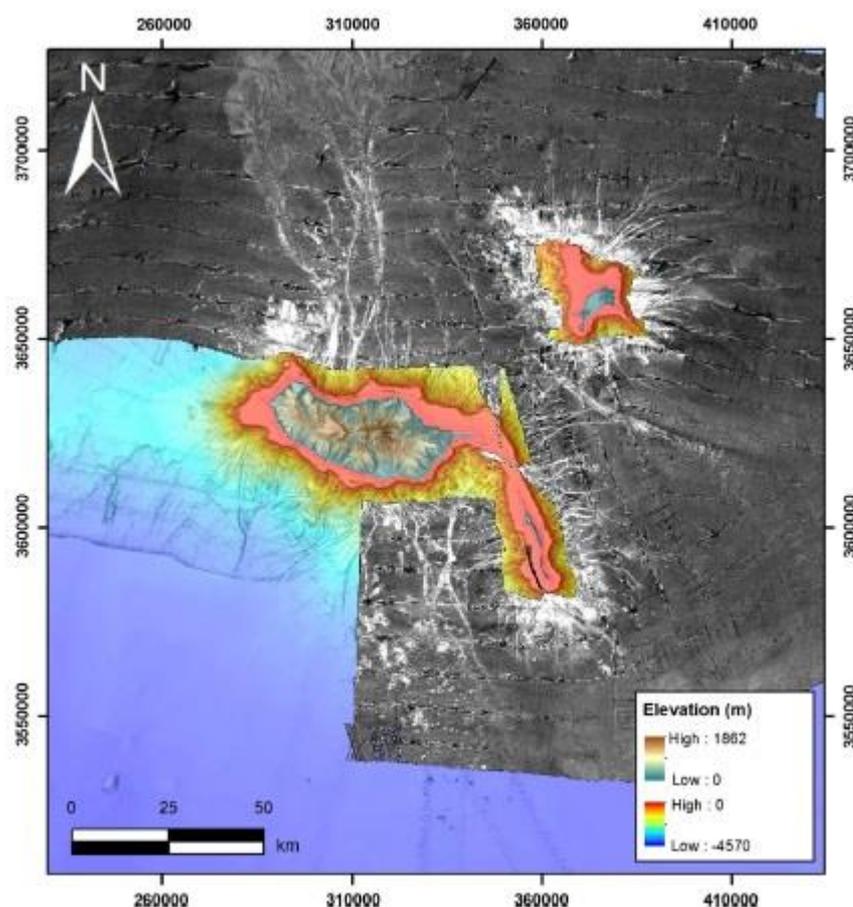


Figure 62 - Result of the withdrawal of the marine funds. Source: Quartau et al,2018

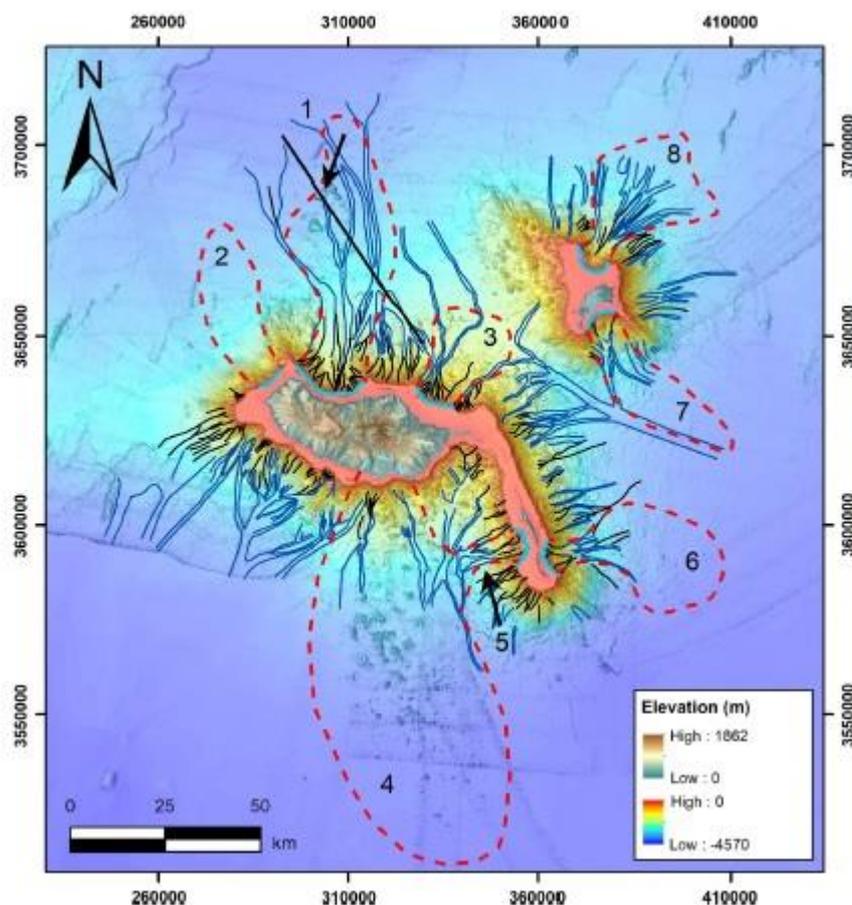


Figure 63 - Interpretation of the submarine topography: the light blue lines represent the scars, the black lines the ravines, the dark blue lines represent the canals and lines Red dotted areas represent the avalanches of debris from landslides. Source: Quartau et al, 2018.

6.8.1.3. Legal framework and constraints

6.8.1.3.1 Competent institutions for sector management

The responsible entity for this activity in the Region is the Observatório Oceânico da Madeira.

6.8.1.4. Analysis of interactions

6.8.1.4.1 Interaction with other sectors

The scientific research doesn't have any restrictions regarding the other maritime activities.

6.8.1.4.2 Land-sea interaction

This activity is dependent of the port areas and investigation units. In the case of the Madeira island, one of the investigation units are near to the coast and to Calheta marina. This is

important for the investigation once they quickly arrive to the laboratories to analyse the data, for example.

6.8.1.4.3. Interaction with the environment

In view of the existence of significant areas of environmental value which need to be protected, it is important to ensure that potential impacts of research campaigns including removal techniques are minimized, especially if they occur in areas with particularly sensitive habitable habitats irreversible damage.

6.9.Recreation, Sports and Tourism

6.9.1.Sector characterization

The geographic and physical characteristics of the region, marked by mild climate, favorable oceanographic conditions throughout the year, as well as by marine ecological values, have provided the development of recreational, sport and tourism activities. These activities have a strong tradition in the region, expressing themselves in the existing infrastructures and in the dynamics associated with the search for these activities.

The maritime space is currently a very sought-after resource for the development of activities linked to the tourism sector, which includes nautical tourism, recreation and leisure.

The *Estratégia para o Turismo 2027* defines nautical tourism and related activities, as priority projects to affirm tourism in the economy of the sea.

Within nautical tourism, the nautical recreation includes all activities related to the practice of water sports (e.g. sailing, kiteboarding, bodyboarding, surfing, windsurfing, skimboarding, paddle surfing, longboarding, diving, rowing, kayaking, sport fishing, motor boating, among others) and tourist cruises. Nautical tourism also includes nautical sports, that is, all kinds of activities whose core is the component of competition, regardless of whether your mother is amateur or professional.

However, where it is necessary to reserve a certain area or volume of the maritime space for a certain period of time, which may be prolonged or temporary, intermittent or seasonal, the use ceases to have characteristics of common use and enjoyment and becomes have characteristics of private use. Examples of private uses of maritime space are the following uses and activities:

- Playgrounds, moorings for nature observation
- Sports competitions of various types, such as regattas, surfing championships or other sports, where the area in which the test is being conducted is unequivocally delimited
- Another activity that requires the establishment or construction of a structure in the sea, such as sport fishing when associated with a structure built for this purpose, submerged hotels, artificial islands, etc.

6.9.1.1. Present Situation

Recreational Boating

Recreational boating is an important activity that has grown in recent years in the Region due to the natural conditions, landscape and safety offered in the berthing areas for the development of its practice. Recreational boating is a complementary product of sun and beach tourism, promoting the creation of differentiated employment and the emergence of upstream and downstream activities, and also, contributes to the defense of environmental values, to a greater connection of the population to the sea and to the dynamism of local communities

The recreational boating is a concept that promotes the contact with the sea, by which it includes the sport activity, recreational navigation, maritime-tourist activities. The existence of a potential regional market for the development of this activity, gives it a significant role in the development of the regional blue economy and allows territorial development with tourism potential.

Recreational leisure activities at the ARM are mainly concentrated on the south coast of Madeira and Porto Santo, where rippling conditions are more favorable to the development of this activity.

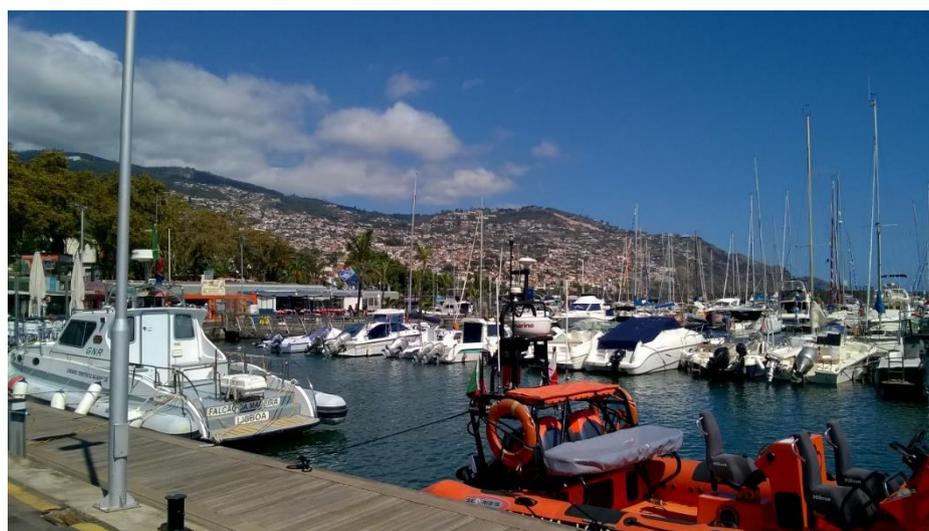


Figure 64 - Funchal marina
Isabel Lopes

International ship registry of Madeira (RINM-Mar *in Portuguese*)

The International Ship Registry of Madeira (RINM-Mar) was established with the aim of avoiding the process of flagging out ships for other flags, attracting new ship owners and ensuring that ship safety standards were met.

The registration offers an attractive tax regime applicable to vessels and shipping companies duly licensed to operate within the scope of the International Business Center of Madeira. As an EU register, the RINM-MAR allows full access to community waters and ensures the supervision of all registered vessels.

RINM-Mar is the second Portuguese registry and is among the highest quality international registrations. All international conventions to which Portugal is a signatory are fully applicable and respected by RINM-Mar.

RINM-Mar accepts registration of commercial vessels, oil rigs, commercial or private yachts and recreational craft.

All the measures and efforts employed by RINM-Mar have led to a positive development in the register of ships.

Water sports activities (sports activities)

In the Basic Law of the Regional Sports System, article 30 states that the regional public administration and public and private sports entities should encourage the practice of physical and sports activities in the open air, in contact and in respect for nature. In measure 54 of the XII Program of the Regional Government of Madeira, it is mentioned that a new framework strategy should be developed for sport in nature, valorization of natural resources (sea and mountain), in order to promote activities carried out in the open air, in contact with nature and in their defense and protection.

The physical, climatological (mild climate) and oceanographic conditions (extensive coastal border, water temperature) Region that provide sports activities, as well as the great

enthusiasm of the young population, explains to a considerable extent to the dynamics associated with sea sports.

To this end, future strategies should include investments in port infrastructures (ports e.g.) that do not provide adequate safety conditions for the development of sport, investment in sports education, encouraging the general population to practice sport for the development of a greater number of national and international sports events and championships in the Region.

In the Region, the main sports activities related to the sea are the following:

- Open water activities - Corresponds to the swimming activity, practiced in the open sea, on the south coast of the island of Madeira and Porto Santo, where the sea is more conducive to the development of this activity. In the Region there is a swimming championship between the island of Madeira and the Desertas islands, usually held annually.

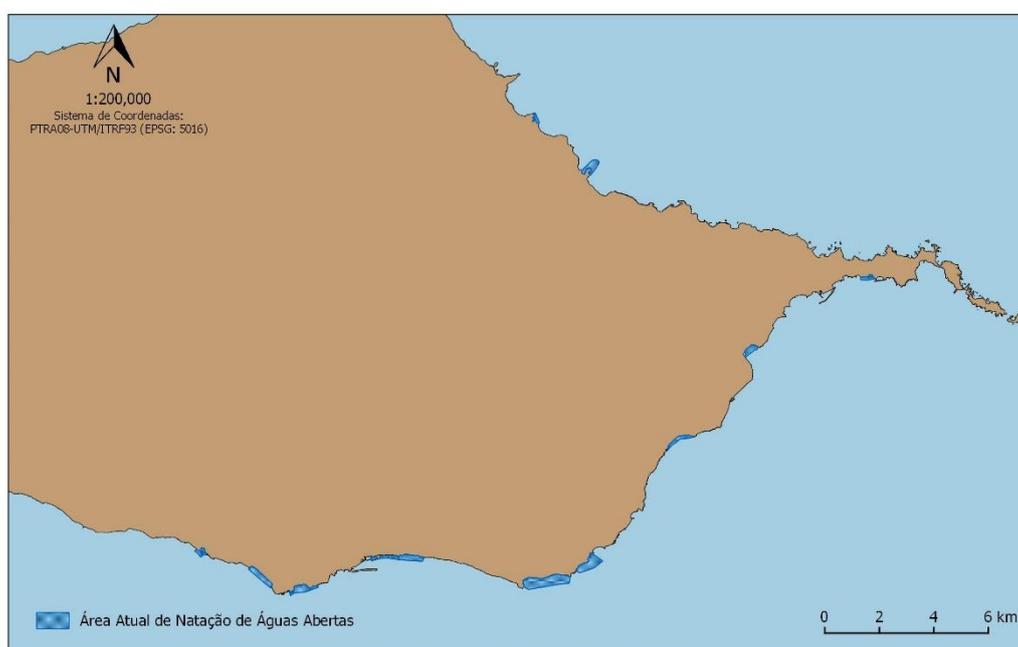


Figure 65 - Open water swimming area – current area (Madeira island)

Source: Secretaria Regional da Educação -Direção Regional da Juventude e Desporto



Figure 66 - Open water swimming area – potential area (Madeira island)
 Source: Secretaria Regional da Educação - Direção Regional da Juventude e Desporto

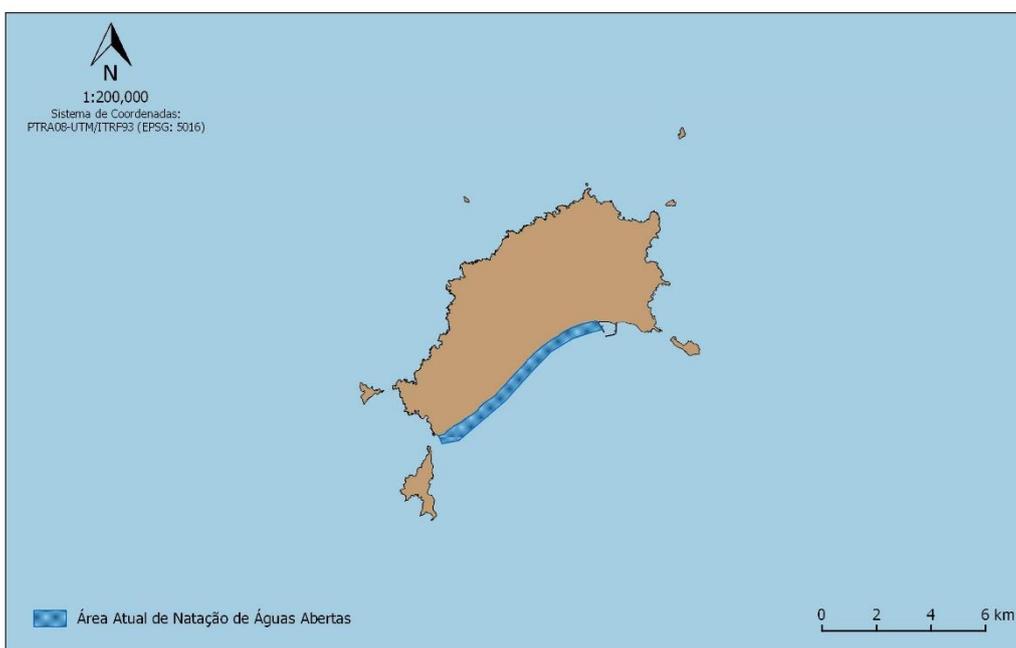


Figure 67 - Open water swimming area – current area (Porto Santo Island)
 Source: Secretaria Regional da Educação - Direção Regional da Juventude e Desporto

Underwater Hunting - It is an activity carried out in a ludic or recreational perspective, tendentially seasonal, normally practiced in the summer months, although it can be practiced throughout the year, according to the migrations of the captured species. The underwater

hunting in the region is preferably carried out in Ponta do Pargo, usually up to the bathymetric of 50 meters and has an average duration of 3 hours. Most practitioners make access to the sea from the shoreline or through a vessel. The species most captured is the wrasse (*labridae*). The catches resulting from underwater fishing have their own consumption. This activity is carried out along the island of Madeira and Porto Santo, except for protected areas. There are several types of underwater hunting, depending on the degree of difficulty intended. In relation to the support sites, there are several wharf that allow access to the sea and hauling small boats.



Figure 68 - Current underwater hunting area (Madeira island)
 Source: Secretaria Regional da Educação - Direção Regional da Juventude e Desporto

Fishing competition can be done individually, by doubles or triples, regardless of gender. Currently the championships are made in two days (2 days), there is always a main test area and a reserve area, in case the sea conditions are not favorable.

Surfing and surfboarding:/Bodyboarding/Stand up paddle/Windsurfing - The region has several areas to practice this activity, especially on the island of Madeira. These areas are characterized by varying degrees of difficulty, from the lowest in that it allows easy access to the initiated practitioners, to the professional with waves of worldwide interest.

The Paul do Mar / Jardim do Mar area is the most used to practice this modality due to the exceptional conditions for the practice of this activity. This activity has contributed to the decline of the seasonality felt in some areas of the Region and enabled the growth of businesses associated with this modality (surf shops and surf houses e.g.). The number of championships has also contributed to the increase of this activity not only in the national context, but also internationally.

At the moment, it is stipulated the constitution of regional or world-wide reserves of surf, attracting more championships and athletes to the Region.

The modality has experienced a significant increase in the number of practitioners during the next years, especially in the training levels or younger levels. The number of championships has grown in the Region, attracting many participants.

Canoeing - Canoeing is practiced mainly on the south coast of the island of Madeira, however there is the possibility of extending to the north coast of the island and to Porto Santo.

Sport fishing - The archipelago of Madeira is located in the migratory route of some species, reason why it becomes a privileged place for the development of this activity.

Sport fishing can be practiced along the coast, next to an anchorage. This activity is carried out along the coast of the island of Madeira although the island of Porto Santo is a privileged place for the development of this activity.

Every year sports competitions are held at regional, national and sometimes international level, bringing several sportsmen and women to the Region.

This activity can also be developed in the exclusive economic zone of the Region, through the hiring of vessels destined for this purpose.

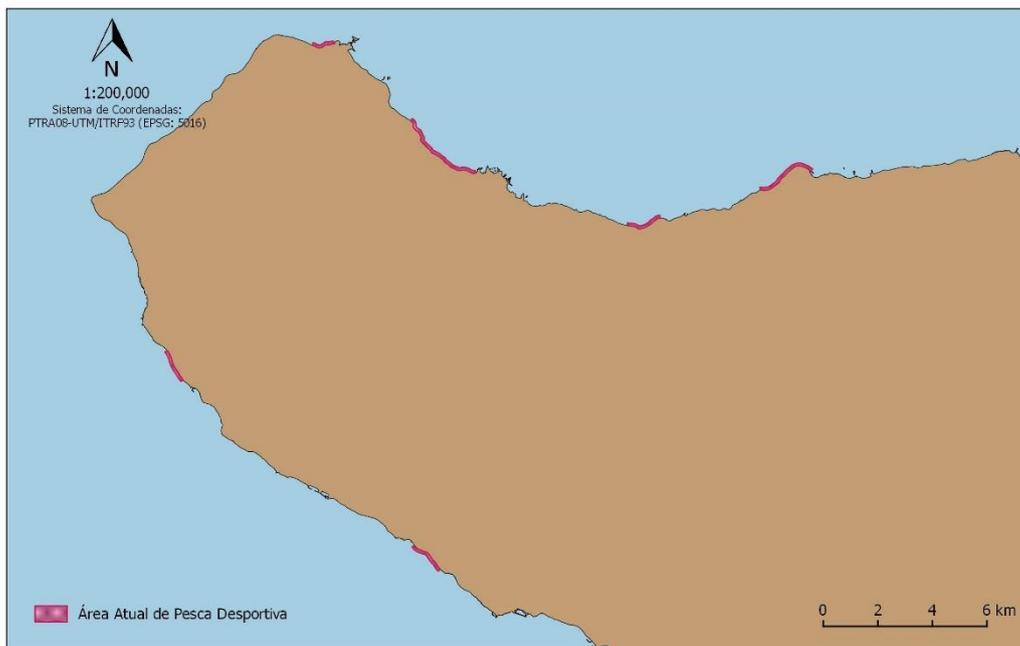


Figure 69 - Sport fishing – current area (Madeira island)

Source: Secretaria Regional da Educação - Direção Regional da Juventude e Desporto



Figure 70 - Sport fishing – potential area (Madeira island)

Source: Secretaria Regional da Educação - Direção Regional da Juventude e Desporto

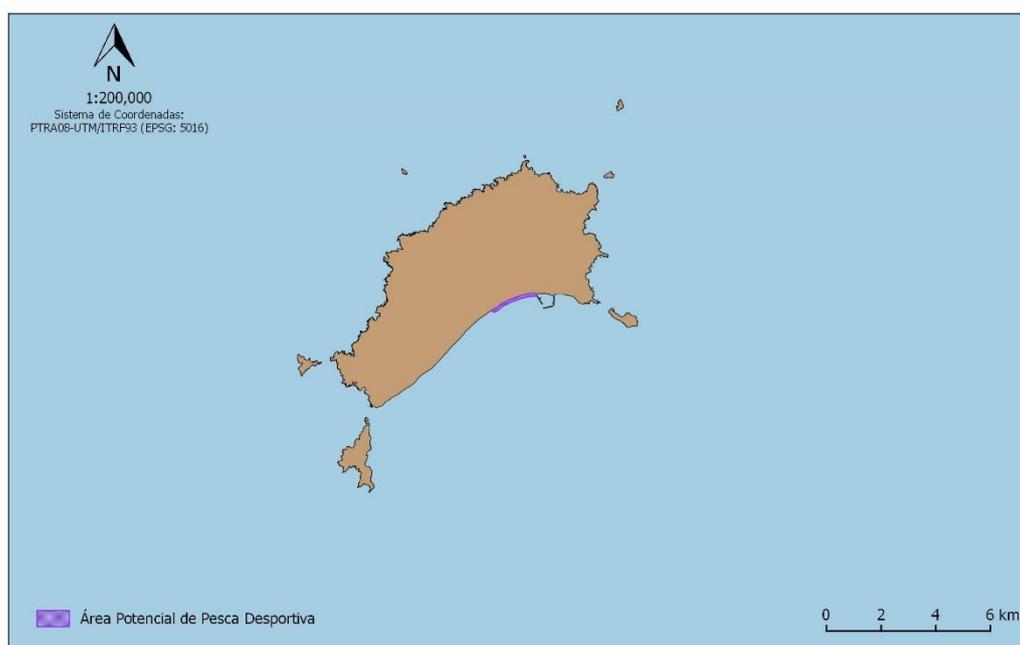


Figure 71 - Sport fishing – potential área (Porto Santo Island)
Fonte: Direção Regional da Juventude e Desporto

Sailing – This sport is performed throughout the year, depending on the natural conditions (ripple and wind). The most appropriate places for the accomplishment of this modality are the following: Funchal -São Lázaro, Quinta Calaça, Formosa beach; Santa Cruz - Reis Magos, Machico - Água de Pena, Caniçal - Ribeira do Natal, Quinta do Lorde; Porto Moniz; Paul do Mar; Calheta, Porto Santo.

Tourism

The tourism associated with the maritime activities has undergone a strong impulse in the last decades, revealing a strong dynamic that ends up attracting numerous tourists to the sea.

On the other hand, the sea offers many potentialities that must be harnessed and developed, as with the emergence of new activities, capable of attracting new stakeholders.

Constituting itself as a successful tourist product, the maritime-tourism activities offered in the Region are as follows:

Sea rides - They can last for two hours or a day at most. Depending on the program selected, sea excursions take place along the south coast of Madeira, especially on Cabo Girão and Ponta de São Lourenço, trips to the Desertas and Selvagens islands. In the last few years, the

sea rides, organized by maritime tourism operators, continue to show, after almost two decades of activity, a frank growth in ARM (POTRAM, 2015). The walks are often associated with the observation of cetaceans, turtles and seabirds.



Figure 72 - Sea walk - Cabo girão.
Isabel Lopes

Whale watching – This activity began as a substitution for whaling activity, allowing whalers to continue to have a source of income and to apply their expertise in the observation and conservation of these marine mammals.

Vessels usually choose different courses depending on the program selected. The most common routes are as follows:

- They travel normally to the south and southeast of the coast of the island of Madeira, although cetaceans can be observed all along the south coast. Head west towards Cabo Girão or head east to Ponta de São Lourenço.

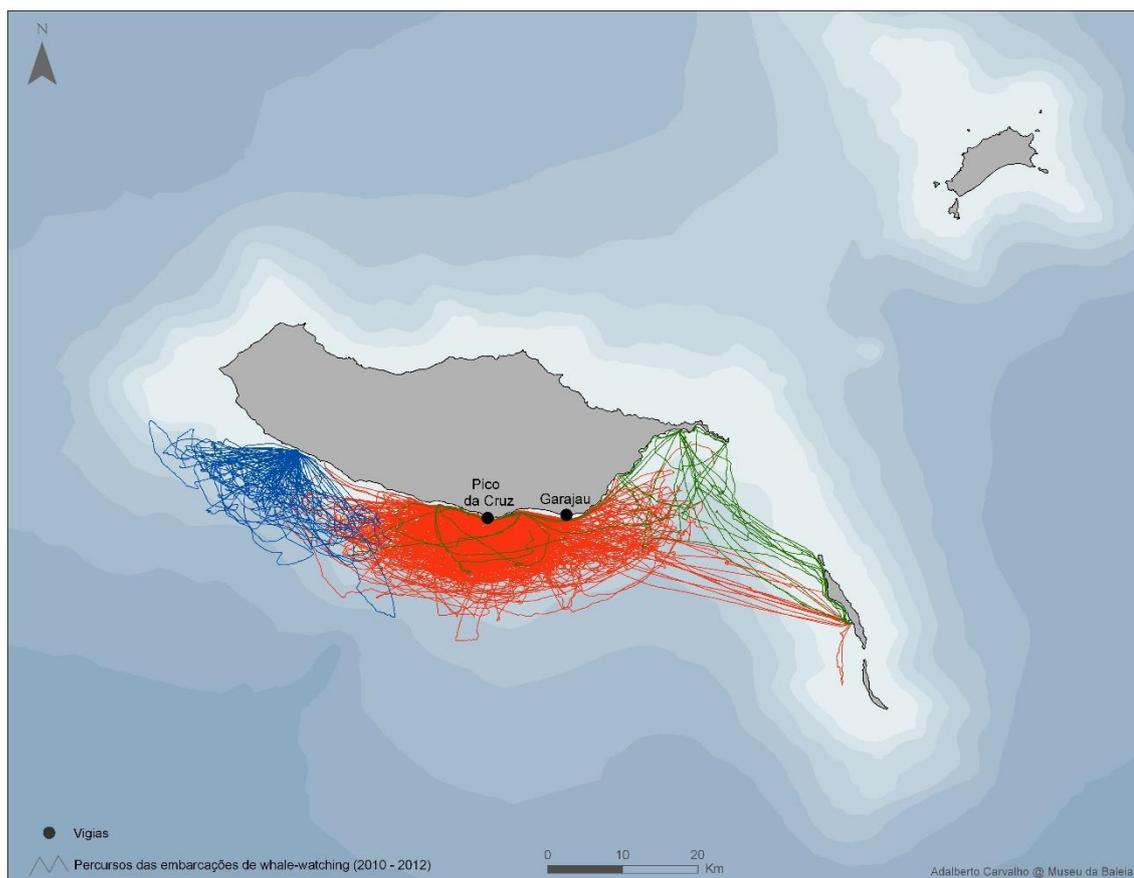


Figure 73 - Operating area of whale-watching vessels. As cores of the lines correspond to the exit points of the vessels

- **Green - trails of vessels operating from Quinta do Lorde marina;**
- **Red - boat routes that operate from the port of Funchal;**
- **Blue - vessels operating from Calheta marina.**

Source: Adalberto Carvalho@Museu da Baleia da Madeira.

According to the International Fund for Animal Welfare, in 2008, based on the growth of this activity, the Region was in the top 10 of the countries with the highest growth rate and had approximately 60 thousand individuals who participated in the activity. In 2007 it was estimated this activity caught about 58 thousand tourists a year attending this activity, moving 1.5 million euros.

The ARM is an important area for the distribution of numerous species of marine vertebrates, many of which are of community interest and constitute one of the most diverse marine habitats of marine mammals within the European area. At present, there are more than twenty-four species of cetaceans, more than ten species of sea birds, two of them endemic, the sea lion and five species of sea turtles.

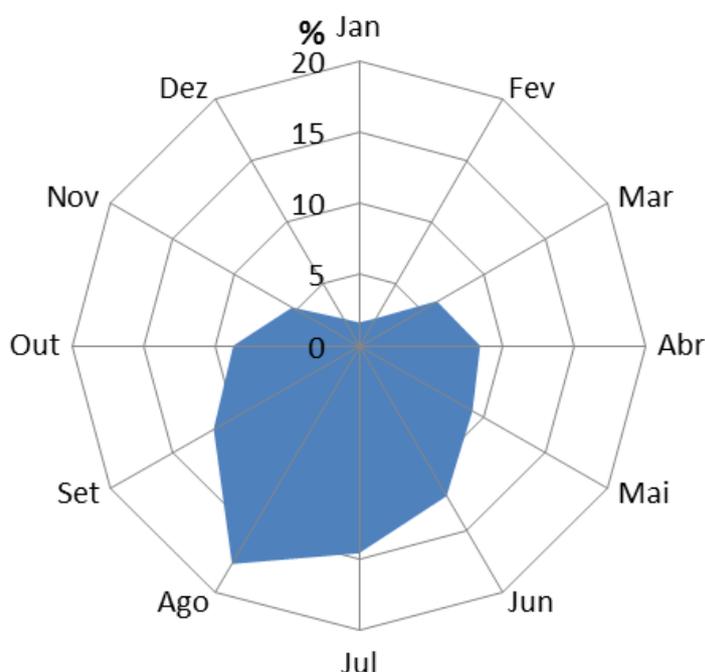
The activity of cetacean observation is in rapid growth, already exhibiting short-term effects on cetaceans. As such, it is necessary to reconcile tourist interests with the environmental safeguard and the welfare of the animals observed. These activities should follow a set of good practices, in particular when approaching and observing animals.

The constitution of these areas resulted from the scientific projects developed by the Madeira Whale Museum, especially the CETACEOS MADEIRA II project (2009-2013), in which the areas with the greatest interest for the conservation of cetaceans, especially its crossing with the current areas of operation of whale - watching vessels. One of the objectives of this study was to try to establish maximum limits for the whale-watching activity, to determine the carrying capacity, in order to minimize the impact of the activity on cetaceans.

In 2007 the Museu da Baleia da Madeira carried out a study (Ferreira, 2007) on the impact of WW activity on cetaceans, in the scope of the EMECETUS project (FEDER / INTERREG IIIB 05 / MAC / 4.2 / M10), in which cetacean behavior was evaluated and Before, during and after the anthropogenic disturbance (assuming that any behavioral change observed during this period was due exclusively to the human factor). Regarding the behavior that the animals presented before and after a meeting with boats, and taking into account only observations from land, this study showed that in 89% of the cases the animals maintained the same behavior. This trend was consistent for all species observed. The family *Delphinidae* (group of dolphins) was the group of cetaceans that most reacted / interacted with the vessels. However, one of the final results of this study indicates that there were short-term impacts on the speed of *Delphinidae* due to the presence of whale-watching vessels, i.e. after boarding the animals increased their average movement speeds.

The practice of cetacean observation activity occurs almost throughout the year, however, there are monthly variations in the number of trips, with an increase, particularly in the high season (summer months). The analysis of the number of trips of three companies operating in the south coast of Madeira allows to corroborate this fact. At least 5 vessels announce 3 daily trips between July and September, and 2 daily trips throughout the remaining months of the year. The analysis of the temporal effort carried out by the maritime-tourism vessels with which MBM has established collaboration protocols, whether with or without observer, also

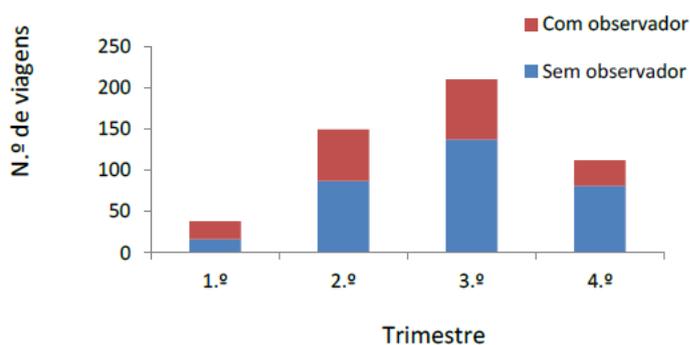
helps to show that there are departures throughout the year, with a higher peak in the third quarter of the year.



Graphic 7 - Percentage of the number of trips made by three maritime-tourist companies during the year, based on a total of 1601 trips to the south coast of Madeira (24-month analysis - July 2010 to June 2012).
Source: Museu da Baleia da Madeira

By 2013, there were 15 vessels with bi-daily departures (annual average, but with 5 vessels making tri-daily departures in the summer) operating on the island of Madeira for tours dedicated to cetacean observation throughout the year, but with a slight Reduction in the coldest half of the year. Four of these vessels conduct underwater observation of dolphins. These numbers are based on licensed vessels that operated at least one season in the last 2 years (2012 and 2013). Of these 15 vessels, it was found that 10 operate from Funchal. Although the MBM does not have substantial data, nor the in situ knowledge of the activity of WW in Porto Santo, it seems that this activity is carried out by two vessels only in the summer months and occasionally.

The sample of the maritime-tourist vessels in this study covered more than $\frac{2}{3}$ of the fleet and corresponded to 20 000 km of routes in 509 trips, of which 7 463 km (188 trips) had an observer on board. This level of sampling and fleet coverage allow a representative analysis of this activity.



Graphic 8 - Effort (in number of trips) made on board vessels of cetacean observations by quarter (2010-2012), with and without observer of the Museum of the Whale of Madeira.

Source: Museu da Madeira da Madeira

Birdwatching - It is an activity that attracts the interest of birdwatchers at an international level due to the endemic species that the Region holds. The first company dedicated to this activity in ARM came in 2004 and also promotes scientific tourism in this area. The Protected Areas of the Region, namely Ponta de São Lourenço, Desertas and Selvagens Islands, islets of Porto Santo, are prime locations for nesting species of seabirds, many of which are considered a priority by the Birds Directive. To the west of the island of Madeira, near Ponta do Pargo, there is an area of great interest for nesting seabirds.

Diving - There are many companies that promote diving activities (snorkelling, scuba diving, scuba diving, diving baptisms). This activity presents a high growth in the Region and that can be compatible with the guidelines for nature conservation. Most of these activities are carried out in areas where it is possible to observe the rich flora and fauna of the Island of Madeira. Thus marine protected areas are excellent sites for the development of these modalities due to the high landscape and ecological value and benefit from specific regulations necessary for the development of these activities, such as Garajau or Ponta de São Lourenço.

The growing growth of this activity should be subject to regulation so that a monitoring of the diving areas is established so that they are not subject to anthropic pressure, establishing the carrying capacity of each site and the definition of a code of conduct. On the other hand, taking into account the interviews carried out, in these areas, facilities to support this activity must be built, guaranteeing the necessary conditions for the safety of the activity.

Recreational diving has gained fans in the Region. For diving, places like: marine reserves, caves and shipwrecks, offering excellent photographic opportunities.

Big Game Fishing - Big Game Fishing The high depths near the coastline, reached 1,000 m, associated with the migratory routes of large pelagic species, attracts many fans, especially in

recent years, as a result of the promotion that companies have made. Practitioners of this activity may choose to rent the vessel with or without crew and spend several hours at sea. In addition to the existing tour operators in the Region, there are a number of foreign vessels that are dedicated to this activity, most of them in the RINM - Mar, however there are others that only move to the ARM in the summer, without Tourist structures.

This type of activity registers two peaks throughout the year, according to the migratory routes of the species: the blue marlin season starts in May and runs until October and that of bigeye tuna runs from March to June.

In this activity there is no control over the capture of these species. In order to promote the sustainable development of this activity, it is necessary to frame, regulate and monitor it.

Tourist fishing (experience of commercial sea fishing) - It is an emerging concept in the European Union and intends that tourists have direct contact with this activity. As mentioned in the fisheries chapter, the Region still retains many characteristics of artisanal fishing. On the other hand, the fishery is very associated with Madeiran gastronomy, an element highly appreciated by tourists. Fishing tourism is intended to offer the experience of sea fishing experience in vessels registered in the commercial fishing exercise. It provides tourists with genuine cultural experiences and complements the income of professionals and communities in the inshore and artisanal fishing sectors, who sometimes face serious economic and social problems. According to the Tourism Planning Plan of the Autonomous Region of Madeira, there is the desire to implement an experimental unit in the Funchal port.

Coasteering - It is a relatively recent activity in Portugal. It combines sports practice and the involvement of protected areas. The activity focuses on rappel, rock climbing and jumps to the sea in a single activity. This is accompanied by specialized professionals. There are many nautical activities that exist in ARM. Most activities are seasonal, depending on weather conditions and sea waves. It should be highlighted the level of creativity that is made by many of these companies, namely in the offer of activities increasingly creative and aimed at knowledge of the Portuguese ocean. Also within the scope of tourism, there are some sports activities that can be practiced by tourists, such as surfing, bodyboarding, windsurfing, SUP, there are several tourist animation companies that are dedicated to these sports.

Maritime tourism - cruise tourism

The cruise tourism takes an important position in ARM. The geostrategic location, close to the Mediterranean, North Africa and the Canary Islands archipelago, as well as the crossing of the connecting routes between the European and American continents (Figueira de Sousa, 2001), allowed the region to become an important cruise port (Lopes, 2016).

Currently, the ARM is inserted in the following cruise circuits:

- Between the ARM and the Canary Islands and North Africa
- Circuits operating from the Atlantic facade of Europe and the Western Mediterranean
- Circuits operating from Northern Europe, namely from the United Kingdom.



Figure 74 - The ARM in the circuits of the Atlantic Cruise Region and in the cruise circuits between America and the Europe. Adapted from Figueira da Sousa, 2004.

The APRAM, S.A. has strongly focused on the development of cruise tourism, through the improvement of port infrastructures, namely the port of Funchal, in order to receive the passengers with the greatest convenience. Among the improvements are those carried out on the quay north of the port and the construction of the new cruise pier and the construction of the International Maritime Gare.

6.9.1.2. Legal framework and constraints

6.9.1.2.1. Competent institutions for sector management

This sector has a various of entities responsible. For the tourism activity, the responsible entity is the *Secretaria Regional da Economia, Turismo e Cultura*. In conjunction with this entity, the *Administração dos Portos da Região Autónoma da Madeira, S.A.* is responsible for the cruise activity in the Region.

Regarding the sports activity, the entity responsible is the *Secretaria Regional da Educação – Direção Regional da Juventude e Desporto*.

6.9.1.2.2. Normative basis or instruments

Tourism Planning Program of the Autonomous Region of Madeira

The Tourism Planning Program of the Autonomous Region of Madeira was approved by Regional Legislative Decree no. 15/2017 / M of June 6. The mission of the this program is to define a tourism development strategy within a ten-year time frame. This strategy will make it possible to consolidate the region as a differentiated tourism destination, for the authenticity of the offer, based on quality of service, aiming at economic, social and environmental sustainability.

This program defines for Madeira the following vision: *A year-round destination of unparalleled natural beauty, safe, easily accessible, cosmopolitan, recognized as a must visit of Europe, with sun and mild climate, a strong tradition of well receive and vast offer of experiences, capable of exceeding the most demanding expectations.*

The *Tourism Planning Program of the Autonomous Region of Madeira* identifies the sea as one of the main strategic resources for the development of tourism in the region. In this sense, it is mentioned that the articulation and compatibility of the this program with the maritime spatial planning instruments in which the Situation Plan should fit must be deepened.

Within the main objectives resulting from the analysis of the diagnosis made by the POT, some of the development strategies were presented, in which the sea theme is framed:

- To requalify, in the logic of modernization and maintenance, the dominant tourism product in the consumption of nature / landscape
- Reinforcing the formatting of niche products, with a view to increasing the attractiveness of tourism audiences, in the world demand, found in their activities the main motivation of their travel
- To develop and consolidate emerging products due to the present socio-territorial context, coupled with some emerging dynamics, to affirm and develop new tourism products that broaden the region's specific attraction motives
- To optimize the secondary offer in a logic of networking, taking advantage of the fact that Madeira has today a richer and more diversified secondary offer, be it in cultural, sports or entertainment terms, supported in equipment and infrastructures.

In the Thematic Program and Strategic Projects by Areas and Sectors, POT has the More Mar program related to tourism and sports activities that use the sea as a resource. In this chapter, it is mentioned that the tourism, sports, recreational and cultural activities connected to the sea have been gaining importance in the region during the last decades, contributing to the growth of the regional economy. In this thematic program are given some guidelines or projects that must be developed, highlighting the following:

- Creation or improvement of port infrastructures or support to the development of the maritime-tourist or sport activity
- Preparation of a report assessing the evolution of the maritime-tourist activity with a view to identifying constraints, needs and opportunities, and submitting proposals for adjustment and/or corrective actions in order to ensure the development of the activity in line with the standards of high quality and safety
- The need to develop supplementary regulations regarding sea trips if there is a very significant expansion of this activity
- Need to analyze the organization and infrastructure of ports or marinas in order to allow the extension of the number of starting points
- Equating the possibility of creating specific legislation regarding tourist fishing in order to regulate this activity in order to be effectively guaranteed the control and inspection of the same

6.9.1.3. Current spatial distribution

There are no spaces defined for the tourism or sport activity although it is considered that there are certain places more susceptible to the development of these activities.

Regarding the activity of cetacean observation, there is an area that is prohibited to this activity. The Regional Ordinance no. 46/2014 of April 22 delimits an exclusion zone for cetacean observation. This area is characterized by being a preferential habitat of common bottlenose dolphin to feed, socialize, rest and reproduce (Freitas *et al.*, 2013).

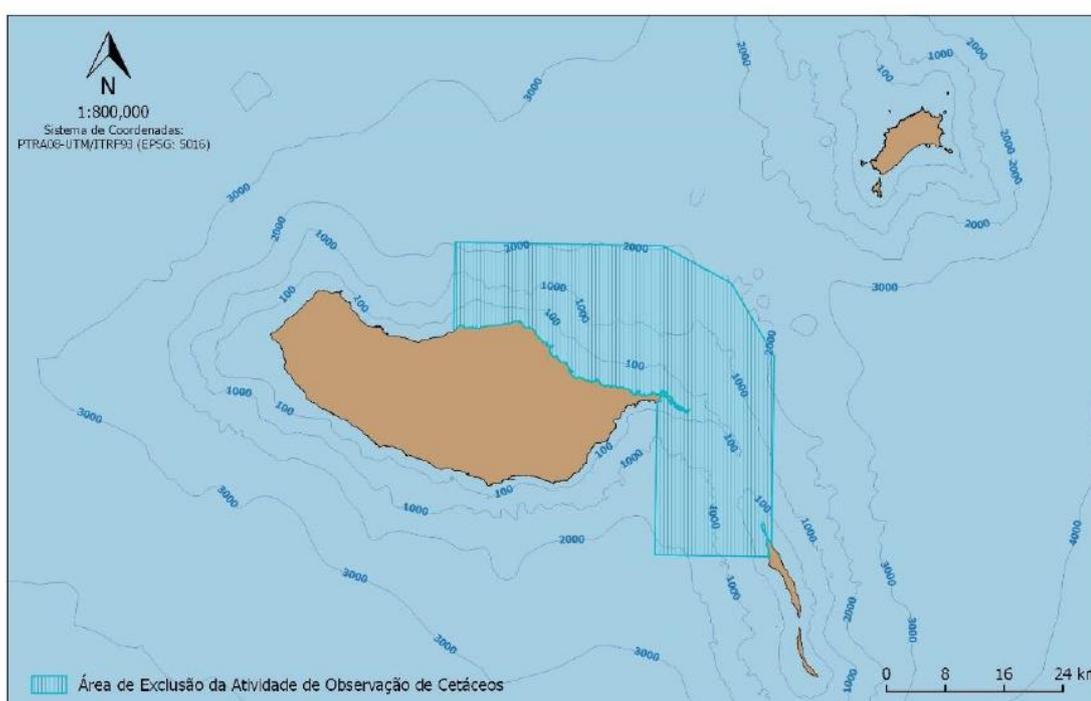


Figure 75 - Area of exclusion of cetacean observation activity.

6.9.1.4. Analysis of interactions

6.9.1.4.1. Interactions with other sectors

This sector, especially the sports and tourism activities can cause some conflicts with other uses.

In this way, these situations of conflict should be minimized, ensuring their coexistence whenever possible. This compatibility must be made at the spatial and temporal level. In

spatial terms, it is observed that the greatest pressure occurs on the surface of the sea (play parks, berths, sports competitions, among others), although some activities occur preferentially in the water column and seabed, the visiting underwater itineraries. When seasonality is considered, the greatest conflicts occur mainly in the months of April to September and, especially, during the daytime period.

6.9.1.4.2.Land-sea interaction

This sector is strictly dependent of the ports or marinas areas.

6.9.1.5.Interactions with the environment

Management of maritime space should aim at optimum utilization, exploiting synergies and avoiding or minimizing negative effects in other uses, as well as in the good environmental state of the marine environment and the good state of coastal waters.

In the development of activities/private use of tourism and sport, the following practices, among others, should be considered:

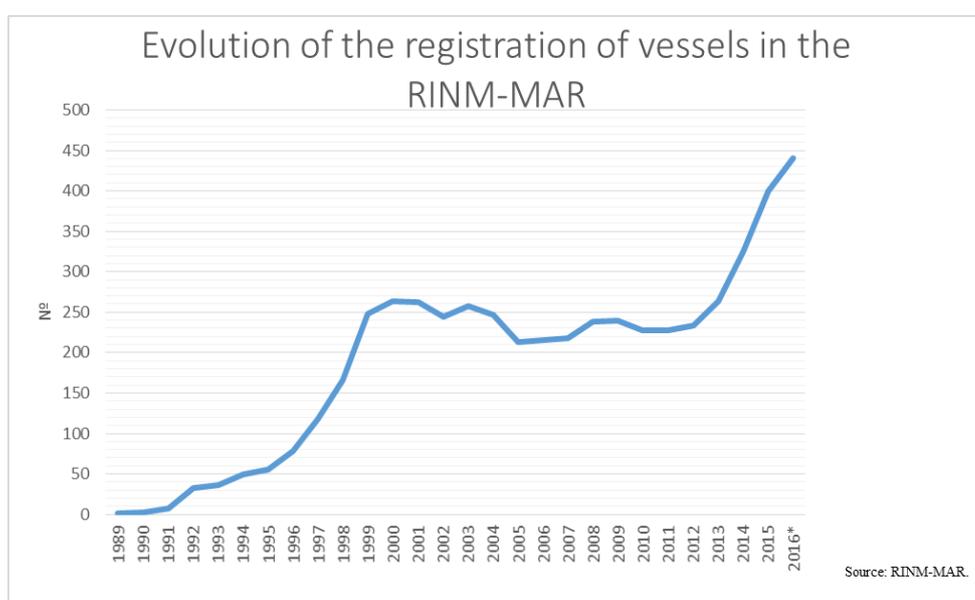
- The space to be occupied should be limited to the minimum necessary for the development of the activity
- Removal of structures deployed in the maritime space should be carried out as soon as they are no longer used
- In certain projects, such as underwater itineraries, a characterization study of the marine area that includes biodiversity, physical and chemical characteristics, as well as an evaluation of the main impacts resulting from the activity
- Regattas must comply with the navigation regulations in force, namely the Regulations to Prevent Collisions at Sea, as well as the distances to the ports according to the navigation classes of the vessels
- The maritime-tourist activities should create mooring points suitable for the vessels in order to prevent the disordered mooring of vessels and the affectation of the seabed

6.9.1.6. Statistical Information

International ship registry of Madeira (RINM-Mar in Portuguese)

Until 30 April 2016, the average age of commercial vessels was 11,4 years, one of the EU's most positive averages, which puts RINM-Mar at the highest level of international maritime records.

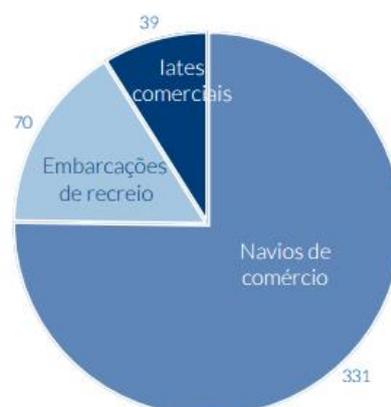
The main registers of RINM-Mar trade vessels in 2016 came mainly from Germany (66%), Italy (11%), Spain (8%), Portugal (4%) and Norway (4%).



Graphic 9 - Evolution of the registration of vessels in the RINM-MAR

* Until April 30, 2016

Source: RINM-Mar



Graphic 10 - Types of vessels registered in RINM-Mar

Source: RINM-MAR

Water sports activities (sports activities)

Table 2 - Location of sports practice. Source: Colaço, 2009)

Places of practice	Frequency
Natural Spaces / Mountains / Sea	65 (11,6)
Fitness Center / Gym	100 (17,9%)
Public facilities	180 (32,2%)
Clubs	74 (13,2%)
Public road / open spaces "promenades"	118 (21,1%)
Others	22 (3,9%)
Total	559 (100%)

Sports activities play a key role in the Region. According to the *Estudo da procura e consumo desportivo da população da Região Autónoma da Madeira*, the natural spaces/mountains/sea, appear as the third option (11.6%) in the places for the accomplishment of the sport that affirmed to practice some type of activity with regularity.

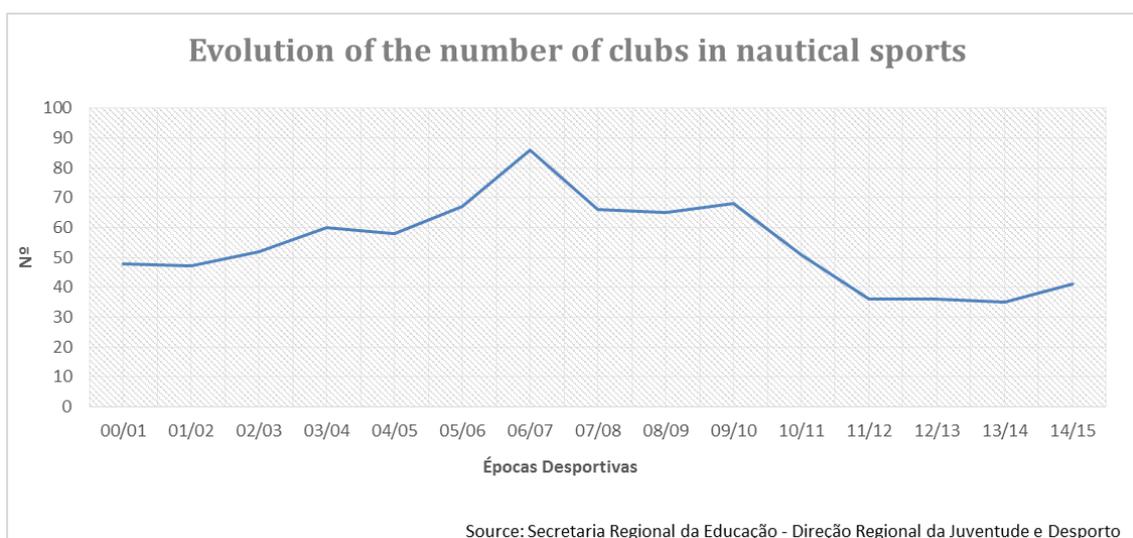
Sports activities, for their strong role in the Region, have been taken into account in the regional government programs, and their support in the new model of sport support approved by the Sports Support Regulation (RAD) has been substantiated. These funds are included in the Regional Support Program for Sports (PRAD). From the definition of the new model of support to the sport until the sporting season 2015/2016, nautical modalities were granted around 1,6 million euros. This document support the difficulties and constraints resulting from insularity and dual insularity, development an decisive role of competitive high-level sport as a tool for promotion of the Region.

Since que sport season 2012/2013, the Secretaria Regional da Educação - Direção Regional da Juventude e Desporto, gave the following financial support:

Table 3 – Support for nautical modalities. Source: DRJD

sport season	Total
2012/2013	342.620,25 €
2013/2014	397.597,53 €
2014/2015	421.977,70 €
2015/2016	413.280,04 €
Total	1.575.475,52 €

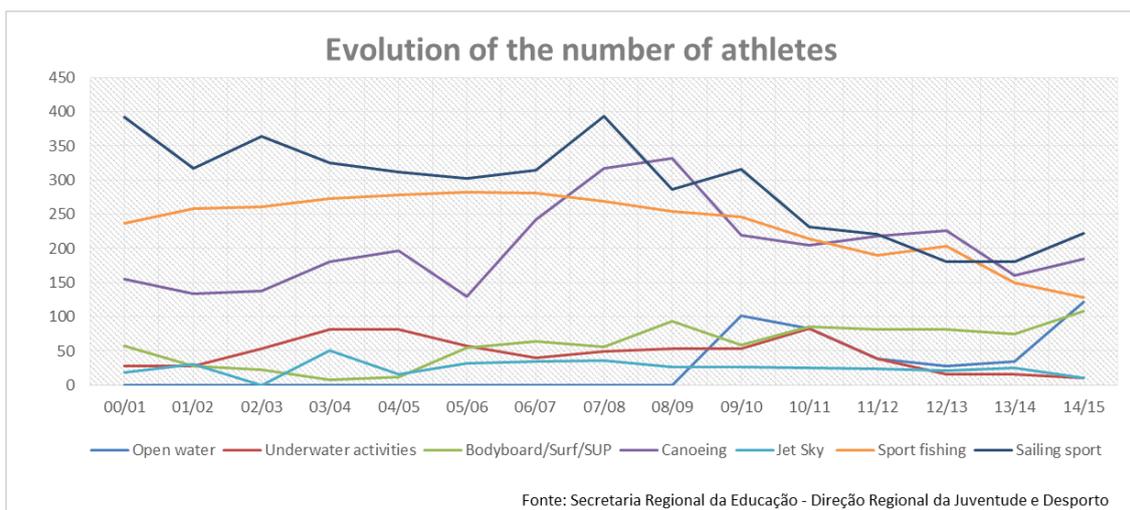
In the years under analysis, it is possible to observe the existence of some fluctuations in the number of clubs in nautical sports, and in the 2006/2007 season there were the largest number of clubs related to this activity.



Graphic 11 - Evolution of the number of clubs in nautical sports
Source: Secretaria Regional da Educação – Direção Regional da Juventude e Desporto

In the sports season 2014/2015, there were 41 sports entities related to the sea, representing about 27% of the total number of sports clubs in the region (LOPES, 2016).

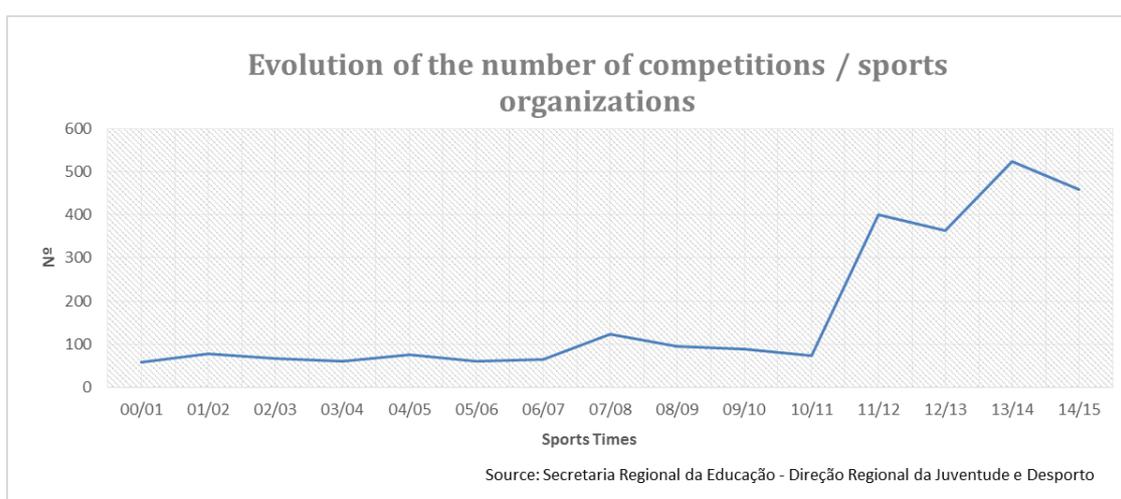
The following graphic, shows the evolution of the number of athletes. Sailing (28%), canoeing (23%) and sport fishing (16%) correspond to modalities with more federated athletes.



Graphic 12 - Evolution of the number of athletes
Source: Secretaria Regional da Educação – Direção Regional da Juventude e Desporto

In the 2014/2015 sports season, in the total number of federated athletes registered, the number of athletes in nautical modalities represented 5%.

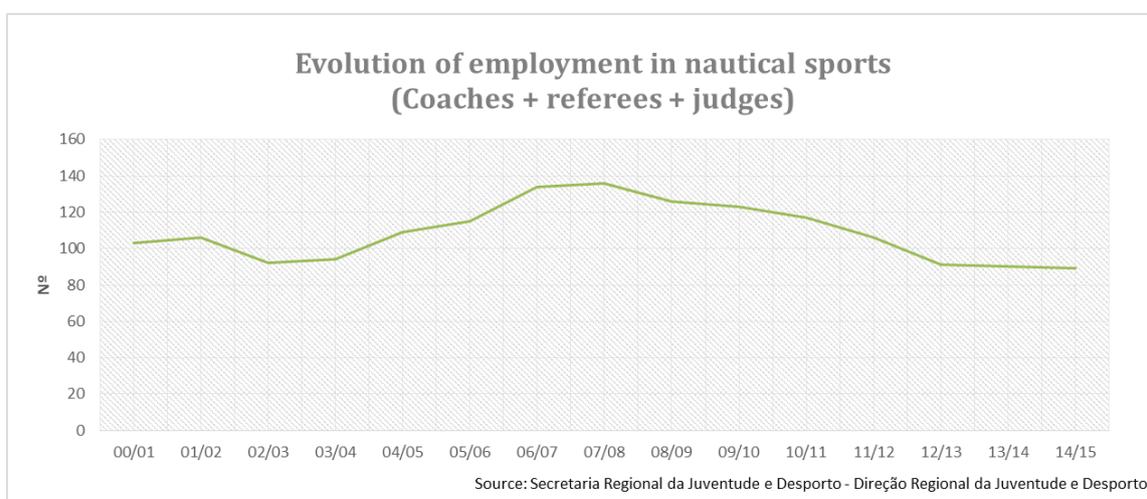
The evolution of the number of competitions / sports organizations, there has been no stability in their performance. From the sports season 11/12 there was a strong growth in the number of competitions / sports organizations, registering in the sporting season 14/15, about 460 competitions / sports organizations. This positive value is due to the modification of the system of support granted to sport (Lopes,2016).



Graphic 13 - Evolution of the number of competitions/sports organizations
Source: Secretaria Regional da Educação – Direção Regional da Juventude e Desporto

The evolution of the number of employments, only the number of coaches, judges and referees of the different sports activities were counted, since it was impossible to account for all those involved in this process.

It is possible to observe that between the sports seasons 04/05 and 07/08, the number of technicians, referees and judges has grown. From this sporting season we have witnessed a decrease and stabilization. In the 14/15 sports season, there were 89 referees/judges (Lopes,2016).



Graphic 14 - Evolution of employment in nautical sports (coaches + referees + judges)
 Source: Secretaria Regional da Juventude e Educação – Direção Regional da Juventude e Desporto

Cruise tourism

In the national context, the port of Funchal and the port of Lisbon constitute the main cruise ports. According to the annual statistics of APRAM, S.A., the port of Funchal in 2017 ended up achieving the national leadership by registering about 539 192 cruise lines and 208 stopovers, which would have belonged previously to the port of Lisbon in the same period.

The fall recorded in the number of passengers and stopovers in 2013 and 2014 is associated with the strong temporal that occurred in 2013 and the works that resulted from this.

Regarding the number of stopovers, in 2012, the Funchal port had the highest number of stopovers. As of that year, there was a 14% drop in the number of stopovers until 2017. This reduction could be linked to the decision of cruise ship operators to opt for another competitive destination.

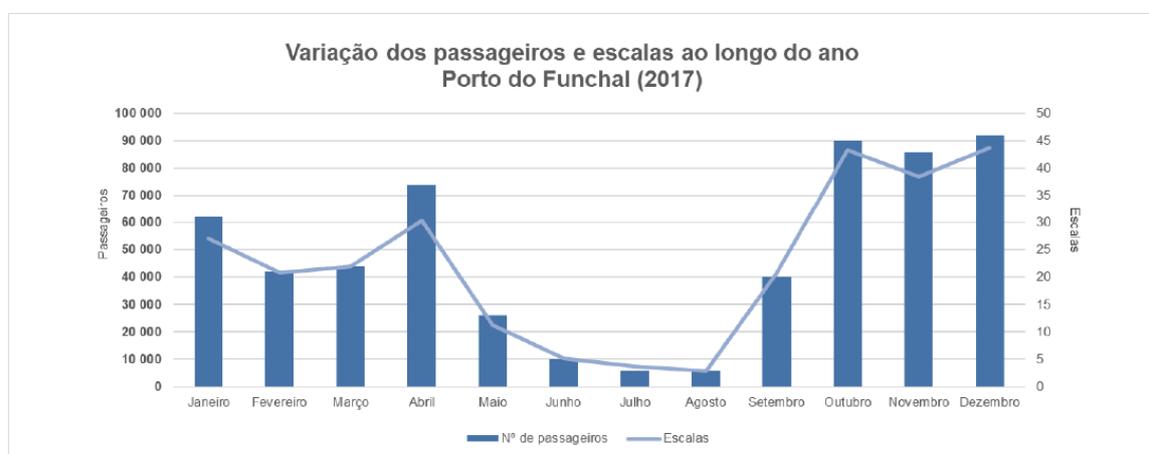
Table 4 - Stopovers of cruise ships in the Region. Source: APRAM, S.A.

Indicator	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Stopovers	248	262	270	277	294	303	336	286	283	308	294	289

According to the PIETRAM report 2014-2020, the average stay of vessels in the port of Funchal is 14 hours and is considered a reasonable period of time for a stay when compared to the same type of operations in other regions, such as Mediterranean. It is estimated that the average cost per passenger contributes to the regional economy by around 40.6M € (APRAM, 2015 apud Madeira-Canary Islands Competitive Intelligence Study 2004/2005).

The activity of the cruises in the ARM is marked by the seasonality with two peaks of activity:

- During the spring - from March to May - when shipowners are set to operate in Europe (Northern Europe, the Mediterranean and the Mediterranean Coast of Africa)
- At the end of the year - November and December - when ships return to the Caribbean again, with stopovers in the Region



Graphic 15 - Variation of passengers and stopovers throughout the year in the Port of Funchal in 2017. Source: APRAM, S. A.

6.10. Underwater Cultural Heritage

6.10.1. Sector characterization

The UNESCO Convention on the Protection of Underwater Heritage, ratified by Portugal in 2006, considers that all traces of the existence of a man of a cultural, historical or archaeological nature, whether partially or totally, periodically or continuously submerged, for at least 100 years. Underwater cultural heritage encompasses:

- Sites, structures, buildings, artifacts and human remains, as well as their natural archaeological context
- Ships, aircraft and other vehicles, or parts thereof, their cargo or other content, as well as their archaeological and natural context
- Prehistoric artifacts

Since the coast is vast under national jurisdiction, there are innumerable archaeological remains lying there and whose recovery under the right conditions requires it to be secured.

Thus, the creation of policies for the safeguarding, valorization and sustainable development of the country within the national maritime space (territorial sea, exclusive economic zone and continental shelf beyond 200 miles) is the legal actions that the Portuguese State holds.

Within this space, the sovereignty of the spoils is, however, conditioned to the shipwrecks of State Pavilion ships. In such cases, States Parties are encouraged to establish international cooperation, information exchange and exchange of researcher's agreements for the protection and management of underwater cultural heritage and in accordance with the rules of the UNESCO Convention, regardless of declarations of interest certain underwater cultural goods.

According to Decree-Law no. 577/76, of July 21, objects with no known owner found on the seabed or by the latter, which are of scientific interest (namely archeological), artistic or other, are of interest for the state, constitute its property. Those objects which are not recovered by the owner within a period of five years from the date on which he has lost them, abandoned them or separated them in any way shall be equipped with the objects without known owner.

6.10.1.1. Present Situation

In ARM, the underwater cultural heritage is mainly used for recreational diving activities, which resulted in a dive route called Scuba Diving Routing in Madeira. Scientific research is also one of the main activities developed.

The majority of the cultural heritage in the region corresponds, for the most part, to vessels that have been shipwrecked off the coast of the island of Madeira at a depth of not more than 100 meters deep. The majority of vessels are more than 100 years old and are therefore covered by the UNESCO Convention.

In the territorial sea, the following vessels and artefacts are considered as underwater cultural heritage:

- *Slot Ter Hooge*
- *Varuna*
- *Mardoll*
- *Ponta do Patacho cannons*
- *Newton*
- *Fourerunner*

In the exclusive economic zone, the following vessels are considered as underwater cultural heritage:

- *Ruelle*
- *Iran*
- *Etna*
- *Viajante*
- *Margaret L. Roberts*
- *Ioannina*
- *Açoriano*
- *Sebastian*
- *Chariton*
- *Artesia*
- *Atlantide*

- *Jorgina*
- *Rio Ave*

There are vessels less than 100 years old, which although not considered as underwater cultural heritage, should be mentioned in the Situation Plan given its importance to the diving activity or its historical importance:

- *Bom Rei*
- *Prompt or Pronto*
- *Bom Príncipe*

6.10.1.2. Legal framework and constraints

6.10.1.2.1. Competent institution for sector management

The *Secretaria Regional da Economia, Turismo e Cultura – Direção Regional da Cultura* is the responsible entity for management of this activity.

6.10.1.2.2. Normative basis or instruments

- Decree-Law No. 416/70 of 1 September amended by Decree-Law No. 777 / 76 of July 21, which establishes a specific legal framework for underwater cultural heritage by distinguishing the archaeological findings "with scientific or artistic interest from others" legal protection plus, in particular, the status of cultural heritage and state property
- Decree-Law no. 289/93, of 21 August, which establishes the legal regime of the underwater cultural heritage
- Ordinance No. 568/95 of June 16, approving the Regulation of Underwater Archaeological Works
- Decree-Law No. 164/97, of July 27, which harmonizes the legislation governing the archaeological activity in an underwater environment with that applicable to archaeological activity in the terrestrial environment
- Law 24/2013 of 20 March, which approves the legal regime applicable to recreational diving

- Decree - Law No. 164/2014 of November 4, which adopts a new regulation for archaeological works

6.10.1.3. Current spatial distribution

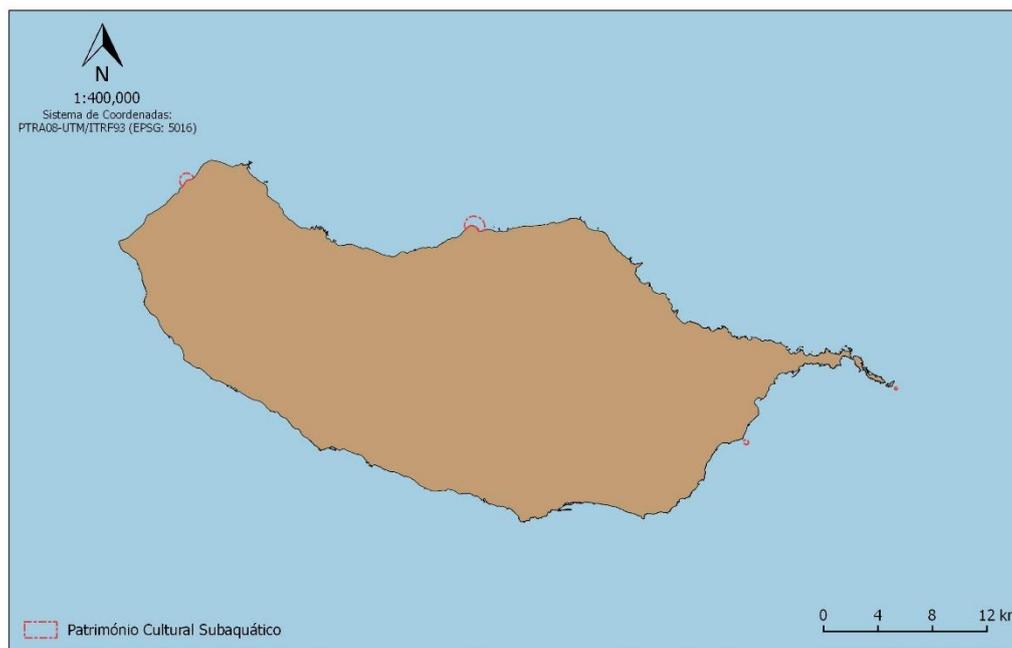


Figure 76 - Location of the existing underwater cultural heritage on the island of Madeira. Source: Secretaria Regional da Economia, Turismo e cultura – Direção Regional da Cultura

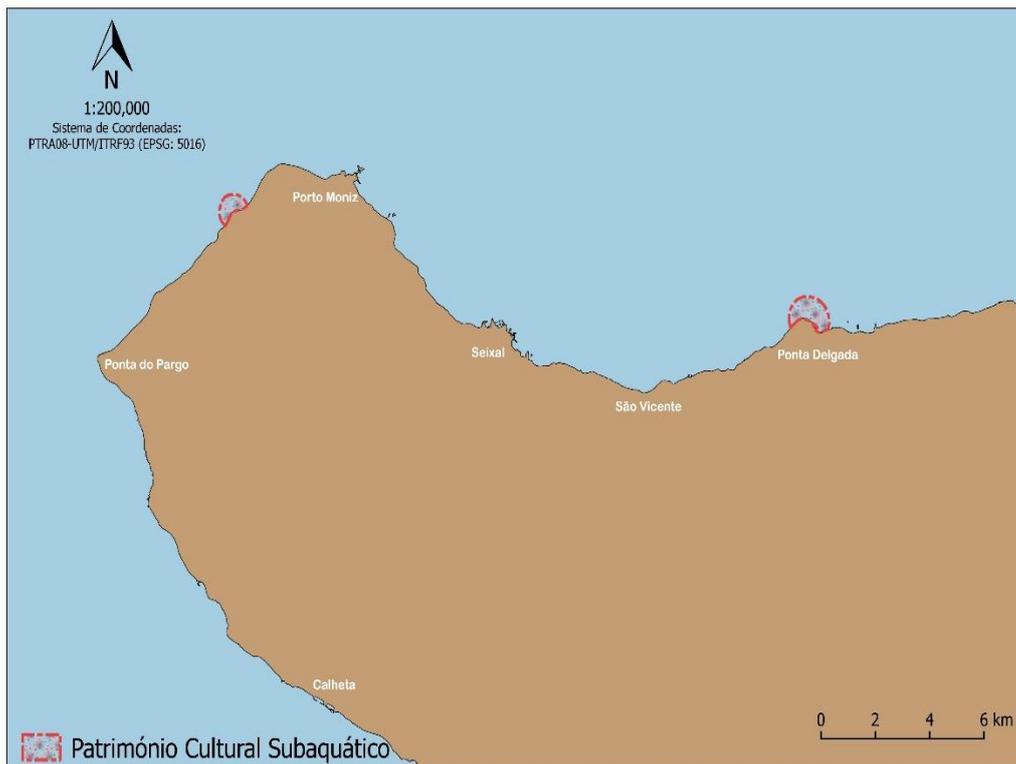


Figure 77 - Location of the existing underwater cultural heritage on the island of Madeira (West).
 Source: Secretaria Regional da Economia, Turismo e Cultura – Direção Regional da Cultura.

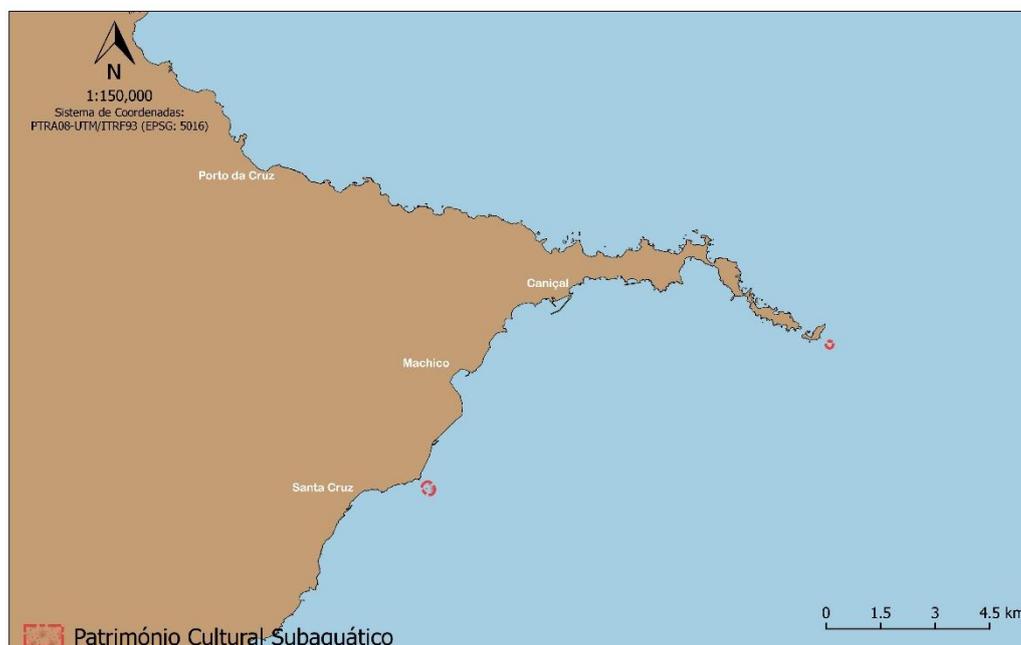


Figure 78 - Location of the existing underwater cultural heritage on the island of Madeira (East). Source
 Secretaria Regional da Economia, Turismo e Cultura – Direção Regional da Cultura.

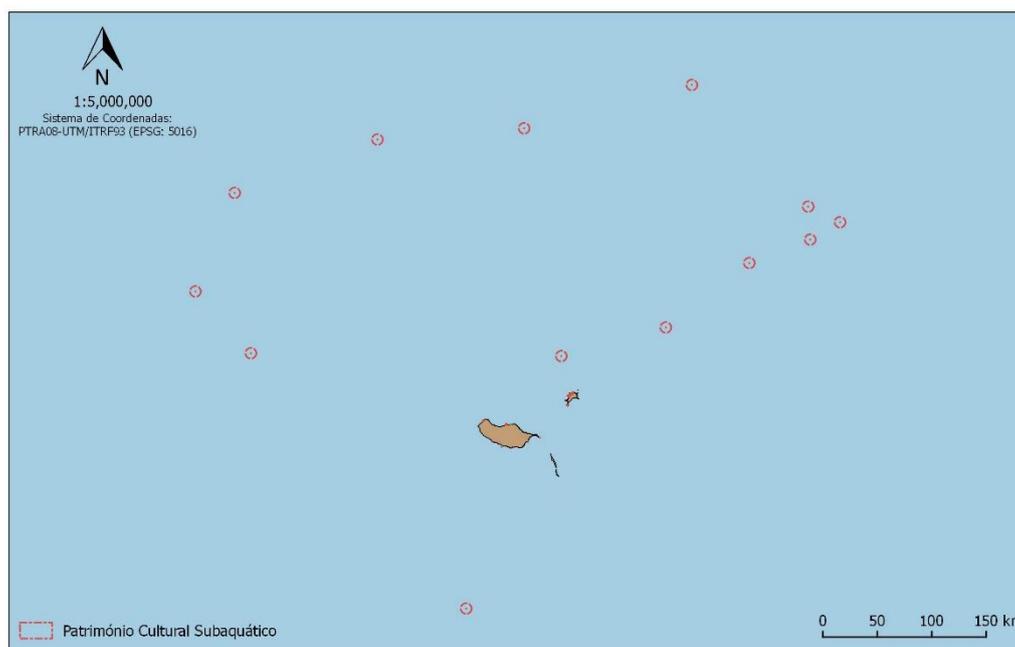


Figure 79 - Location of underwater cultural heritage in the exclusive economic zone of the RAM. Source: Secretaria Regional da Economia, Turismo e Cultura – Direção Regional da Cultura

6.10.1.4. Analysis of interactions

6.10.1.4.1. Interaction with other sectors

Underwater cultural heritage has become increasingly accessible and fragile, notably due to the action of entities or bodies that often do not resort to scientific methods of archaeological exploration. On the other hand, the construction of infrastructures on the coast can damage or destroy existing assets.

The potential negative consequences on heritage are evident since they have been recorded since the second half of the 20th century. A clear example is the case of the *Prompt or Pronto* vessel that was partially destroyed by an anchor of a vessel that was anchoring in that area.

It should also be noted that maritime archaeological sites are being plundered, which in many cases have resulted in the loss and destruction of valuable scientific and cultural materials.

The underwater cultural heritage is incompatible with activities or uses that interfere with the seabed, namely:

- Aquaculture
- Aggregates extraction

- Extraction of mineral resources
- Areas of anchorage
- Cables and pipelines and submarine emitters

The underwater cultural heritage is compatible with the following activities or uses:

- Activities in the field of sport sailing
- Tourist maritime activities
- Protected areas
- Scientific investigation

6.10.1.4.2. Land-sea interaction

As discuss above, the wrecks are used for diving activities. In this way, the interaction land-sea that this activity can arouse is with the marine areas (anchoring).

6.10.1.4.3. Interaction with the environment

The impact it has not yet been properly studied in the Region. However, it is known that vessels may have impacts on the seabed. On the other hand, it is also known that it can generate more biodiversity (e.g. fish).

6.11. Dredging Immersion

6.11.1. Sector characterization

The operability of maritime accesses to port infrastructures is one of the priority areas for intervention, ensuring that ports can operate safely and efficiently.

In the port areas, especially in the ports of Funchal, Caniçal and Porto Santo, there is the accumulation of sediments in the sea bottom, derived from the transport of sediments caused by the streams or the result of rippling conditions.

In order to ensure the safety and operability of port areas, regular dredging operations are required.

Dredged materials that are not reusable or used for other purposes are immersed in the sea, as is the case in the port of Funchal. In the case of Porto Santo, they are reused for feeding the beach.

6.11.1.2. Present Situation

Dredging immersion in the ARM is associated with the underwater discharge of sediments from dredging operations commonly performed in port areas.

The port of Funchal, due to its location and derived from the dominant sea currents of the East, is affected by the deposition of the materials loaded by the streams that flow into the Funchal bay (São João, Santa Luzia and João Gomes). São João riverside is responsible for frequent burials in the entrance area of the Funchal marina, on quays 6 and 7 and in the sheltered area located inside the port to the west. The riversides of Santa Luzia and João Gomes are responsible for the silting of the city wharf, which, with the changes in the port infrastructures, have reduced the bathymetry of the maneuvering basin of the larger vessels, as well as the area of small vessels fishing anchorage.

On the island of Madeira, there is a specific dump site for the dredging deposit, in front of the port of Funchal (16 53 '30 "W (longitude) and 32 36' 35" N (latitude)).

Given the history of the silting of the port, interventions are planned every two years, corresponding to a maximum dredging volume of approximately 50,000 cubic meters, to be carried out during the months of May/June.

In Porto Santo this operation allows the feeding of the existing beach on the south coast of the island. Given the orientation of the main jetty in relation to the dominant currents of the East, it is a port that does not have a great tendency to sediment, however periodic interventions are necessary in order to guarantee the initial design quotas. Areas subject to intervention are constituted by the interior of the whole basin but should mainly concern the mooring areas of the main jetty, the operating area of the cement vessels and the inner maneuvering area (rotating basin).

Due to the characterization of the materials to be dredged, the dredging will be used in the direct deposition as feeding of the beach, in zones to be defined by the *Secretaria Regional do Ambiente e Recursos Naturais – Direção Regional do Ordenamento do Território e Ambiente*.

6.11.1.3. Statistical information

The following table shows the volumes dredged in the port areas. The last scheduled dredging intervention with some significance was made in 2004, for which purpose, samples were collected in the different areas of the port, which were submitted to analyzes for their characterization (Order of the Ministry of the Environment and of the Sea, Republic Diary, no. 141 - 2nd series, of June 21, 1995).

The values of the dredged volumes have varied over the years, as needed. It should be highlighted the period from 2010 to 2014 in which the volume of dredging was increased due to the storm that occurred during the year 2010 as well as the works that took place in the port of Funchal.

In the year 2014 and 2015 there was an increase in the volume of dredging. This situation was due to the need to dredge the port areas due to the significant changes in the configuration of the port of Funchal that resulted from the works carried out.

The displacement to the west of the São João river mouth and the geometric alteration of the entrance to the Funchal marina also revealed the need for future dredging planning, accompanied by a programmed monitoring in order to continue to ensure the operation of the port.

Table 5 - Volumes dredged in the ports of RAM. Source: APRAM, S.A

Year	Volume (m ³)
2004	40 000
2005	130 000
2006	20 000
2007	7 000
2008	3 000
2009	12 000
2010	110 000
2011	64 500
2012	0
2013	0
2014	124 504
2015	32 006
2016	There was no dredging immersion.
2017	There was no dredging immersion

6.11.1.4. Legal framework and constraints

6.11.1.4.1. Competent institutions for sector management

The competent entity responsible for the dredging immersion is the Administração dos Portos da Região Autónoma da Madeira (APRAM, S.A.).

6.11.1.4.2. Normative basis and instruments

In ARM, the legal framework for the characterization and management of dredging is governed by Ordinance no. 1450/2007 of November 12. This ordinance provides for the

sampling and prior characterization of sedimentary materials in terms of density, percentage of solids, particle size and total organic carbon, sediment contamination classes, number of sampling stations as a function of volumetric to be dredged and their final destination.

6.11.1.5. Current spatial distribution

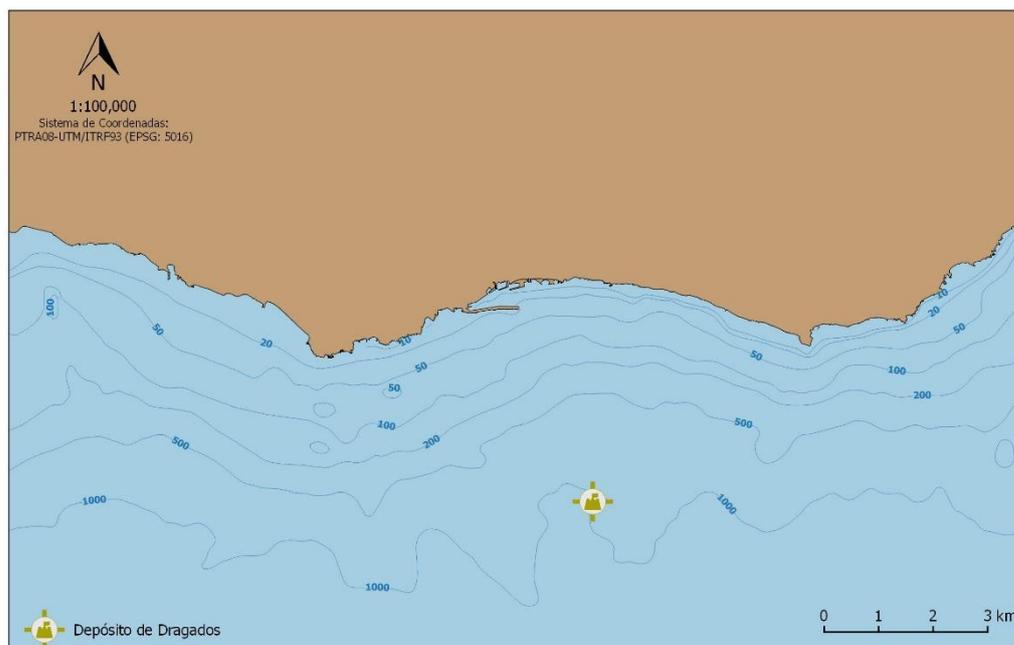


Figure 80 - Location of the area for the dredging deposit. Source: APRAM, S.A.

6.11.1.6. Analysis of interactions

6.11.1.6.1. Interaction with other sectors

The dredging immersion is compatible with the following activities or uses:

- Touristic and sport activities
- Navigation
- Areas of anchorage

The dredging immersion is incompatible with the following activities or uses:

- Underwater cultural heritage
- Artificial reefs
- Aquaculture

- Protected Marine Areas
- Areas of passage of cables, outfalls and submarine pipelines and their protection areas, pipelines and pipelines

6.11.1.6.2. Land sea interaction

This area is not dependent of any terrestrial infrastructures.

6.11.1.7. Interaction with the environment

The dredging immersion should, wherever possible, take place at low tide and regarding the sea conditions and currents favorable to the dredging operation, which must be accompanied by APRAM, SA and the maritime police so that dredging does not disperse outside of the place of disposal.

Before dredging and dredging operations are carried out at sea, any lighter debris that may float and which are included in dredged materials, especially plastics and other products harmful to the environment, must be removed.

Dredging refers to muds, clays, silts and sands that must be transported by barge and deposited in the sea in order to safeguard the ecological conditions of the coastal region.

The company that is to carry out the dredging / transport and dredging dredging works, must, in due time, request the monitoring of the Port of Funchal Harbor.

Since it is a project in a port area adjacent to areas of high tourist interest, dredging and dredging operations should be carried out as far as possible outside the bathing season, which runs from June to September. Work to be carried out should also avoid as far as possible the periods of greatest vulnerability for migratory species (of high natural and commercial value).

In all situations, the best techniques and appropriate measures should be adopted in the operations of dredging, transport and immersion of materials, in order to minimize the negative environmental effects that these activities may originate.

6.12. Ship Sinking and other structures

6.12.1. Sector characterization

The region has extensive experience in the development of artificial reefs, proven by the various structures sunk since the early 1980s by the Regional Directorate for Fisheries - Research Services.

The main objective of the use of sunken structures is to contribute to the restocking of coastal areas degraded by fishing or other activities that have an impact on marine ecosystems. On the other hand, it allows diving activities in these areas.

6.12.1.2. Present Situation

In Baía d'Abra, the first shedding of tire collars occurred, followed by shedding of carcasses previously decontaminated. These are scattered over a large area, between 14 and 17 m deep. Faunal evolution of the site was monitored over several years in the 1980s, 1990s and following.

Between 2000 and 2004, a new model of integrated marine production and coastal protection, on the sea front of Calheta, was experimented with the Mariculture Center (Ponta da Marinha) in the context of a community project, INTERREG III B - MARINOVA MAC / 4.2 / 11. Galley). This project aimed to study the interaction between an aquaculture system and an artificial reef, aiming at its use as a biofiltration agent in relation to the excess organic matter generated by aquaculture practice in the floating cages, entered into the system.

Madeirense was a Portuguese boat constructed in 1962 and sunk in the bay of the island of Porto Santo in 2000, becoming an authentic sanctuary for several marine species.

The former Portuguese Navy vessel, the General Pereira d'Eça corvette, was sunk in the bay of the island of Porto Santo on July 13, 2016 to create an artificial reef and had as objectives to promote the ecological, scientific and socioeconomic development of the region. The first monitoring campaign for the Pereira d'Eça corvette took place between October 31 and November 4, 2016, and it was possible to inventory more than 20 species of fish, invertebrates and algae.

The Corvette Afonso Cerqueira was sunk in Cabo Girão on September 4th of 2018 to create an artificial reef. This sinking aims to promote ecological, scientific and socio-economic development.

6.12.1.3. Potential Situation

It is expected that in the coming years the survey of all underwater cultural heritage will be carried out through the elaboration of the Underwater Archaeological Charter for the Autonomous Region of Madeira. Since Funchal Bay has an important archaeological heritage, due to the diversity of historical times it covers, it is considered an area that should have a thorough archaeological intervention.

6.12.1.4. Legal framework and constraints

12.1.4.5. Competent institutions for sector management

The responsible entity is the *Instituto de Florestas e Conservação da Natureza, IFCN, IP RAM* and *Secretaria Regional de Agricultura e Pescas – Direção Regional de Pescas*.

12.1.4.2. Normative basis and instruments

It will be necessary for the Captaincy of the Port of Funchal or Porto Santo to issue a notice with the location of the sinking area.

6.12.1.5. Current spatial distribution



Figure 81 - Location of artificial reefs on the island of Madeira (West).

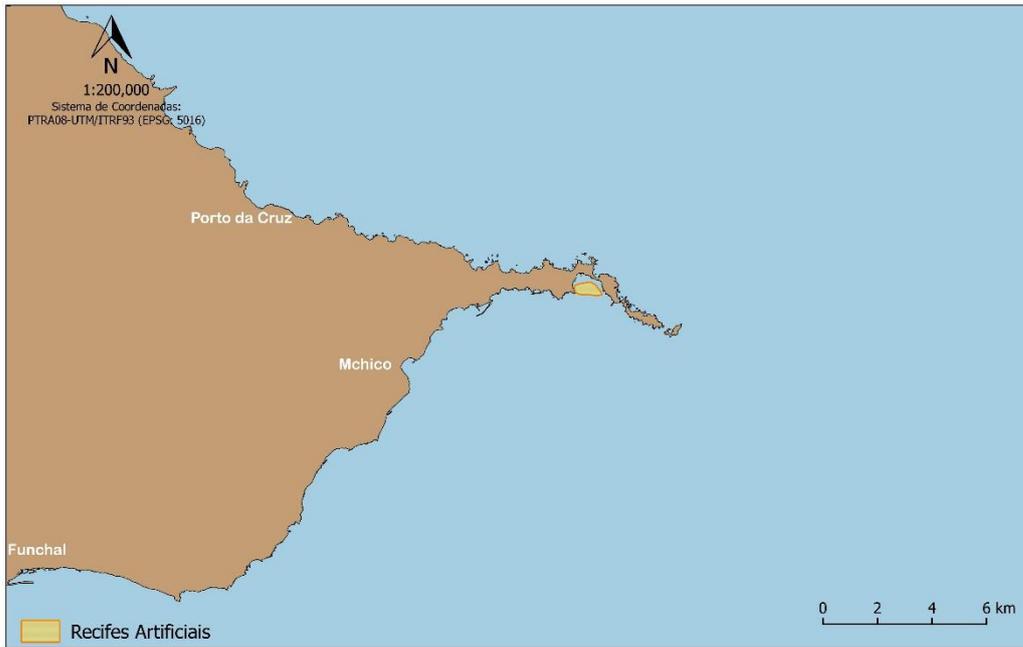


Figure 82 - Location of artificial reefs on the island of Madeira (East).

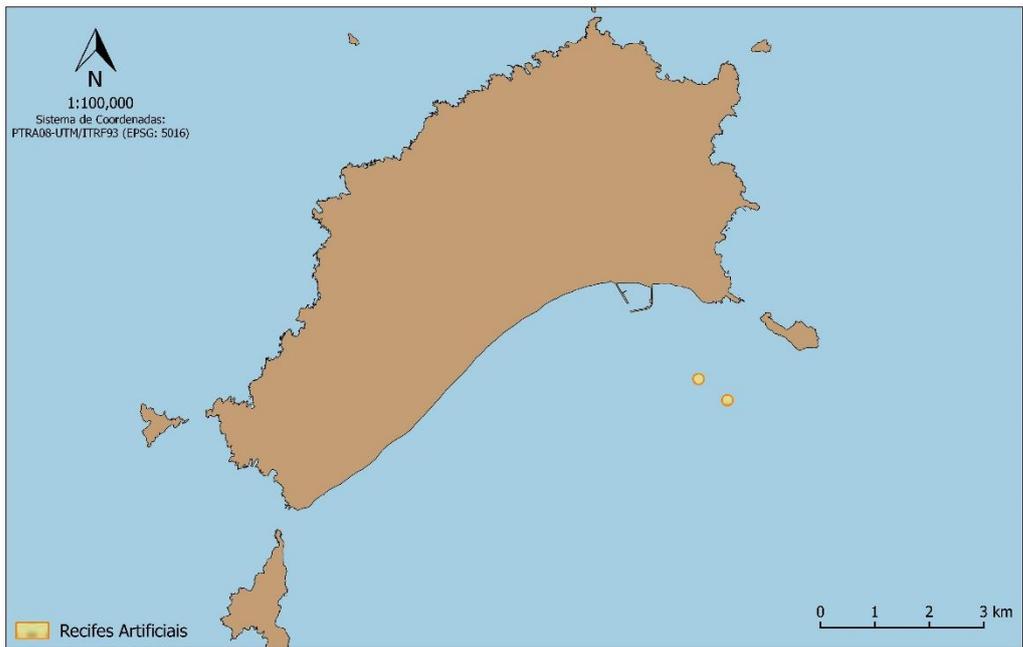


Figure 83 - Location of artificial reefs on the island of Porto Santo.

6.12.1.6. Analysis of interactions

6.12.1.6.1. Interaction with other sectors

Based on the objectives defined for artificial reefs, the activities considered to be incompatible are as follows:

- Dredging for inert extraction
- Fishing - Prohibition of trawls and gill nets
- Underwater cables and pipelines

The compatible activities are the following:

- Diving for observation and photography - provided it is properly planned and regulated
- Tourist and sports activities
- Protected Marine Areas

6.12.1.6.2 Land sea interaction

This area is not dependent of any terrestrial infrastructures.

6.12.1.7. Interaction with the environment

It will be necessary to monitor the artificial reefs already in place to characterize the biodiversity existing there, following the colonization of sessile organisms as well as the ichthyofauna for an extended period (5 to 10 years). A comparative study should be carried out between man-made concrete reefs and artificial reefs made up of sunken vessels in order to characterize the biodiversity of each type of reef and to respond to the best option when creating new artificial reefs in the near future.

Annual reports of the waters characteristics where the artificial reefs are should be carried out in order to assess the quality and toxicity levels of the reefs.

It will be important to create a multidisciplinary team to collect and analyze data to better respond to future applications for artificial reef installations.

Since there are artificial reefs that are intended for diving, it will be important to create a manual of good practice for the users (diving in apnea and scuba diving or other activities to consider).

6.13. Navigation and maritime transport

6.13.1. Sector characterization

Maritime transport – passengers

Passenger, car and inter-shipment traffic is provided by the Ro/Ro *Lobo Marinho* ferry, belonging to the shipping company Porto Santo Line.

The ferry travels between the port of Funchal and the port of Porto Santo with the frequency of 6 stopovers per week in winter time and 7 weekly stopovers in summer time (Lopes, 2016).

The ferry has capacity to receive 1 150 passengers, 145 vehicles although this value is not totally accurate, depending on the size of the cargo it transports.

This ferry allows Porto Santo island to receive daily cargo, most of which are transported in vans and trucks, which reduces logistical costs and increases distribution capacity.

Maritime transport – goods

According to PIETRAM 2014-2020, the following sets of commercial vessels are currently registered:

- Weekly service consisting of three regular lines between the port of Caniçal and the ports of Lisbon - climb the port of Caniçal on Mondays (two lines) and Thursday (one line). Fortnightly one of these lines climbs the port of Porto Santo;
- A biweekly regular line linking Ponta Delgada (RAA) and mainland Portugal;
- A regular line from Northern Europe scales the Port of Caniçal every 3 weeks.
- If the vessel movement is analysed by its type, it is possible to observe that the movement of ships in 2016 represented 54% of the movements in the RAM.

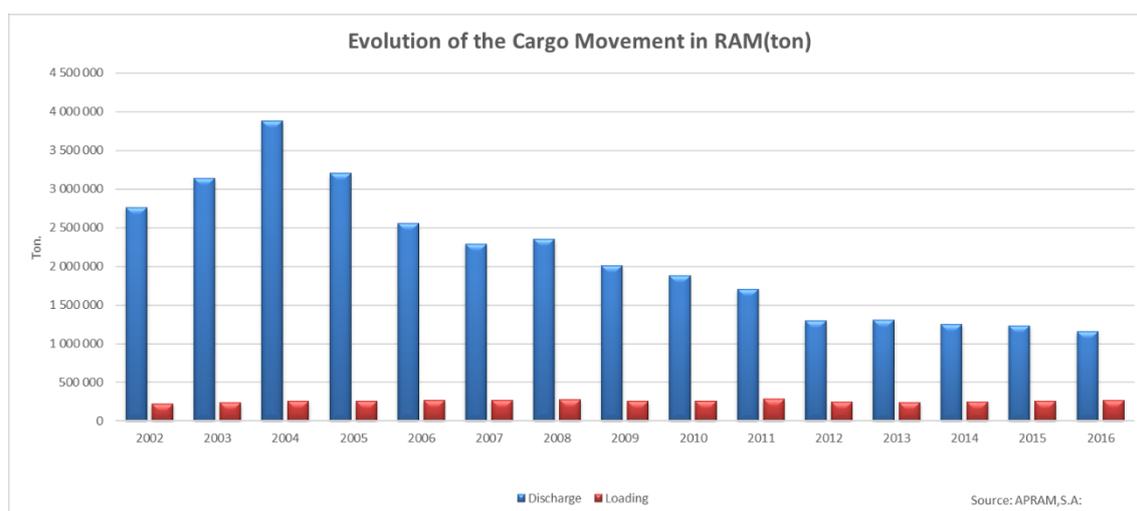
6.13.1.2. Statistical information

Port activity

The first indicator to be analysed is the movement of cargo. The overall movement of cargo in the ports of the RAM, for the years under review, reached its highest value in 2004, with more

than 3.5 thousand tons. Between 2008 and 2012 the variables related to container shipping, freight shipping and number of ships have fallen due to economic instability that has impacted the country and the region. This trend continued in 2016 with 1.5 thousand tons of goods moved.

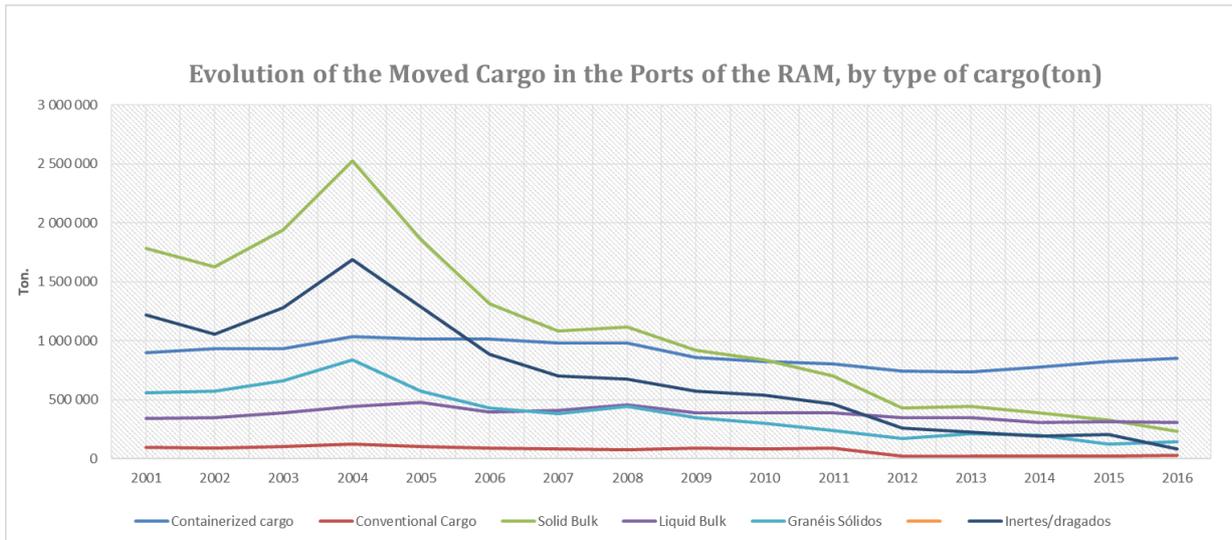
Approximately 82% of the goods handled are imported. It comes mostly from the rest of the national territory (89%). Exports account for 17% of the total regional merchandise movement. These have remained constant in recent years. Export support from the EU may be one of the factors that have contributed to this stability (Lopes, 2016). About 99% of the exports are destined to the national territory.



Graphic 16 - Evolution of the cargo movement in RAM (ton)
Source: APRAM ,S.A.

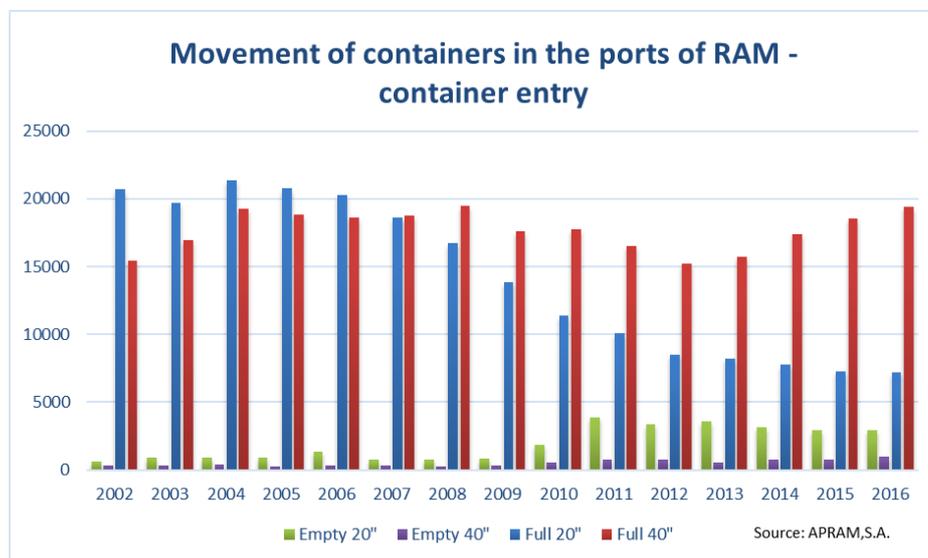
Currently, the port of Caniçal accounts for 87% of the region's merchandise traffic (fuels included), followed by the Socorridos terminal (cement and fuels until January 2015) with 10.5%, the port of Porto Santo with 2, 2% and the port of Funchal has a share of 0.2% (CONSULMAR and Figueira De Sousa, 2016).

In 2016 containerized cargo accounted for 60% of the total cargo handled. The solid bulk was the load that registered a major decrease. Since the aggregates are the only cargo that has origin and destination to Madeira, it was decided to separate from solid bulk. The fall in consumption and especially in construction, explain these values.



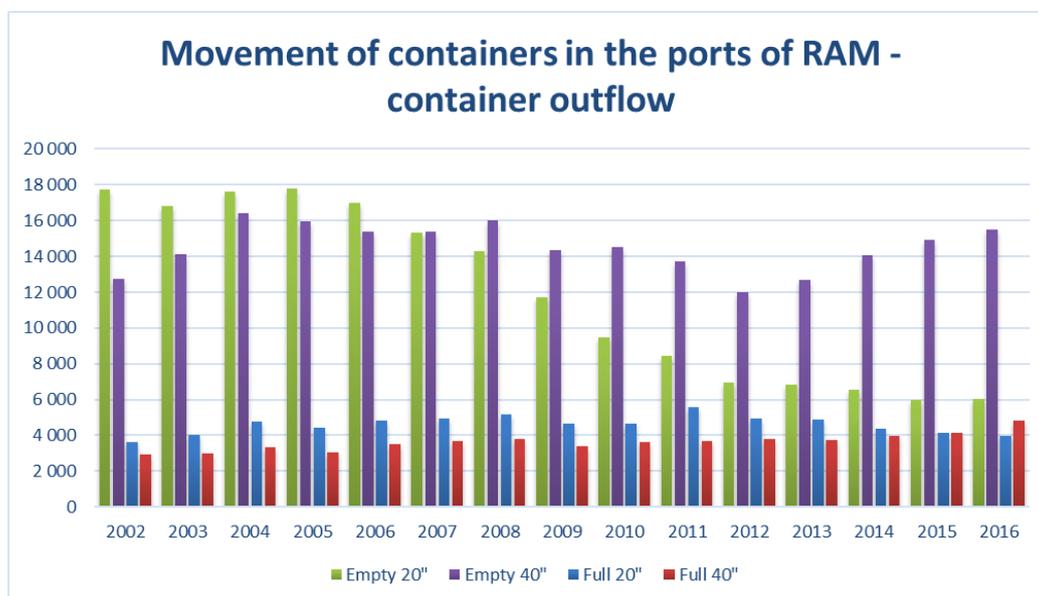
Graphic 17 - Evolution of the moved cargo in the ports of the RAM by type of cargo (RAM)
 Source: APRAM, S.A.

With regard to the movement of containers in the Region, based on what has been mentioned previously in this analysis, about 87% of containers entering the Region are full and correspond mostly to 40-foot containers.



Graphic 18 - Movement of containers in the ports of RAM – container entry
 Source: APRAM, S.A.

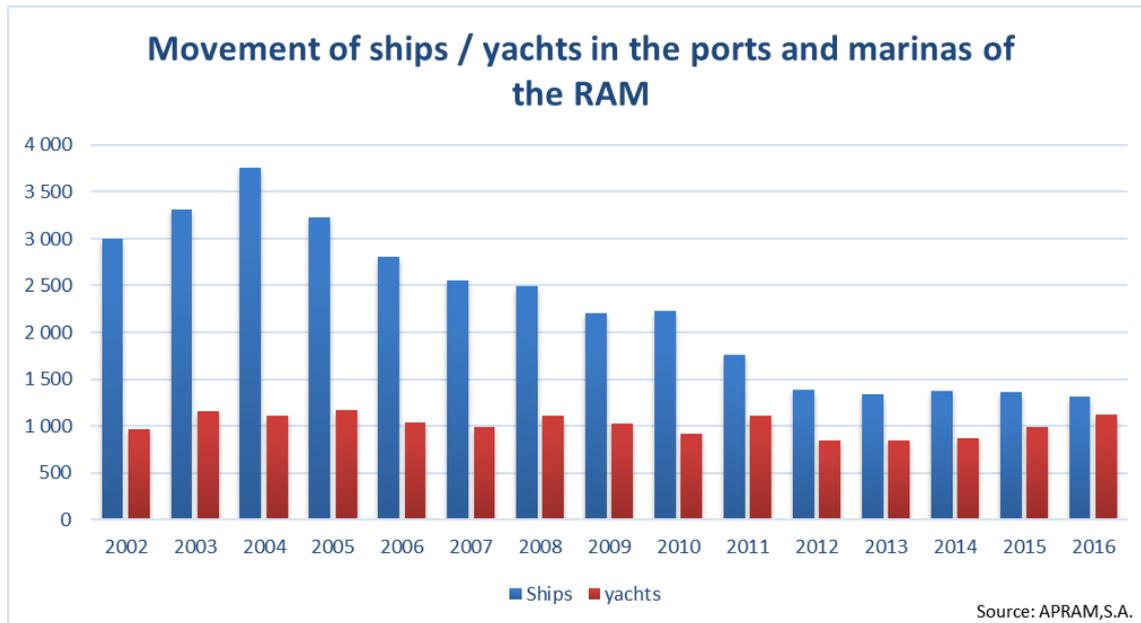
About 71% of the containers leaving the Region correspond to empty containers, in line with the previous analysis that reveals that the Region is mainly an importing territory.



Graphic 19 - Movement of containers in the ports of RAM – container outflow
Source: APRAM, S.A.

The gross registered tonnage in the ports of the Region, in the period of 2002 and 2016, shows a growing trajectory until 2012, with more than 31 thousand tons. In 2013 there was a decrease of 17% compared to the previous year. In 2015 there was a growth of 16% over the previous year.

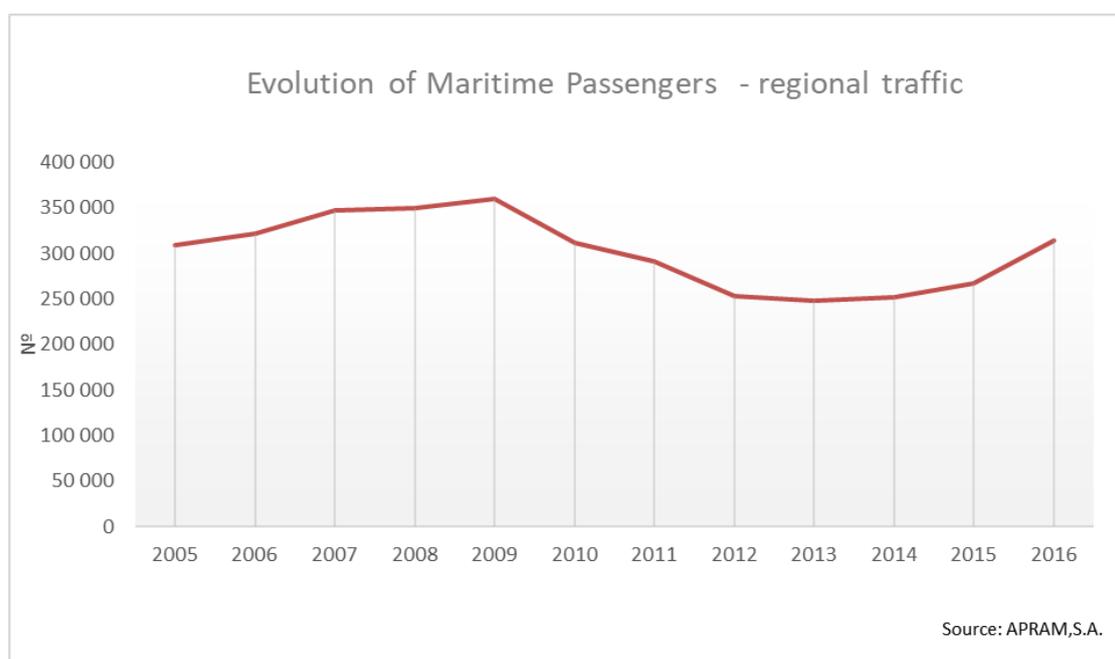
Regarding the movement of yachts, the marina of Porto Santo is the one with the highest value, about 754 vessels, or 67%.



Graphic 20 - Movement of ships/yachts in the ports and marinas of the RAM
Source: APRAM, S.A.

Transportation of passengers

The analysis of the evolution of maritime traffic of inter-island passengers allows us to verify that there was a fall between 2009 and 2012, due to the economic crisis. As of 2012, the number of passengers transported remained stable, and in 2015, it was 267,541 passengers.



Graphic 21 - Evolution of maritime passengers – regional traffic
Source: APRAM, S.A.

According to PIETRAM 2014-2020, the Madeira-Porto Santo line is only sustainable with a minimum traffic of 300 thousand passengers per year.

This objective was reached in 2016, due to the efforts made by the Regional Government, in the design of subsidies in support of Madeira Islanders who wish to move between islands during the low season.

The company *Naviera Armas* operated a ferry boat for the transport of passengers and goods (trailers and vehicles) between 2006 and 2012 (Lopes,2016). Initially the transport was assured between the Madeira Archipelago and the Canary Islands Archipelago. This activity eventually extended to the national continent (Portimão), from 2008 to 2012. The activity ceased on the island of Madeira for economic reasons.

6.13.1.3. Analysis of interactions

6.13.1.3.1. Interaction with other sectors

Activities producing goods, such as aquaculture, are dependent on this sector.

Port areas are compatible with activities such as tourism or sport.

Regarding navigation, corridors may be incompatible with activities that require some fixed infra-structure.

6.13.1.3.2. Land-sea interaction

In the case of the transport of goods, the ports will be of support to the industries for the disposal of goods.

6.13.1.4. Interaction with the environment

The impacts that this activity may have on marine ecosystems are still poorly studied.

However, it is known that navigation is responsible for the emergence of non-indigenous species that are embedded in the hulls of ships.

7. Forecast of occupation of maritime space - Madeira subdivision

The spatialization of activities or uses, private, common or constituting easements / restrictions, either existing or potential, whose overall view must be faced.

As regards the subdivision of Madeira, the vast majority of uses / activities provided for in this Plan are in the territorial sea and inland waters.

The maps below try to give an overview of the occupation of maritime space for the main uses and activities planned and spatialized in the Situation Plan especially for the territorial sea and inland waters, admitting the full realization of the Situation Plan.

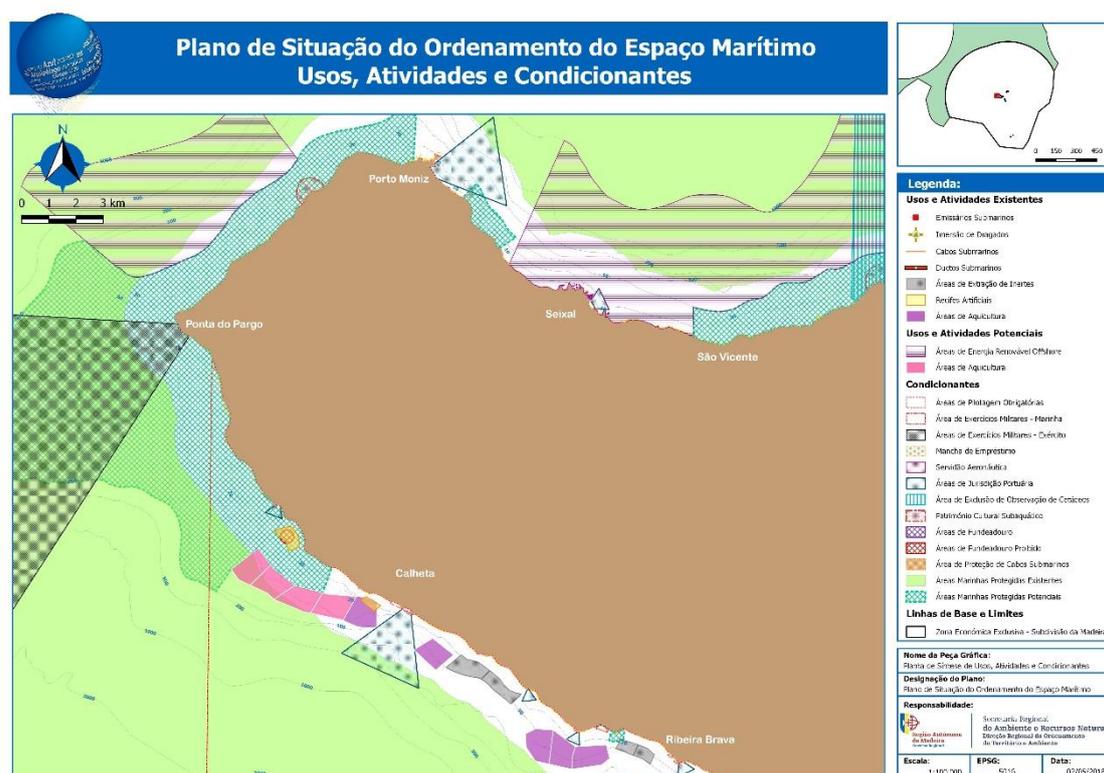


Figure 84 - Detail of existing and potential uses and activities - West coast of Madeira Island.

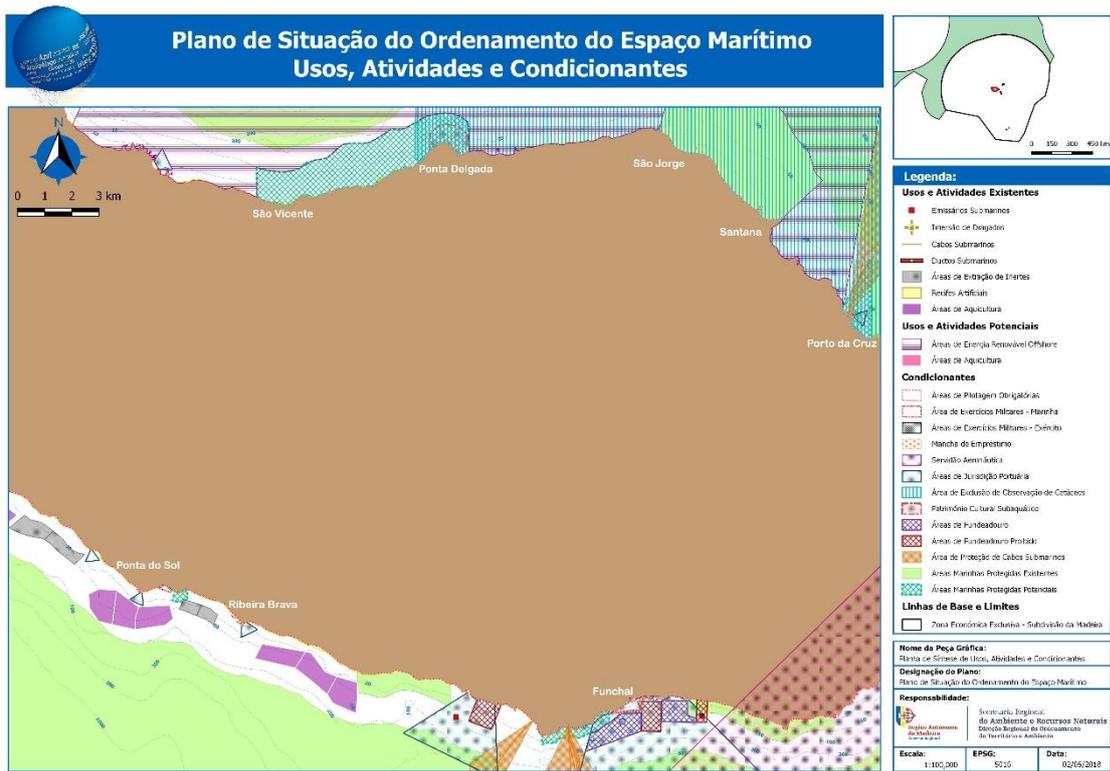


Figure 85 - Detail of existing and potential uses and activities - Madeira island

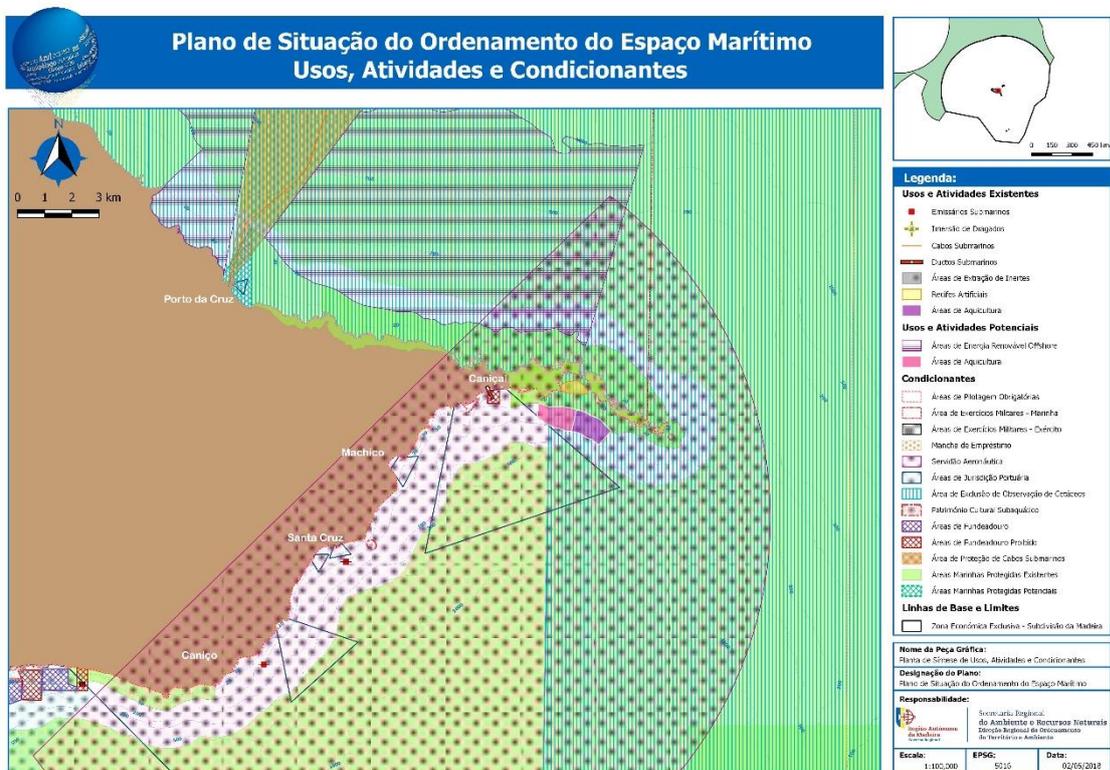


Figure 86 - Detail of existing and potential uses and activities - east coast of Madeira.

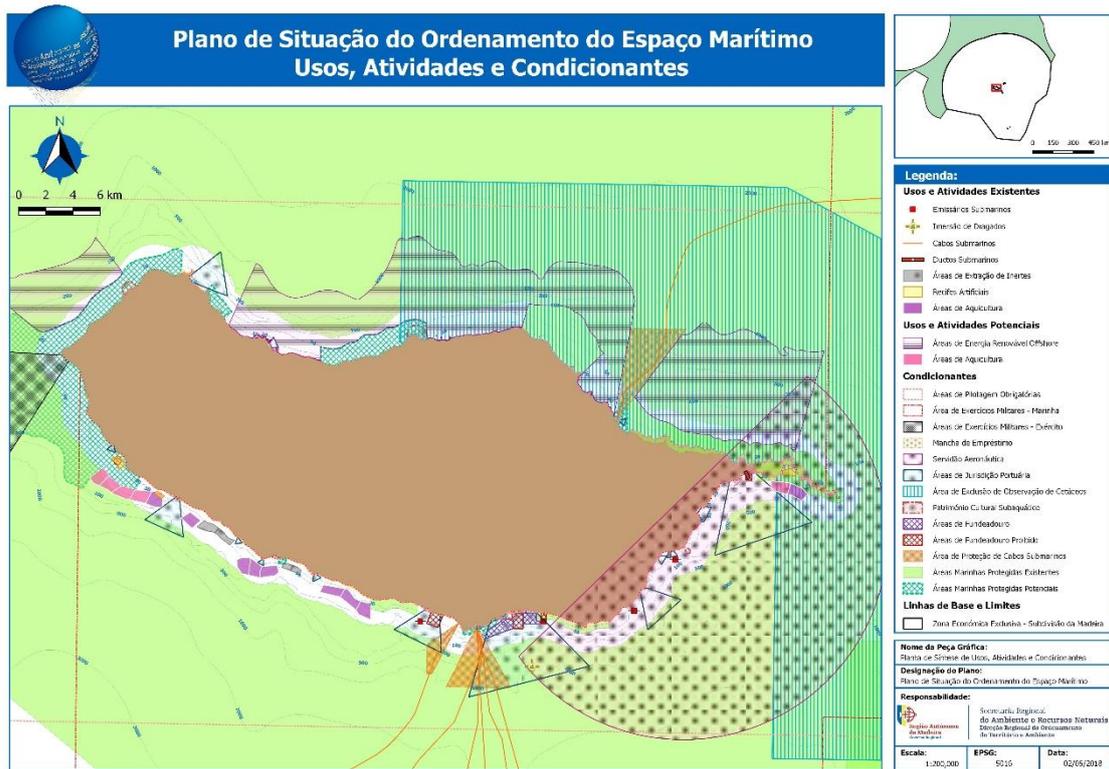


Figure 87 - Detail of existing and potential uses and activities - Madeira island.

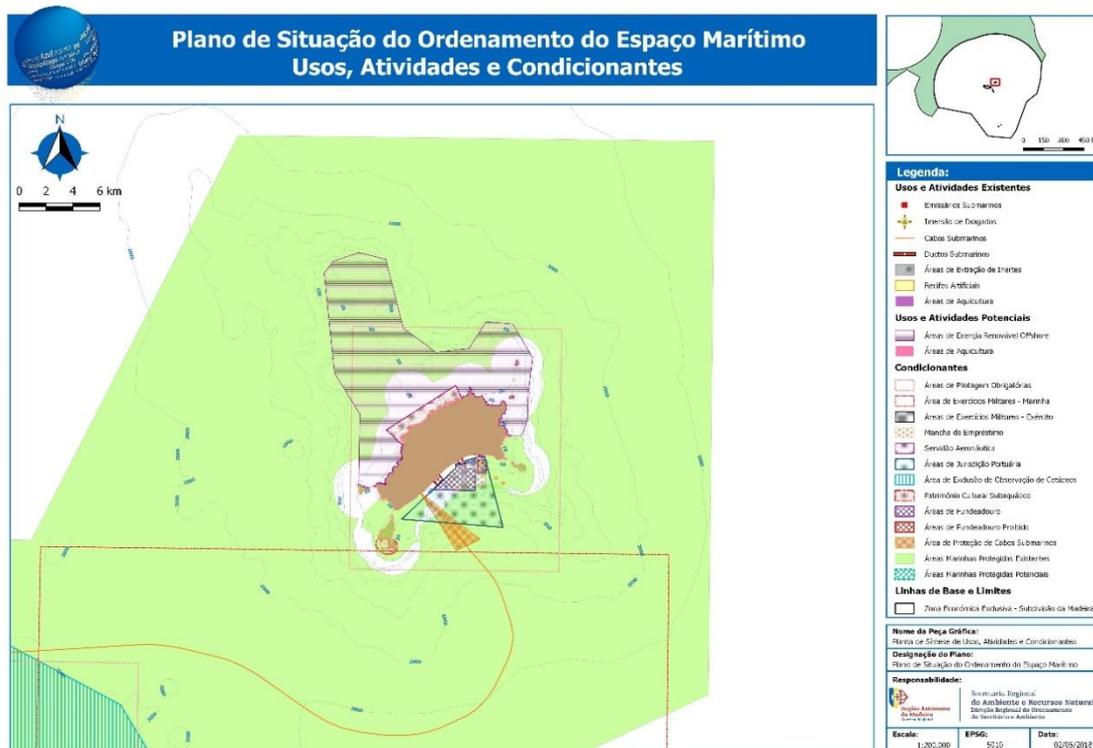


Figure 88 - Detail of existing and potential uses and activities - Porto Santo island.

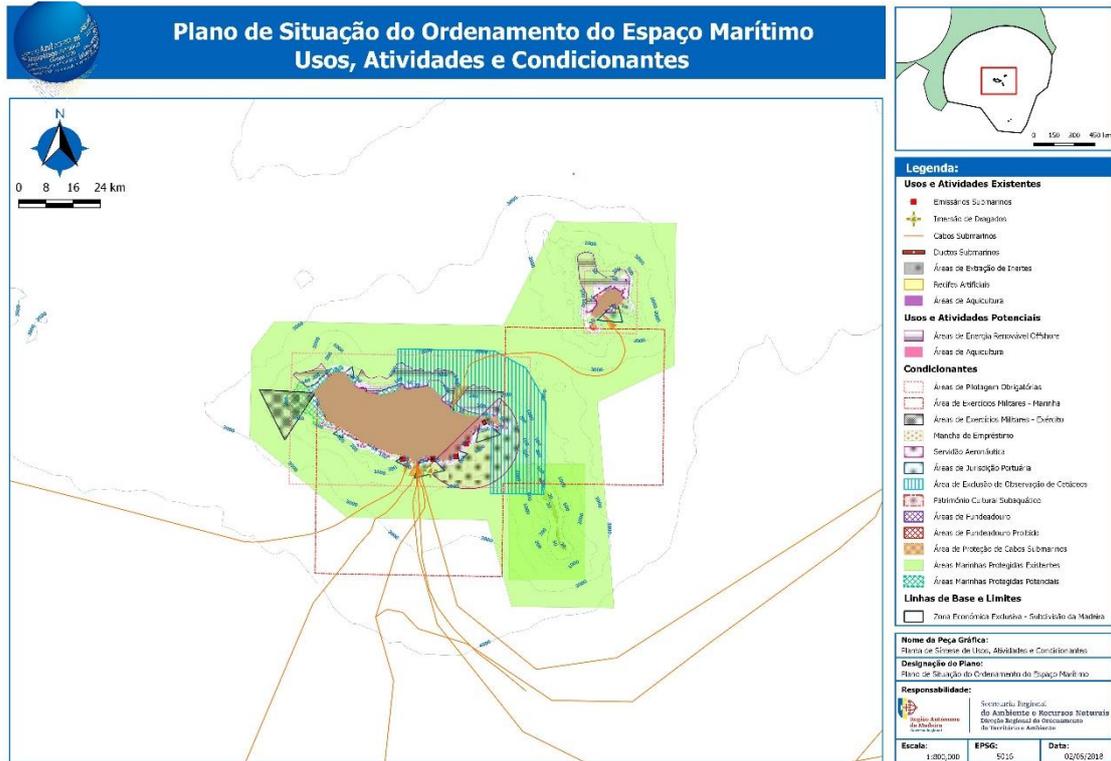


Figure 89 - Detail of existing and potential uses and activities - Madeira Island and Porto Santo.

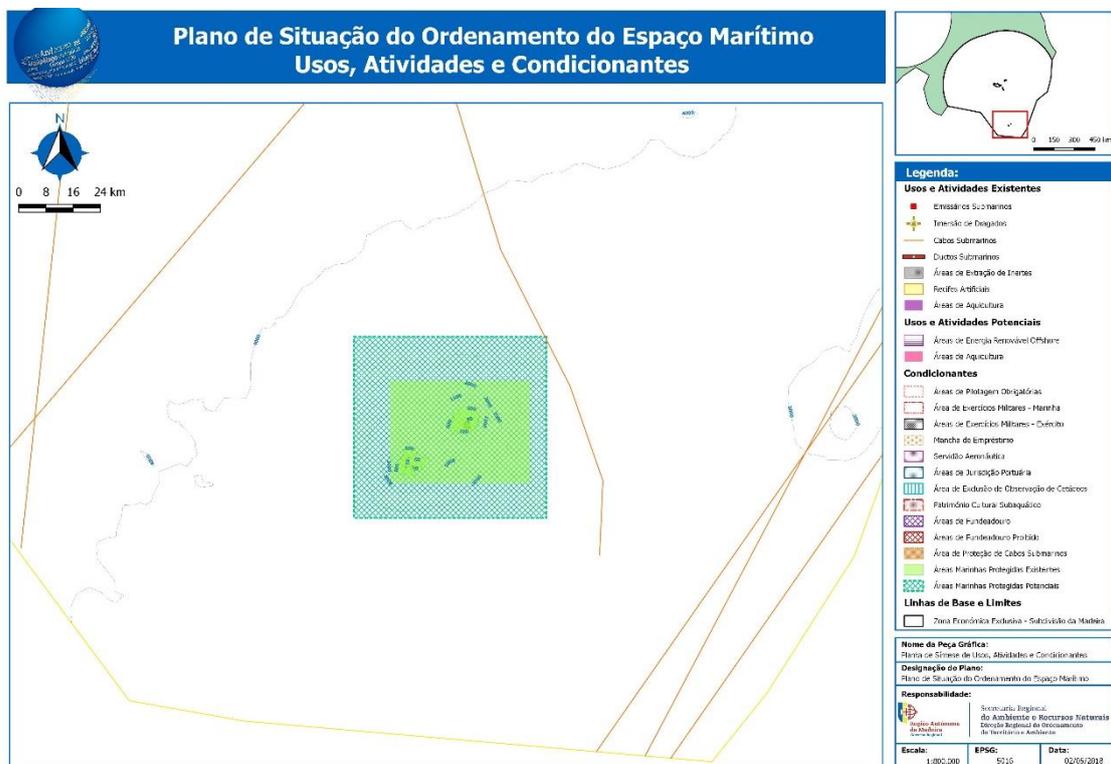


Figure 90 - Detail of existing and potential uses and activities - Selvagens Islands.

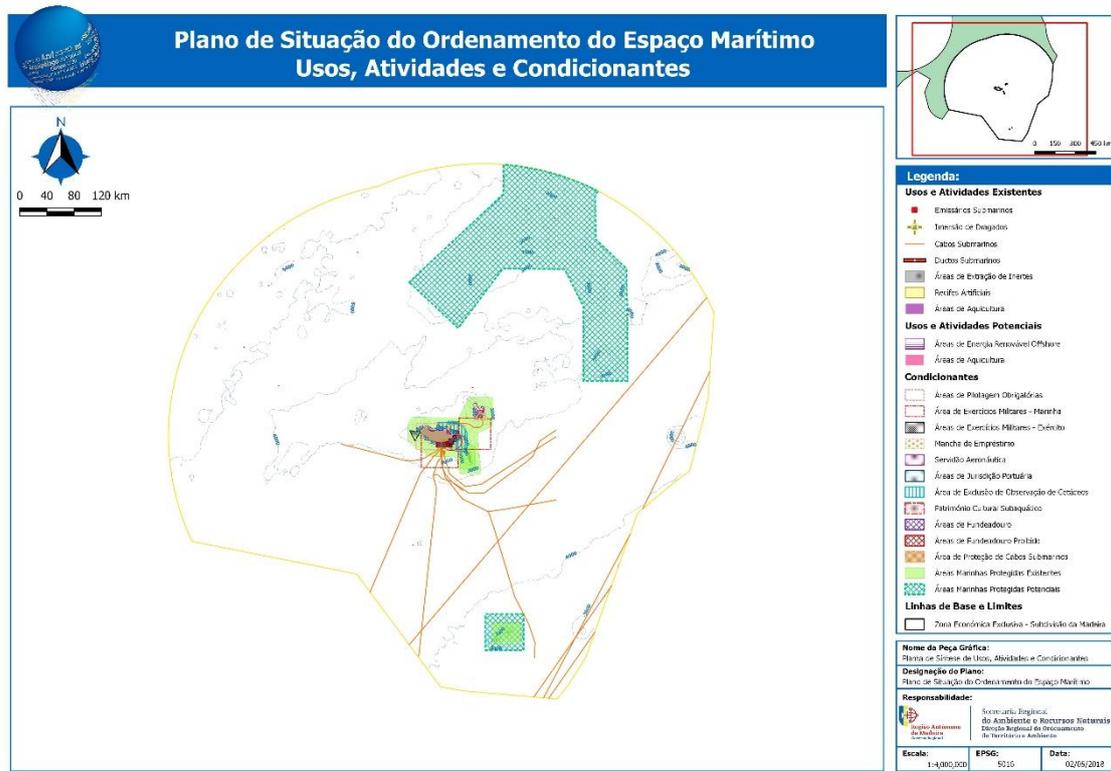


Figure 91 - Detail of existing and potential uses and activities - exclusive economic zone.

8. Bibliography

- Agência Regional da Energia e Ambiente da Região Autónoma da Madeira, Direção Regional do Comércio, Indústrias e Energia e Empresa de Eletricidade da Madeira (2012), Plano de Ação para a Energia Sustentável (ilha do Porto Santo).
- Almada, F., D. Abecasis, D. Villegas-Ríos, S. Henriques, M. P. Pais, M. Batista, B. Horta e Costa, J. Martins, I. Tojeira, N. V. Rodrigues, R. Araújo, M. Souto, H. Alonso, J. M. Falcón, F. Henriques, P. Catry, H. Cabral, M. Biscoito & V. C. Almada, 2015. Ichthyofauna of the Selvagens Islands. Do small coastal areas show high species richness in the northeastern Atlantic? *Marine Biology Research*, 11(1): 49-61. DOI: 10.1080/17451000.2014.889306
- Almeida, A. J., M. Biscoito, J. I. Santana & J. A. González (2010) New records of *Synaphobranchus affinis* Günther, 1877 (Anguilliformes, Synaphobranchidae) from the Eastern-central Atlantic ocean. *Acta Ichthyologica et Piscatoria*, 40(1):67-70.
- Alves, F., Chícharo, L., Serrão, E., and Abreu, A. D., 2003. Grazing by *Diadema antillarum* (Philippi) upon algal communities on rocky substrates. *Scientia Marina* 67, 307–311.
- Alves, Filipe M. A., Chícharo, Luís, M., Serrão, Ester, Abreu, António, D., 2001. Algal cover and sea urchin spatial distribution at Madeira Island (NE Atlantic). *Sci. Mar.* 65, 383–392.
- Andrade, C. A. P. (1995a). O Desenvolvimento da Aquacultura na Região Autónoma da Madeira: Potencialidades e Perspectivas. *Boletim do Instituto Português de Investigação Marítima*, Lisboa, 1: 103-104.
- Andrade, C. A. P. (1995b). Maricultura na Região Autónoma da Madeira – construindo o futuro de uma nova indústria Regional. Colóquio Maricultura na Madeira, 6-7 Março 1995, Secretaria Regional de Agricultura, Florestas e Pescas, Governo Regional da Madeira, Actas do Colóquio, pp. 9-14.
- Andrade, C. A. P. (1996). A fishfarm pilot-project in Madeira Archipelago, Northeastern Atlantic - I. The offshore option. In *Open-Ocean Aquaculture, Proceedings of an International Conference, May 8-10, 1996, Portland, Maine*. Marie Polk (Ed). New Hampshire/Maine Sea Grant College Program Rpt.# UNHMP-CP-SG-96-9, pp. 371-376.
- Andrade, C. A. P. and Gouveia, N. M. A. (2008). Ten years of marine aquaculture development in Madeira Archipelago. In Pham, C. K., R. M. Higgins, M. De Girolano and E. Isidro (Eds). *Proceedings of the International Workshop: Developing a sustainable Aquaculture Industry in the Azores. Archipelago. Life and Marine Sciences. Supp. 7*, p. 30-32.
- Andrade, C. A. P., Vlamincck B. M. and Gouveia, N. M. (2000). Development of a growth model and a feed ration model for gilt-head seabream, *Sparus aurata* L. under offshore conditions. *Relatórios Científicos e Técnicos do IPIMAR*, Lisboa, 50, pp. 8.
- Ansín Agís, J., Ramil, F., and Vervoort, W., 2001. *Atlantic Leptolida (Hydrozoa, Cnidaria) of the families Aglaopheniidae, Halopterididae, Kirchenpaueriidae and Plumulariidae collected during the CANCAP and Mauritania-II expeditions of the National Museum of Natural History, Leiden, The Netherlands*. (Nationaal Natuurhistorisch Museum: Leiden.)
- Araújo, R., 2002. *Gnathophyllum americanum* Guérin-Méneville, 1855 (Crustacea: Decapoda, Gnathophyllidae): a new record from the archipelago of Madeira (NE Atlantic Ocean). *Bocagiana*, 1–4.
- Araújo, R., and Wirtz, P., 2015. The decapod crustaceans of Madeira Island—an annotated checklist. *Spixiana* 38, 205–218.

- Araújo, R., Freitas, M., 2003. A new crab record *Platypodiella picta* (A. Milne- Edwards, 1869) (Crustacea: Decapoda: Xanthidae) from Madeira Island waters. *Bocagiana* 1–6.
- Araújo, R., M. Biscoito, J. I. Santana & J. González, 2009. First record of the deep-sea red crab *Chaceon inglei* (Decapoda: Geryonidae) from Madeira and the Canary Islands (Northeastern Atlantic Ocean). *Bocagiana*, **230**: 1-6.
- Araújo, R., Maranhão, M., Silva, J. and Kaufmann, M., 2012. Seagrass meadow of *Cymodocea nodosa* at south coast of Madeira Island – a priority habitat in the EU Habitat Directive. FLORAMAC 2012, Funchal, Portugal, September 5-8, 2012.
- AREAM – Agência Regional da Energia e Ambiente da Região Autónoma da Madeira. Available at: <https://aream.pt/>
- AREAM, Atlas das Ondas da Madeira. Disponível em: <http://ondatlas.aream.pt/>
- AREAM, DRICE, EEM (2012) – Plano de Ação para a Energia Sustentável da ilha da Madeira.
- AREAM, DRICE, EEM (2012) – Plano de Ação para a Energia Sustentável da ilha do Porto Santo.
- Arísteguiá, J., Mendonça, A., Vilas, J.C., Espino, M., Polo, I., Montero, M.F., Martins, A. (2009). Plankton metabolic balance at two North Atlantic seamounts, Deep Sea Research II: Topical Studies in Oceanography, 56 (25): 2646:2655. DOI: 10.1016/j.dsr2.2008.12.025
- Autoridade Marítima Nacional, Capitania do Porto do Funchal. Available at: <http://www.amn.pt/DGAM/Capitanias/Funchal/Paginas/Capitania-do-porto-do-Funchal.aspx>
- Autoridade Marítima, para questões de segurança marítima, disponível em: www.amn.pt
- Autoridade Nacional de Comunicação, ANACOM. Disponível em: <https://www.anacom.pt/>
- Aviso n.º 6/2012 de 26 de março. Portugal: Ministério dos Negócios Estrangeiros, Diário da República, 1.ª série, nº 61, pp. 1427 – 1436.
- Avisos ao Navegantes
- Bamber, R. N., 2012. Littoral Tanaidacea (Crustacea: Peracarida) from Macaronesia: allopatry and provenance in recent habitats. *Journal of the Marine Biological Association of the United Kingdom* **92**, 1095–1116. doi:10.1017/S0025315412000252
- Bashmachnikov I, C. Mohn, J. L. Pelegri, A. Martins, F. Jose, F. Machin, M. White, 2009. Interaction of Mediterranean water eddies with Sedlo and Seine Seamounts, Subtropical Northeast Atlantic. Deep-Sea Research Part II - Topical Studies in Oceanography 56:2593-2605. doi:10.1016/j.dsr2.2008.12.036
- Becker-Weinberg, V. (2016). Ordenamento e gestão do espaço marítimo e nacional: enquadramento e legislação. Quid Juris. Lisboa.
- Becker-Weinberg, V. 2015. Portugal's legal regime on marine spatial planning and management of the national maritime space: Appendix A. Supplementary material. *Marine Policy*, Volume 61, November 2015. <https://www.sciencedirect.com/science/article/pii/S0308597X15001736> [9 April 2018]
- Biscoito, M. Freitas, M., e Costa, A. L. (2004) – Relatório preliminar da missão RECPROFMAD – 1 (11/10 a 9/11/2004). Museu Municipal do Funchal e Estação de Biologia Marinha do Funchal, 12pp.
- Biscoito, M., 1993. An account on the shrimps of the family Pandalidae (Crustacea, Decapoda, Caridea) in Madeiran waters. In Proceedings of the 5th Symposium "Fauna and Flora of the Cape Verde Islands", Leiden, 4-7 October, 1989. *Cour. Forsch. Inst. Senckenberg*, 159:321-325

- Biscoito, M., J. Delgado, J. A. González, S. Stefanni, V. M. Tuset, E. Isidro, A. García-Mederos and D. Carvalho (2011) Morphological characterization and genetic validation of two sympatric species of Trichiuridae, *Aphanopus carbo* and *A. intermedius*, from the northeastern Atlantic. *Cybium*, 35(1):19-32.
- Biscoito, M., M. Freitas, J. G. Pajuelo, R. Triay-Portella, J. I. Santana, A.L. Costa, J. Delgado & J. A González, 2015. Sex-structure, depth distribution, intermoult period and reproductive pattern of the deep-sea red crab *Chaceon affinis* (Brachyura, Geryonidae) in two populations in the north-eastern Atlantic. *Deep-Sea Research I*, 95: 99-114. DOI: 10.1016/j.dsr.2014.10.010.
- Braga-Henriques A (2014) Cold-water coral communities in the Azores: diversity, habitat and conservation. Ph.D. Thesis. University of the Azores, Portugal. <http://hdl.handle.net/10400.3/3615>
- Braga-Henriques A (2018). Habitats mesofóticos e profundos da Madeira: observações preliminares e ameaças emergentes. Livro de Resumos, II.4, Sessão III:20, Workshop OOM 2017, Madeira Tecnopolo, Funchal, Portugal. https://oom.arditi.pt/documents/WORKSHOP_OOM_2017_Livro%20Resumos.pdf
- Braga-Henriques A (2018). Hidden treasures from Madeira Island: deep ecosystems of cold-water coral reefs and coral gardens. Expedition BIODIAZ (M150), oceanographic research ship F.S. Meteor, Ago. 30. Invited communication.
- Braga-Henriques A, Cardigos F, Menezes G, Ocaña O, Porteiro FM, Tempera F, Gonçalves J (2006). Recent observations of cold-water coral communities in the “Condor de Terra” Seamount, Azores. Programme and book of Abstracts, 41st European Marine Biology Symposium 2006 (Cork, Ireland), communication 116, 79.
- Braga-Henriques A, Carreiro-Silva M, Porteiro FM, de Matos V, Sampaio Í, Ocaña O, and Ávila S (2011a). The association between a deep-sea gastropod *Pedicularia sicula* (Caenogastropoda: Pediculariidae) and its coral host *Errina dabneyi* (Hydrozoa: Stylasteridae) in the Azores. *ICES Journal of Marine Science*, 68(2), 399-407. doi:10.1093/icesjms/fsq066
- Braga-Henriques A, Carreiro-Silva M, Tempera F, Porteiro FM, Jakobsen K, Jakobsen J, Albuquerque M, and Santos RS (2012). Carrying behavior in the deep-sea crab *Paromola cuvieri* (Northeast Atlantic). *Marine Biodiversity*, 42(1), 37-46. doi: 10.1007/s12526-011-0090-3
- Braga-Henriques A, Pereira JN, Tempera F, Porteiro FM, Pham C, Morato T, Santos RS (2011b) Cold-water coral communities on Condor Seamount: initial interpretations. In: Giacomello E, Menezes G (eds) CONDOR observatory for long-term study and monitoring of azorean seamount ecosystems. Final Project Report, Arquivos do DOP, Série Estudos 1/2012, Horta, Portugal, pp 105–114.
- Braga-Henriques A, Porteiro FM, Ribeiro PA, de Matos V, Sampaio I, Ocaña O, and Santos RS (2013). Diversity, distribution and spatial structure of the cold-water coral fauna of the Azores (NE Atlantic). *Biogeosciences*, 10, 4009-4036. doi:10.5194/bg-10-4009-2013
- Braga-Henriques, A. (2017). Final report from the benthic ecology group on board the Yersin yacht (MBE Lab/OOM-EBMF), 24 to 27 of August 2017, Madeira (Portugal). Monaco Explorations - Macaronesia 2017.
- Brito, A., and Ocaña, O. 2004. *Corales de las Islas Canarias*. (F. Lemus: La Laguna.).
- Calado, R. and Nogueira, N. 2004. On the occurrence of *Cestopagurus timidus* (Roux, 1830) (Decapoda: Paguridae) in Madeira Island waters. *Boletim do Museu Municipal do Funchal (História Natural)* 55, 17–23.
- Calado, R., Chevaldonné, P., and Santos, A., 2004. A new species of the deep-sea genus *Bresilia* (Crustacea: Decapoda: Bresiliidae) discovered from a shallow-water cave in Madeira. *J Mar Biol UK*, 84, 191–199.
- Caldeira and R. Tomé (2013). Wake response to an ocean-feedback mechanism: Madeira Island case study. *Boundary-Layer Meteorology*, 148:419–436. DOI: 10.1007/s10546-013-9817-y

- Caldeira, R. M. A., A. Stegner, X. Couvelard, I. B. Araujo, P. Testor, and A. Lorenzo (2014), Evolution of an oceanic anticyclone in the lee of Madeira Island: In situ and remote sensing survey, *J. Geophys. Res. Oceans*, 119, DOI: 10.1002/2013JC009493.
- Caldeira, R. M. A., Groom, S., Miller, P., Pilgrim, D., and Nezlin, N. P., 2002. Seasurface signatures of the island mass effect phenomena around Madeira Island, Northeast Atlantic. *Remote Sensing of Environment* **80**, 336–360. doi:10.1016/S0034-4257(01)00316-9
- Caldeira, R. M. A., Stegner, A., Couvelard, X., Araújo, I. B., Testor, P., and Lorenzo, A., 2014. Evolution of an oceanic anticyclone in the lee of Madeira Island: In situ and remote sensing survey. *Journal of Geophysical Research: Oceans* **119**, 1195–1216. doi:10.1002/2013JC009493
- Caldeira, R., Sangra, P., (2012). Complex geophysical wake flows. *Ocean Dynamics* **62**, 785–797. DOI: 10.1007/s10236-012-0528-6
- Caldeira, R.M.A. and S. Lekou 2000. *Madeira, um oásis no Atlântico* – Uma introdução aos estudos oceanográficos no arquipélago da Madeira. D.R. Regional de Formação Profissional, Madeira.
- Caldeira, R.M.A., P. Russell, and A. Amorim, (2001). Evidence of an unproductive coastal front in Baía D’Abra, an embayment on the South East of Madeira Island, Portugal. *Bulletin of Marine Science*, 69(3): 1057-1072.
- Caldeira, R.M.A., S. Groom, P. Miller, N. Nezlin, (2002). Sea-surface signatures of the island mass effect phenomena around Madeira Island, Northeast Atlantic. *Remote Sensing of the Environment*, 80: 336-360. DOI: 10.1016/S0034-4257(01)00316-9.
- Canning-Clode J, Fofonoff P, McCann L, Carlton JT, Ruiz G., 2013. Marine invasions on a subtropical island: Fouling studies and new records in a recent marina on Madeira Island (Eastern Atlantic Ocean). *Aquatic Invasions* **8**: 261–270.
- Capitania do porto do funchal, edital n.º 1 de 2018.
- Carr, M.H., Neigel, J.E., Estes, J.A., Andelman, S., Warner, R.R. e Largier, J.L. (2003). Comparing marine and terrestrial ecosystems: implications for the design of coastal marine reserves. *Ecological Applications*. **13** (1): 90-107.
- Carreiro-Silva M, Andrews AH, Braga-Henriques A, de Matos V, Porteiro FM, Santos RS (2012). Variability in growth rates of long-lived black coral *Leiopathes* sp. from the Azores. *Marine Ecology Progress Series*, **473**: 189-199. doi:10.3354/meps10052
- Castanhari, G.; Tomás, A.R.G.; Elliff, C. I. (2012) - Benefícios, prejuízos e considerações relevantes na utilização de sistemas de recifes artificiais e estruturas correlatas Benefits, damages and relevant considerations in the use of artificial reef and correlated structure systems. G. Castanhari, *Revista da Gestão Costeira Integrada* 12(3):313-322 (2012). *Journal of Integrated Coastal Zone Management* 12(3):313-322.
- CE (2009). Comunicação da Comissão ao Parlamento Europeu e ao Conselho - Construir um futuro sustentável para a aquicultura - Um novo ímpeto para a estratégia de desenvolvimento sustentável da aquicultura europeia - COM/2009/0162 final.
- CE (2009). Comunicação da Comissão ao Parlamento Europeu e ao Conselho - *Construir um futuro sustentável para a aquicultura - Um novo ímpeto para a estratégia de desenvolvimento sustentável da aquicultura europeia* - COM/2009/0162 final.
- CE (2013). COM (2013) 229 final - Comunicação da Comissão ao Parlamento Europeu, ao Conselho, ao Comité Económico e social Europeu e ao Comité das Regiões, de 29 de abril de 2013.
- Chaves, M.F.L.M. (2014). Contributo para o estudo da relação de Portugal com o Mar. *Teorias do Poder*

- Christiansen, B. & Wolff, G. (2009) The oceanography, biogeochemistry and ecology of two NE Atlantic seamounts: The OASIS project. *Deep Sea Research II*, 56: 2579-2581.
- Christiansen, B., Albers, L., Brand, T., Chivers, A., Christiansen, H., Christiansen, S., Denda, A., Diniz, T., George, K.-H., Irion, I., Janßen, T., Kaufmann, M., Kullmann, B., Lamont, P., Molodtsova, T., Montgomery, J., Peine, F., Schneehorst, A., Schuster, A., Springer, B., Stahl, H., Stefanowitsch, B., Turner, G., Turnewitsch, R., Vieira, R., Vogel, S. & Wehrmann, H. (2012) Biodiversity and Biological Production at a Shallow NE Atlantic Seamount (Ampère Seamount) - Cruise No. M83/2. DFG Senatskommission für Ozeanographie, Bremen. 1-64 pp.
- Christiansen, B., Martin, B. & Hirsch, S. (2009) The benthopelagic fish fauna on the summit of Seine Seamount, NE Atlantic: Composition, population structure and diets. *Deep Sea Research II*, 56: 2705-2712.
- Christiansen, B., Vieira, R. P., Christiansen, S., Denda, A., Oliveira, F. & Gonçalves, J. M. S. (2014) The fish fauna of Ampère Seamount (NE Atlantic) and the adjacent abyssal plain. *Helgoland Marine Research*,
- Christiansen, B., Wolff, B. (2009) - *Deep Sea Research Part II: Topical Studies in Oceanography*, Volume 56, Issue 25, Pages 2579-2730 (1 December 2009). The Oceanography, Biogeochemistry and Ecology of Two NE Atlantic Seamounts: OASIS.
- Christiansen, Bernd (2009) Poseidon 384 [POS384] Cruise report . Universität Hamburg, Institut für Hydrobiologie und Fischereiwissenschaft, Hamburg, 13 pp.
- Coelho H. e Santos R., (2003) Enhanced primary production over seamounts: A numerical study. 4th Symposium on the Iberian Atlantic Margin. *Thalassas: Vigo, Spain*, 2 pp.
- Colaço, A., Carreiro e Silva, M., Giacomello, E., Gordo, L., Vieira, A., Adão, H., Gomes-Pereira, J. N., Menezes, G., Barros, I., (2017). *Ecosistemas do Mar Profundo*. DGRM, Lisboa, Portugal. E-book disponível em www.sophia-mar.pt.
- Comissão Europeia, Comunicação da comissão ao Parlamento Europeu, ao Conselho, ao Comité Económico e Social Europeu e ao Comité das Regiões, Crescimento Azul: Oportunidades para um crescimento marinho e marítimo sustentável, Bruxelas, 13.9.2012 COM (2012)494 Final
- Comissão Europeia, Comunicação da comissão ao Parlamento Europeu, ao Conselho, ao Comité Económico e Social Europeu e ao Comité das Regiões, Energias Renováveis: Um agente decisivo no mercado Europeu da Energia, COM (2012) 271.
- Comissão Europeia, Comunicação da comissão ao Parlamento Europeu, ao Conselho, ao Comité Económico e Social Europeu e ao Comité das Regiões, Crescimento Azul: Oportunidades para um crescimento marinho e marítimo sustentável, Bruxelas, 13.9.2012 COM (2012)494 Final
- Comissão Europeia, Comunicação da comissão ao Parlamento Europeu, ao Conselho, ao Comité Económico e Social Europeu e ao Comité das Regiões, *Crescimento Azul: Oportunidades para um crescimento marinho e marítimo sustentável*, Bruxelas, 13.9.2012 COM(2012)494 Final
- Comissão Europeia, Comunicação da comissão ao Parlamento Europeu, ao Conselho, ao Comité Económico e Social Europeu e ao Comité das Regiões, Energias Renováveis: Um agente decisivo no mercado Europeu da Energia, COM (2012) 271.
- Conselho de Ministros. 2017. Resolução do Conselho de Ministros n.º 174/2017 que aprova a Estratégia Industrial e o Plano de Ação para as Energias Renováveis Oceânicas. *Diário da República* n.º 227/2017, Série I de 2017-11-24. <https://dre.pt/application/conteudo/114248654> [10 April 2018]
- CONSULMAR e FIGUEIRA DE SOUSA (2016) - *Plano Integrado Estratégico de Transportes da Região Autónoma da Madeira 2014-2020*, Funchal: Secretaria Regional da Economia, Turismo e Cultura.

- CORREIA, F. N., MENDES, J. M. M. (coord.) (2000) - *Plano Regional da Política de Ambiente – Caracterização Base*, Agência Regional da Energia e Ambiente da Região Autónoma da Madeira.
- Couvelard, X., R.M.A. Caldeira, I.B. Araújo, R. Tomé, (2012). Wind mediated vorticity-generation and eddy-confinement, leeward of the Madeira Island: 2008 numerical case study, *Dynamics of Atmospheres and Oceans*, Volume 58, Pages 128-149, ISSN 0377-0265. DOI: 10.1016/j.dynatmoce.2012.09.005.
- Da Cunha, A. G.; Santos, D. A. (2010) Implantação de recifes artificiais: uma forma alternativa para incrementar a produtividade pesqueira, *Rev. Bras. Eng. Pesca* 5(2): I-XII, 2010.
- Dayton, P.K., Kim, S., Jarrell, S.C., Oliver, J.S., Hammerstrom, K., Fisher, J.L., O'Connor, K., Barber, J.S., Robilliard, G., Barry, J., Thurber, A.R., Conlan, K. (2013). Recruitment, growth and mortality of an Antarctic hexactinellid sponge, *Anoxycalyx joubini*. *PLoS One* 8, e56939. doi:10.1371/journal.pone.0056939
- de Matos V, Braga-Henriques A, Santos, RS, Ribeiro PA (2014). New species of *Heteropathes* (Anthozoa: Antipatharia) expands genus distribution to the NE Atlantic. *Zootaxa*, 3827(2), 293-300, <http://dx.doi.org/10.11646/zootaxa.3827.2.10>
- de Matos V, Gomes-Pereira JN, Tempera F, Ribeiro PA, Braga-Henriques A, Porteiro FM (2013). First record of *Antipathella subpinnata* (Anthozoa, Antipatharia) in the Azores (NE Atlantic), with description of the first monotypic garden for this species, *Deep-Sea Research Pt. II*, 99: 113-121. <http://dx.doi.org/10.1016/j.dsr2.2013.07.003>
- Decreto – lei nº 507/72 de 12 de dezembro. Portugal: Ministério da Marinha, Gabinete do Ministro, 1ª série, número 287, p. 1899 – 1901.
- Decreto – Lei nº 577/76, de 21 de julho. Portugal, Diário da República, 1º série, número 169
- Decreto do Presidente da República 65/2006, de 18 de julho. Portugal: Presidência da República, Diário da República, Série I, n.º 137.
- Decreto Legislativo Regional 14/90/M, de 23 de maio. Região Autónoma da Madeira: Assembleia Legislativa Regional, Diário da República, 1.ª série, n.º 118.
- Decreto Legislativo Regional 22/2018/M, de 12 de Dezembro, Estabelece o regime jurídico da extração comercial de materiais inertes no leito das águas costeiras, territoriais e das águas interiores sujeitas à influência das marés da Região Autónoma da Madeira, Diário da República n.º 239/2018, Série I de 2018-12-12.
- Decreto Legislativo Regional 23/86/M, de 4 de outubro. Região Autónoma da Madeira: Assembleia Regional, Diário da República, 1.ª série, n.º 229.
- Decreto Legislativo Regional n.º 25/2003/M, Altera o Decreto Legislativo Regional n.º 19/99/M, de 1 de julho, que transforma a Administração dos Portos da Região Autónoma da Madeira em APRAM — Administração dos Portos da Região Autónoma da Madeira, S. A., e aprova os respetivos Estatutos. Região Autónoma da Madeira: Assembleia Legislativa Regional, Diário da República, 1.ª série - A, n.º 194, pp. 5501 – 5508.
- Decreto Legislativo Regional n.º 15/2013/M de 14 de maio. Região Autónoma da Madeira: Assembleia Legislativa Regional, Diário da República, 1.ª série, n.º 92.
- Decreto Legislativo Regional n.º 15/2017/M, Aprova o Programa de Ordenamento Turístico da Região Autónoma da Madeira, 6 de junho. Região Autónoma da Madeira: Assembleia Legislativa, 1ª série, n.º 109, pp. 2795 – 2814.
- Decreto Legislativo Regional n.º 18/2017/M, Desenvolve as bases da política pública de solos, de ordenamento do território e de urbanismo na Região Autónoma da Madeira e define o respetivo sistema regional de gestão territorial, 27 de junho. Região Autónoma da Madeira: Assembleia Legislativa Regional, Diário da República, 1ª série, n.º 122, pp. 3270.

- Decreto legislativo regional n.º 28/2008/M que estabelece o regime jurídico de proteção e de extração e dragagem de materiais inertes da orla costeira na Região Autónoma da Madeira, de 12 de agosto. Portugal: Região Autónoma da Madeira, Assembleia Legislativa, Diário da República, 1.ª série — N.º 155, pp. 5528 – 5531.
- Decreto Legislativo Regional n.º 4/2017/M, Cria o Parque Natural Marinho do Cabo Girão, de 30 de janeiro. Região Autónoma da Madeira: Assembleia Geral, Diário da República, 1.ª série, n.º 21, pp.542 - 547.
- Decreto Legislativo Regional n.º 95/95/M de 20 de maio. Região Autónoma da Madeira: Assembleia Legislativa Regional, Diário da República, 1.ª série, n.º 117.
- Decreto legislativo regional nº14/2013/M, Altera o decreto legislativo Regional nº 28/2008/m, de 12 de agosto, que estabelece o regime jurídico de proteção e de extração e dragagem de materiais inertes da orla costeira na Região autónoma da madeira. de 12 de abril. Portugal, Região Autónoma da Madeira, Assembleia Legislativa, Diário da República, 1.ª série — N.º 72, pp. 2151 – 2153.
- Decreto legislativo regional nº17/2016/M, Segunda alteração ao Decreto Legislativo Regional n.º 28/2008/M, de 12 de agosto, que estabelece o regime jurídico de proteção e de extração e dragagem de materiais inertes da orla costeira na Região Autónoma da Madeira de 23 de março. Portugal, Região Autónoma da Madeira, Assembleia Legislativa, Diário da República, 1.ª série — N.º 58, p.949.
- Decreto nº 7/2017, de 13 de março, que aprova o Protocolo de Nagoya, Diário da República, 1.ª série, n.º 51
- Decreto Regulamentar Regional n.º 1/2014/M de 30 de janeiro. Região Autónoma da Madeira: Jornal Oficial da Região Autónoma da Madeira, 1.ª série.
- Decreto Regulamentar Regional n.º 11/81/M de 15 de maio. Região Autónoma da Madeira: Assembleia Geral, Diário da República, 1.ª série, n.º 58.
- Decreto Regulamentar Regional n.º 3/2014/M, de 3 de março. Região Autónoma da Madeira: Presidência do Governo, Diário da República, 1.ª série, n.º 43.
- Decreto-lei 289/93, de 21 de agosto. Portugal: Presidência do Conselho de Ministros, Diário da República, Série I-A n.º 196.
- Decreto-lei 289/93, de 21 de agosto. Portugal: residência do Conselho de Ministros, Diário da República, Série I, n.º 196.
- Decreto-lei 289/93, de 21 de agosto. Portugal: residência do Conselho de Ministros, Diário da República, Série I, n.º 196.
- Decreto-Lei n.º 130/2012 de 22 de junho. Portugal: Ministério Agricultura, do Mar, do Ambiente e do Ordenamento do Território, Diário da República, 1ª série, n.º 120 pp. 3109 - 3139.
- Decreto-Lei n.º 164/97 de 27 de junho. Portugal: Ministério da Cultura, 1.ª série-A, n.º 146, pp. 3140 – 3144.
- Decreto-Lei n.º 164/97 de 27 de junho. Portugal: Ministério da Cultura, 1.ª série-A, n.º 146, pp. 3140 – 3144.
- Decreto-Lei n.º 245/2009 de 22 de setembro. Portugal: Diário da República, 1ª série, n.º 184, pp. 6747 – 6748.
- Decreto-Lei n.º 38/2015 de 12 de março. Portugal: Ministério da Agricultura e do Mar. Diário da República, 1.ª série, n.º 50, pp. 1523 – 1549.
- Decreto-Lei n.º 458/71 de 29 de outubro. Portugal: Diário da República, 1ª série.
- Decreto-Lei n.º 60/2012 de 14 de março. Portugal: Diário da República, 1ª série, n.º 53, pp. 1153– 1172.
- Decreto-Lei n.º 80/2015 de 14 de maio. Portugal: Ministério do Ambiente, do Ordenamento do Território e Energia, Diário da República, 1ª série, n.º 93 pp. 2469 – 2512.
- Decreto-Lei n.º226-A/2007 de 31 de maio. Portugal: Ministério do Ambiente, do Ordenamento do Território e do Desenvolvimento Regional, Diário da República, 1.ª série, n.º 105, pp. 3644-(24) - 3644-(48).

Decreto-Lei nº 122/2017, de 21 de setembro, normas de aplicação do Protocolo de Nagoya, Diário da República, 1.ª série, n.º 183

DECRETO-LEI nº 38/2015, de 12 de março de 2015. Portugal: Diário da República, 1ª série, nº 50, p. 1523-1549.

Decreto-Lei nº 416/70 de 1 de setembro. Portugal: Diário da República, 1ª série, número 202, p. 1150 - 1151

Decreto-Lei nº 416/70 de 1 de setembro. Portugal: Diário da República, 1ª série, número 202, p. 1150 - 1151

Decreto-lei nº263/2009 de 28 de setembro. Portugal: Diário da República, 1ª série, nº 188, p.6967-6972

Decreto-Lei nº289/93 de 21 de agosto. Portugal: Presidência do Conselho de Ministros, Diário da República, 1ª série – A, nº196, pp. 4462 - 4473

Decreto-Lei nº289/93 de 21 de agosto. Portugal: Presidência do Conselho de Ministros, Diário da República, 1ª série – A, nº196, pp. 4462 - 4473

Decreto-lei nº38/2015 de 12 de março. Portugal: Diário da República, 1ª série, nº50, p.1523-1549

Decreto-lei nº45/2002 de 2 de março. Portugal: Diário da República, 1ª série – A, p.1758-1761

Dellinger, T. 2000. Conservation support project for North Atlantic *Caretta caretta** sea turtles - Life Nature Project contract no. B4-3200/96/541 (Life96Nat/P/3019). Final Technical Activity Report. CITMA, Funchal, pp. 56.

Denda, A. & Christiansen, B. (2014) Zooplankton distribution patterns at two seamounts in the subtropical and tropical NE Atlantic. *Marine Ecology*, 35: 159-179.

Department of foreign affairs and trade, Convention for the Protection of Submarine Telegraph Cables (Paris, 14 march 1884).

DG ENVI (Environment Directorate-General of the European Commission). 2016. Biodiversity Strategy. http://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm [11 April 2018]

DG ENVI (Environment Directorate-General of the European Commission). 2017. Our Oceans, Seas and Coasts: Legislation: the Marine Directive. http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm [10 April 2018]

DG MARE (Directorate-General for Maritime Affairs and Fisheries). 2018. The Common Fisheries Policy (CFP). https://ec.europa.eu/fisheries/cfp_en [10 April 2018]

DGPM (Directorate General for Maritime Policy). 2013. National Ocean Strategy 2013-2020 [in English]. Portugal: Portuguese Government.

DGPM (Directorate General for Maritime Policy). 2018. National Ocean Strategy 2013-2020. <https://www.dgpm.mm.gov.pt/enm-en> [15 March 2018]

DGPM, para consultas sobre Economia Azul e ENM 2013/2020, disponível em: <https://www.dgpm.mm.gov.pt/politicas-e-instrumentos>

DGRM (2014). Plano Estratégico para Aquicultura Portuguesa 2014-2020. Direção geral dos Recursos Naturais, Segurança e Serviços Marítimos, Ministério da Agricultura e do Mar, 85p.

DGRM (2014). *Plano Estratégico para Aquicultura Portuguesa 2014-2020*. Direção geral dos Recursos Naturais, Segurança e Serviços Marítimos, Ministério da Agricultura e do Mar, 85p.

DGRM (Direção Geral de Recursos Naturais, Segurança e Serviços Marítimos). 2013. Plano Estratégico para a Aquicultura Portuguesa 2014-2020. [Portuguese] Direção Geral de Recursos Naturais, Segurança e Serviços Marítimos. [online] Available at: https://www.dgrm.mm.gov.pt/xportal/xmain?xpid=dgrm&xpgid=genericPageV2&conteudoDetalhe_v2=4829995. [10 April 2017]

- DGRM, DROTA (2018) – Plano de Situação do Ordenamento do Espaço Marítimo, versão para consulta pública. Disponível em: <http://www.participa.pt/consulta.jsp?loadP=2249>
- DGRM, para consulta de regras e procedimentos, disponível em: www.dgrm.mm.gov.pt
- Diário da República nº137/1995, Série I-B de 1995
- Diário da República nº196/1993, série I-A de 1993
- Direção Geral de Recursos Naturais, Segurança e Serviços Marítimos, *Aquicultura e Salicultura*. Disponível em: <https://www.dgrm.mm.gov.pt/web/guest/aquicultura1>
- Dworschak, P.C., Wirtz, P., 2010. Discovery of the rare burrowing shrimp *Callinasturus charcoti* de Saint Laurent, 1973 (Decapoda: Axiidea: Callinasturidae) in shallow water: first record of the infraorder for Madeira Island. *Zootaxa* 2691, 53–56.
- Ehler, C. e Douvère, F. (2007). Visions for a Sea Change. Report of the First International Workshop on Marine Spatial Planning. UNESCO. Paris.
- Frazão, C. (2016a). Marine spatial planning in Portugal: an ocean policy analysis. Tese de Doutoramento em Ciências do Mar. Faculdade de Ciências, Universidade de Lisboa. 271 pp.
- EMEPC - Estrutura de Missão para a Extensão da Plataforma Continental (2015). Acedido a 29 de março de 2018, em: <https://www.emepc.pt/>.
- EMEPC, para assuntos relacionados com a extensão da plataforma, disponível em: <https://www.emepc.pt/pt/a-submissao-portuguesa>
- ESCA Article “Submarine Power Cables Ensuring the lights stay on!”
- Espaço Aquicultura, *A produção. Como evoluiu*. Disponível em: <http://eaquicultura.pt/aquicultura-em-portugal/caracterizacao-geral/>
- EurOcean – The European Centre for Information on Marine Science and Technology. Acedido a 29 de março de 2018, em: <http://www.eurocean.org/>.
- European Commission (2018). *Policy and strategy for raw materials*. Acedido a 19 de abril de 2018, em: https://ec.europa.eu/growth/sectors/raw-materials/policy-strategy_en.
- European Commission. 2011. Developing a maritime strategy for the Atlantic Ocean area: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Luxembourg: Publications Office of the European Union.
- European Commission. 2013. Action plan for a maritime strategy in the Atlantic area: Delivering smart, sustainable and inclusive growth: communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Luxembourg: Publications Office of the European Union.
- European Commission. 2018. Maritime affairs: Integrated maritime policy. https://ec.europa.eu/maritimeaffairs/policy_en [15 March 2018]
- European Union. 2008. Directive 2008/56/EC of the European Parliament and of the Council of establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive). Official Journal of the European Union. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32008L0056> [13 April 2018]
- European Union. 2011. The EU Biodiversity Strategy to 2020. Luxembourg: Publications Office of the European Union, 2011.

- http://ec.europa.eu/environment/nature/info/pubs/docs/brochures/2020%20Biod%20brochure_en.pdf
[12 April 2018]
- European Union. 2013. Regulation No 1380/2013 Of The European Parliament and of the Council on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC. Official Journal of the European Union, L 354/22.
- European Union. 2014. Directive 2014/89/EU of the European Parliament and of the Council establishing a framework for maritime spatial planning. Official Journal of the European Union. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.257.01.0135.01.ENG [13 April 2018]
- Fallon, S.J., James, K., Norman, R., Kelly, M., Ellwood, M.J. (2010). A simple radiocarbon dating method for determining the age and growth rate of deep-sea sponges. *Nucl. Instruments Methods Phys. Res. Sect. B Beam Interact. with Mater. Atoms*, 268, 1241–1243. doi:10.1016/j.nimb.2009.10.143
- FAO (2009): International Guidelines for the Management of Deep-sea Fisheries in the High Seas, FAO Fisheries Report No. 888, FAO, Rome.
- FAO (2014). The State of World Fisheries and Aquaculture (2014). Opportunities and Challenges. URL: www.fao.org/3/a-i3720e.pdf
- FAO (2014). *The State of World Fisheries and Aquaculture (2014). Opportunities and Challenges*. Disponível em: www.fao.org/3/a-i3720e.pdf
- Ferreira, S.J.F., 2013. Contributo para o estudo das macroalgas do intertidal da ilha da Madeira: diversidade, distribuição e sazonalidade (Tese de Mestrado). Universidade da Madeira.
- Food and Agriculture Organization of the United Nations (2008) - *Orientações para a gestão das pescarias de fundo em alto-mar*.
- Fransen, C.H.J.M. and Wirtz, P., 1997. Contribution to the knowledge of decapod crustaceans from Madeira and the Canary Islands. *Zool Mededel* 71, 215–230.
- FREITAS, L.; DINIS, A.; NICOLAU, C.; ALVES, F.; RIBEIRO, C. (2013) - Mar da Madeira um oásis a conservar - baleias e golfinhos da Madeira, Museu da Baleia da Madeira, Meio/Eco do Funchal.
- Freitas, M. & M. Biscoito (2007) Four Chondrichthyes new for the archipelago of Madeira and adjacent seamounts (NE Atlantic Ocean). *Bocagiana*, 221: 1-7.
- Freitas, M. N. B., 2009. On the occurrence of *Cymatium martinianum* (d'Orbigny, 1847) (Gastropoda, Ranellidae) in the island of Madeira (NE Atlantic Ocean). *Bocagiana*, 1–6.
- Freitas, M., A. J. Almeida, J. Delgado, J. A. González, J. I. Santana and M. Biscoito (2011) First record of *Hydrolagus affinis* (Holocephali: Chimaeriformes: Chimaeridae) from Madeira and the Seine Seamount (North Atlantic Ocean). *Acta Ichthyologica et Piscatoria*, 41(3): 255-257.
- Freitas, Mafalda (2016), *Roteiro de Mergulho em Naufrágios da Madeira*, Revista Anual do Clube Naval do Funchal.
- GEOATRIBUTO (2016), *Plano de Gestão da Região Hidrográfica do Arquipélago da Madeira 2016-2021*, Funchal: Secretaria Regional do Ambiente e Recursos Naturais.
- George, K. H. (2014) Research Cruise P466 [POS466] of German Research Vessel POSEIDON Cruise Report. Deutsche Zentrum für Marine Biodiversitätsforschung, Senckenberg am Meer, Wilhelmshaven, Germany. 19 pp.

- Glover, A., Paterson, G., Bett, B. J., Gage, J. D., Sibuet, M., Shearer, M., & Hawkins, L., 2001. Patterns in polychaete abundance and diversity from the Madeira Abyssal Plain, northeast Atlantic. *Deep-sea Research I*, 48, 217-236.
- Gofas, S. and Salas, C., 2008. A review of European “*Mysella*” species (Bivalvia, Montacutidae), with description of *Kurtiella* new genus. *J. Molluscan Stud.* 74, 119–135. doi:10.1093/mollus/eym053.
- Gomes, A., Avelar, D., Duarte Santos, F., Costa, H. e Garrett, P. (Editores) (2015). *Estratégia de Adaptação às Alterações Climáticas da Região Autónoma da Madeira*. Secretaria Regional do Ambiente e Recursos Naturais.
- Gould, J., Gulden, G., 2009. Description of a new species of *Glycymeris* (Bivalvia: Arcoidea) from Madeira, Selvagens and Canary Islands. *Zool Med Leiden*, 83, 1059–1066.
- Gouveia, N. M. A., Andrade, C. A. P. (1999). Development of Aquaculture in Madeira Archipelago: Past Trends and Future Perspectives. In Journées Aquacoles de l’Océan Indien 1999 – Réalités et perspectives de développement de l’aquaculture dans le sud-ouest de l’Océan Indien, Ile de La Reunion, Sains-Leu, 31 May – 3 Juin 1999, Actes de Colloque, pp. 198-203.
- GRID-Arendal (2014). *Deep Sea Minerals*. Acedido a 29 de março de 2018, em: <http://www.grida.no/publications/184>.
- Hein, J.R., A. Koschinsky (2014). 13.11 - *Deep-Ocean Ferromanganese Crusts and Nodules*. Treatise on Geochemistry (Second Edition). Elsevier. 273-291. 10.1016/B978-0-08-095975-7.01111-6.
- Hein, J.R., Conrad T.A., Dunham, R.E., (2009). Seamount Characteristics and Mine-Site Model Applied to Exploration- and Mining-Lease-Block Selection for Cobalt-Rich Ferromanganese Crusts. *Marine Georesources and Geotechnology*, 27, 160-176. 10.1080/10641190902852485.
- Hein, J.R., Mizell, K., Koschinsky, A., Conrad, A.T., (2012). Deep-ocean mineral deposits as a source of critical metals for high- and green-technology applications: Comparison with land-based resources. *Ore Geology Reviews*, 51, 1–14. 10.1016/j.oregeorev.2012.12.001.
- Hein, J.R., Mizell, K., Koschinsky, A., Conrad, A.T., (2012). *Deep-ocean mineral deposits as a source of critical metals for high- and green-technology applications: Comparison with land-based resources*. *Ore Geology Reviews*, 51, 1–14. 10.1016/j.oregeorev.2012.12.001.
- Herring, P. J., 1990. Comparative benthic biology at 31°N 20°W (Madeira abyssal plain) and associated midwater studies. *Inst. Oceanogr. Sci. Deac. Lab.*, 219, 5-24.
- Hirsch, S., Martin, B. & Christiansen, B. (2009) Zooplankton metabolism and carbon demand at two seamounts in the NE Atlantic. *Deep Sea Research II*, 56: 2656-2670.
- IMMS - International Marine Minerals Society (2014). *Code for Environmental Management*: Acedido a 29 de março de 2018, em: http://www.immsoc.org/IMMS_code.htm.
- INIP (1980) Programa de apoio às pescas na Madeira - I. Cruzeiro de reconhecimento de pesca e oceanografia 020080779. Relatórios Técnicos e Administrativos do INIP, 3. INIP, Lisboa. 141 pp.
- INIP (1982) Programa de apoio às pescas na Madeira - II. Cruzeiro de reconhecimento de pesca e oceanografia 020170680. Cruzeiro de reconhecimento de pesca e oceanografia 020241180. Relatórios INIP, 11. Relatórios do INIP, Lisboa. 220 pp.
- INIP (1984) Programa de apoio às pescas na Madeira - IV. Cruzeiro de reconhecimento de pesca e oceanografia 020390582. Relatórios INIP, 25. INIP, Lisboa. 125 pp.
- INSTITUTO DE DESENVOLVIMENTO REGIONAL, IP-RAM (2014) – *Programa Operacional da Região Autónoma da Madeira 2014-2020*.

INSTITUTO DE FLORESTAS E CONSERVAÇÃO DA NATUREZA – *Plano de Ordenamento e Gestão das Ilhas Desertas.*

INSTITUTO DE FLORESTAS E CONSERVAÇÃO DA NATUREZA – *Plano de Ordenamento e Gestão das Ilhas Selvagens.*

Instituto de Florestas e Conservação da Natureza, <http://www2.icnf.pt/portal/pesca>

Instituto Hidrográfico – Divisão de Geologia Marinha (2002) - Levantamento geofísico para caracterização de depósitos sedimentares na Costa Sul da Ilha da Madeira. Projeto GM4102/2002, relatório técnico final, REL.TF.GM.01/02.

Instituto Hidrográfico – DIVISÃO DE GEOLOGIA MARINHA (2003) - Dinâmica sedimentar da costa sul da ilha da Madeira. Projeto GM4103/2003, relatório técnico final. REL.TF.GM.02/03.

Instituto Hidrográfico – DIVISÃO DE GEOLOGIA MARINHA (2007) - Dinâmica sedimentar da costa sul da ilha da Madeira (Cabo Girão à Ponta de S. Lourenço), Projeto GM52OP02, relatório técnico final, REL.TF.GM.02/07.

Instituto Hidrográfico – Divisão de Geologia Marinha (2008) – Caracterização dos depósitos sedimentares da plataforma insular sul da ilha do Porto Santo. Projeto GM 52OP02., REL.TF.GM.01/08.

Instituto Superior Técnico – MARETEC (2012). Análise do impacto da rejeição de efluentes resultantes do tratamento de águas residuais urbanas em meio marinho na Ilha da Madeira. Relatório Julho 2008 – setembro 2011. Janeiro de 2012.

IPMA, para questões de informação e divulgação técnica, disponível em: www.ipma.pt

ISA - International Seabed Authority (2018). ISBA 18/A/11, Decision of the Assembly of the International Seabed Authority relating to the Regulations on Prospecting and Exploration for Cobalt-rich Ferromanganese Crusts in the Area. Acedido a 29 de março de 2018, em: <https://www.isa.org.jm/documents/isba18a11>.

ISA - International Seabed Authority (2018). ISBA/19/C/17, *Decision of the Council of the International Seabed Authority relating to amendments to the Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area and related matters.* Acedido a 29 de março de 2018, em: <https://www.isa.org.jm/documents/isba19c17>.

Jesus, D. C.; Abreu, A.D., 1998. Contribution to the knowledge of the soft bottom echinoderms of Madeira island. *Bol. Mus. Munic. Funchal* 50, 59–69.

Jones P.J.S. (2014). *Governing Marine Protected Areas - Resilience through diversity.* Earthscan/Routledge.

Koslow, J. A., Gowlett-Holmes, K., Lowry, J. K., O’Hara, T., Poore, G. C. B., and Williams, A.: Seamount benthic macrofauna off Tasmania: community structure and impacts of trawling, *Mar. Ecol-Prog. Ser.*, 213, 111–125, 2001.

Kuhn, T., Halbach, P. & Maggiulli, M. (1996) Formation of ferromanganese microcrusts in relation to glacial/interglacial stages in Pleistocene sediments from Ampere Seamount (Subtropical NE Atlantic). *Chemical Geology*, 130: 217-232.

Laboratório Nacional de Engenharia Civil - *Estudo de Manutenção e Melhoramento da Praia do Porto Santo.*

Larsen, K., 2012. Tanaidacea (Peracarida) from Macaronesia I. The deep-water fauna off the Selvagen Islands, Portugal. *Crustaceana*, 85(4-5): 571-589.

Le Gouvello, R., Hochart, L.-E., Laffoley, D., Simard, F., Andrade, C., Angel, D., Callier, M., De Monbrison, D., Fezzardi, D., Haroun, R., Harris, A., Hughes, A., Massa, F., Roque, E., Soto, D., Stead, S., Marino, G. (2017). Aquaculture and marine protected areas: Potential opportunities and synergies. *Aquatic Conservation: Marine and Freshwater Ecosystems*. 2017;27(S1):138–150. DOI: 10.1002/aqc.2821

- Lei n.º 24/2013, Aprova o regime jurídico aplicável ao mergulho recreativo em todo o território nacional, em conformidade com o Decreto -Lei n.º 92/2010, de 26 de julho, que transpõe a Diretiva n.º 2006/123/ CE, do Parlamento Europeu e do Conselho, de 12 de dezembro, relativa aos serviços no mercado interno, com a Lei n.º 9/2009, de 4 de março, que transpõe a Diretiva n.º 2005/36/CE, do Parlamento Europeu e do Conselho, de 7 de setembro, relativa ao reconhecimento das qualificações profissionais, e com o Decreto -Lei n.º 92/2011, de 27 de julho, que cria o Sistema de Regulação de Acesso a Profissões (SRAP) de 20 de março. Portugal: Assembleia da República, Diário da República, 1.ª série, n.º 56, pp. 1767 -1775.
- Lei n.º 24/2013, Aprova o regime jurídico aplicável ao mergulho recreativo em todo o território nacional, em conformidade com o Decreto -Lei n.º 92/2010, de 26 de julho, que transpõe a Diretiva n.º 2006/123/ CE, do Parlamento Europeu e do Conselho, de 12 de dezembro, relativa aos serviços no mercado interno, com a Lei n.º 9/2009, de 4 de março, que transpõe a Diretiva n.º 2005/36/CE, do Parlamento Europeu e do Conselho, de 7 de setembro, relativa ao reconhecimento das qualificações profissionais, e com o Decreto -Lei n.º 92/2011, de 27 de julho, que cria o Sistema de Regulação de Acesso a Profissões (SRAP) de 20 de março. Portugal: Assembleia da República, Diário da República, 1.ª série, n.º 56, pp. 1767 -1775.
- Lei n.º 31/2014 cria a Lei de bases gerais da política pública de solos, de ordenamento do território e de urbanismo, 30 de maio. Portugal: Assembleia da República, Diário da República, 1ª série, n.º 104 pp. 2988 – 3003.
- Lei n.º 58/2005 que Aprova a Lei da Água, transpondo para a ordem jurídica nacional a Diretiva n.º 2000/60/CE, do Parlamento Europeu e do Conselho, de 23 de Outubro, e estabelecendo as bases e o quadro institucional para a gestão sustentável das águas, 29 de Dezembro. Portugal: Diário da República, 1ª série – A, n.º 249, pp. 7280 – 7310.
- LEI nº 17/2014, de 10 de abril de 2014. Portugal: Diário da República, 1ª série, nº 71, p. 2358-2362.
- Lei nº49/2006, Estabelece medidas de proteção da orla costeira, de 29 de agosto. Portugal, Região Autónoma da Madeira, Assembleia Legislativa, Diário da República, 1ª Série. n.º 166/2006.
- Lopes, M. I. (2016). Proposta para a Constituição de um Cluster do Mar na Região Autónoma da Madeira e o papel desempenhado pelo Ordenamento do Espaço Marítimo, Tese de Mestrado em Gestão do Território – Território e Desenvolvimento, Universidade Nova de Lisboa – Faculdade de Ciências Sociais e Humanas, Lisboa
- Luís, A.T., Ferreira, F. & Azevedo, R. 2014. Biotecnologia marinha: Um setor emergente no âmbito do Cluster do Conhecimento e Economia do Mar, Boletim de Biotecnologia, Sociedade Portuguesa de Biotecnologia, Série 2(5), 6-7.
- Lukens, R.R.; Selberg, C. (2004) Guidelines for marine artificial reef materials Second Edition Compiled by the Artificial Reef Subcommittees of the Atlantic and Gulf States Marine Fisheries Commissions, Project Coordinators January 2004. Pp 198.
- Marova, N. A. & Yevsyukov, Y. D. (1987) The geomorphology of the Ampere Submarine Seamount (in the Atlantic Ocean). *Oceanology*, 27: 452-455.
- Martin, B. & Christiansen, B. (2009) Distribution of zooplankton biomass at three seamounts in the NE Atlantic. *Deep Sea Research II*, 56: 2671-2682.
- Martins, A.M., A. S. B. Amorim, M. P. Figueiredo, R. J. Souza, A. P. Mendonça, I. L. Bashmachnikov, and D. S. Carvalho, 2007. Sea surface temperature (AVHRR, MODIS) and ocean colour (MODIS) seasonal and interannual variability in the Macaronesian islands of Azores, Madeira, and Canaries, Proc. SPIE Vol. 6743, 67430A (Oct. 10, 2007), 15 pp.2007 | conference-paper. DOI: 10.1117/12.738373

- McCarthy, A.L., Heppell, S., Royer, F., Freitas, C. & Dellinger, T. 2010. Identification of likely foraging habitat of pelagic loggerhead sea turtles (*Caretta caretta*) in the North Atlantic through analysis of telemetry track sinuosity. *Prog. Oceanog.* 86, 224-231.
- McCarthy, A.L., Heppell, S.S., Dellinger, T. & Royer, F. 2008: Getting the most out of satellite tags: how do we know what turtles are attracted to in the open sea? 27th Annual Symposium on Sea Turtle Biology and Conservation, Myrtle Beach, South Carolina, USA, 22-28 February 2007 (Rees, A.F., Frick, M., Panagopoulou, A. & William, K. eds). *NOAA Technical Memorandum NMFS-SEFSC-569*, 48.
- Medel, M.D., Vervoort, W., 2000. Atlantic Haleciidae and Campanulariidae (Hydrozoa, Cnidaria) collected during the CANCAP and Mauritania-II expeditions of the National Museum of Natural History, Leiden, The Netherlands, *Zoologische verhandelingen*. Nationaal Natuurhistorisch Museum, Leiden.
- MENDES, J. M. M., OLIVEIRA, F. (coord.) (2002) - *Plano de Política Energética da Região Autónoma da Madeira*, Agência Regional da Energia e Ambiente da Região Autónoma da Madeira, maio 2002.
- Menezes, G.M., H.M. da Silva H. Krug, E. Balguerías, J. Delgado, J.G. Pérez, I.L. Soldevilla, J.L. Nespereira, D. Carvalho & J.S. Morales. 1997: Design Optimization and Implementation of Demersal Survey Cruises in the Macaronesian Archipelagos (Final Report). Arquivos do DOP, Série: Relatórios Internos, Biblioteca da DSIP, 162 pp.
- Menezes, G.M., J. Delgado, H. Krug, M.R. Pinho, H.M. da Silva e D. Carvalho .1998. Design Optimisation and Implementation of Demersal Cruise Surveys in the Macaronesian Archipelagos II (Final Report). Biblioteca da DSIP. 160 pp.
- MIDAS (2018). Managing Impacts of Deep-sea resource exploitation. Acedido a 29 de março de 2018, em: <http://www.eu-midas.net/>
- MIDAS (2018). *Managing Impacts of Deep-sea resource exploitation*. Acedido a 29 de março de 2018, em: <http://www.eu-midas.net/>
- Morato, T., Hoyle, S. D., Allain, V. & Nicol, S. J. (2010) Seamounts are hotspots of pelagic biodiversity in the open ocean. *Proceedings of the National Academy of Sciences*, doi:10.1073/pnas.0910290107.
- Muiños, S.B.; Hein, J.R.; Frank, M; Monteiro, J.H.; Gaspar, L.; Conrad, T.; Garcia Pereira, H. and F. Abrantes, (2013). Deep-sea Fe-Mn crusts from the northeast Atlantic Ocean: Composition and resource considerations. *Marine Georesources & Geotechnology*, 31:1, 40-70. 10.1080/1064119X.2012.661215.
- Muiños, S.B.; Hein, J.R.; Frank, M; Monteiro, J.H.; Gaspar, L.; Conrad, T.; Garcia Pereira, H. and F. Abrantes, (2013). *Deep-sea Fe-Mn crusts from the northeast Atlantic Ocean: Composition and resource considerations*. *Marine Georesources & Geotechnology*, 31:1, 40-70. 10.1080/1064119X.2012.661215.
- MUNICÍPIA E UNIVERSIDADE NOVA DE LISBOA – FACULDADE DE CIÊNCIAS E TECNOLOGIA (2017) - *Plano de Gestão de Riscos e Inundações da Região Autónoma da Madeira (PGRI – RAM)*, Funchal: Secretaria Regional do Ambiente e Recursos Naturais.
- Nautilus (2018). Solwara 1 Project. Acedido a 29 de março de 2018, em: <http://www.cares.nautilusminerals.com/irm/content/solwara-1-project.aspx?RID=339>
- Nishi, E., Núñez, J., 1999. A new species of shallow water Sabellariidae (Annelida: Polychaeta) from Madeira Island, Portugal, and Canary Islands, Spain.
- Noiva, J., Ribeiro, C., Terrinha, P., Neres, M. & Brito, P. (2017). Exploração de recursos minerais na plataforma continental do Alentejo e alterações ambientais no Plio-Quaternário: resultados preliminares da campanha MINEPLAT. *Comunicações Geológicas* (2017) 104, 1. Versão online: <http://www.lneg.pt/iedt/unidades/16/paginas/26/30/247>

- Ocaña, O., Wirtz, P., 2007. New records of Pennatulacea (Cnidaria, Octocorallia) from Madeira island. *Arquipél. - Life Mar. Sci.* 24, 49–51.
- OLIVEIRA das NEVES, A. e FIGUEIRA DE SOUSA, J. (coord.) (2015). *Plano Referencial Estratégico Mar Madeira*.
- Packmor, J. 2013. Rhizotrichidae Por, 1986 (Copepoda: Harpacticoida) of Madeira and Porto Santo: description of two new species of the genus *Tryphoema* Monard, 1926. *Marine Biodiversity* 43, 341–361. doi:10.1007/s12526-013-0161-8
- Palmero, A.M., Martínez, A., Brito, M. del C., Núñez, J., 2008. Acoetidae (Annelida, Polychaeta) from the Iberian Peninsula, Madeira and Canary islands, with description of a new species. *Arquipélago Life Marine Sciences*, 25, 49–62.
- Pham CK, Diogo H, Menezes G, Porteiro FM, Braga-Henriques A, Vandeperre F, and Morato T (2014), Deep-water longline fishing has reduced impact on Vulnerable Marine Ecosystems. *Scientific Reports*, 4, 4837, 1-6, doi: 10.1038/srep04837
- Pascual, M., Núñez, J., Brito, M. C., and Riera, R., (2001). Ctenodrílidos y Cirratúlidos (Annelida: Polychaeta) asociados a demosponjas litorales de Canarias Y Madeira. *Revista da Academia Canaria de Ciencias* XIII, 49–59.
- Pham CK, Diogo H, Menezes G, Porteiro FM, Braga-Henriques A, Vandeperre F, and Morato T (2014), Deep-water longline fishing has reduced impact on Vulnerable Marine Ecosystems. *Scientific Reports*, 4, 4837, 1-6, doi: 10.1038/srep04837
- Portaria 114/2014, de 28 de maio. Portugal: Ministério da Agricultura e do Mar, Diário da República, 1.ª série, n.º 102.
- Portaria 1450/2007, de 12 de novembro. Portugal: Ministério do Ambiente, do Ordenamento do Território e do Desenvolvimento Regional, Diário da República, 1.ª série, n.º 217.
- Portaria 1450/2007, de 12 de novembro. Portugal: Ministério do Ambiente, do Ordenamento do Território e do Desenvolvimento Regional, Diário da República, 1.ª série, n.º 217.
- Portaria 568/95, de 16 de junho. Portugal: Presidência do Conselho de Ministros, Diário da República, 1ª série – B, nº13, pp. 3870 – 3879.
- Portaria 568/95, de 16 de junho. Portugal: Presidência do Conselho de Ministros, Diário da República, 1ª série – B, nº13, pp. 3870 – 3879.
- Portaria n.º 13/2015, Primeira alteração à Portaria n.º 46/2014, de 22 de abril, que define a “capacidade de carga” inerente à atividade de observação de cetáceos na Região Autónoma da Madeira, de 14 de janeiro. Região Autónoma da Madeira: Jornal Oficial da Região Autónoma da Madeira, 1.ª série, n.º 7.
- Portaria n.º 46/2014, Regula a “capacidade de carga” inerente à atividade de observação de cetáceos na Região Autónoma da Madeira, de 22 de abril. Região Autónoma da Madeira: Jornal Oficial da Região Autónoma da Madeira, 1.ª série, n.º 58.
- Portaria n.º 510/2017 que fixa as taxas devidas para a extração de materiais inertes no leito das águas do mar, bem como para a recolha de calhau rolado, para vigorarem durante o ano de 2018, de 29 de dezembro. Portugal, Região Autónoma da Madeira, Vice-Presidência do Governo Regional e Secretaria Regional do Ambiente e Recursos Naturais, Jornal oficial
- PROCESL e PROSISTEMAS (2003) - *Plano Regional da Água da Madeira*, Funchal: Secretaria Regional do Ambiente e Recursos Naturais.
- Quartau R., Ramalho, R.S., Madeira, J. et al, (2018) – Gravitational erosional and depositional processes on volcanic ocean islands: Insights from the submarine morphology of Madeira Archipelago, earth and Planetary Science Letters, 482, pp.288-299.

- Reed, J. K. & Pomponi, S. A., 1991. Eastern Atlantic expedition: Submersible and scuba collections for bioactive organisms from the Azores to western Africa. *International Pacifica Scientific Diving*, 1991. *Proceedings of the American Academy of Underwater Sciences eleventh annual Scientific Diving Symposium*, 65-74.
- Regulamento (CE) n.º 850/98 do Conselho de 30 de março de 1998 relativo à conservação dos recursos da pesca através de determinadas medidas técnicas de proteção dos juvenis de organismos marinhos, *Jornal Oficial da União Europeia*
- REGULAMENTO (UE) 2016/2336 DO PARLAMENTO EUROPEU E DO CONSELHO de 14 de dezembro de 2016 que estabelece condições específicas para a pesca de unidades populacionais de profundidade no Atlântico Nordeste e disposições aplicáveis à pesca em águas internacionais do Atlântico Nordeste e que revoga o Regulamento (CE) n.º 2347/2002 do Conselho. *Jornal Oficial da União Europeia*, L 354/1.
- REGULAMENTO (UE) N.º 1380/2013 DO PARLAMENTO EUROPEU E DO CONSELHO de 11 de dezembro de 2013 relativo à política comum das pescas, que altera os Regulamentos (CE) n.º 1954/2003 e (CE) n.º 1224/2009 do Conselho e revoga os Regulamentos (CE) n.º 2371/2002 e (CE) n.º 639/2004 do Conselho e a Decisão 2004/585/CE do Conselho. *Jornal Oficial da União Europeia*, L 354/22.
- REGULAMENTO (UE) N.º 227/2013 DO PARLAMENTO EUROPEU E DO CONSELHO de 13 de março de 2013 que altera o Regulamento (CE) n.º 850/98 do Conselho relativo à conservação dos recursos da pesca através de determinadas medidas técnicas de proteção dos juvenis de organismos marinhos, *Jornal Oficial da União Europeia*, L 78/1.
- Resolução da Assembleia da República 51/2006, de 18 de julho. Portugal: Assembleia da República, *Diário da República*, Série I-A n.º 137.
- Resolução da Assembleia da República n.º 60-B/97, Aprova, para ratificação, a Convenção das Nações Unidas sobre o Direito do Mar e o Acordo Relativo à Aplicação da Parte XI da mesma Convenção, de 14 de Outubro.
- Resolução da Assembleia da República nº60-B/97 que Aprova, para Ratificação, a Convenção das Nações Unidas sobre o Direito do Mar e o Acordo Relativo à Aplicação da Parte XI da mesma Convenção. Portugal: *Diário da República*: 1.ª série – A, p. 5486(3) – 5486(192)
- Resolução da assembleia da república nº60-B/97 que Aprova, para Ratificação, a Convenção das Nações Unidas sobre o Direito do Mar e o Acordo Relativo à Aplicação da Parte XI da mesma Convenção. Portugal: *Diário da República*: 1.ª série – A, p. 5486(3) – 5486(192)
- Resolução do Conselho de Governo n.º1291/2009, de 2 de outubro. Região Autónoma da Madeira: *Jornal Oficial da Região Autónoma da Madeira*, 1.ª série, n.º 100.
- Resolução n.º 699/2016 de 17 de outubro. Região Autónoma da Madeira: *Jornal Oficial da Região Autónoma da Madeira*, 1.ª série, n.º 181.
- Resolução n.º 1025/2016, Aprova o Plano de Ordenamento para a Aquicultura Marinha da Região Autónoma da Madeira (POAMAR), que constitui um instrumento de apoio ao desenvolvimento da atividade da aquicultura marinha regional, de 28 de dezembro. Região Autónoma da Madeira: *Jornal Oficial da Região Autónoma da Madeira*, 1.ª série, n.º 227.
- Resolução n.º 211/2017, Aprova a 1.ª alteração ao Plano de Ordenamento para a Aquicultura Marinha da Região Autónoma da Madeira (POAMAR), que constitui um instrumento de apoio ao desenvolvimento da atividade da aquicultura marinha regional. Região Autónoma da Madeira: *Jornal Oficial da Região Autónoma da Madeira*, 1.ª série, n.º 67.
- Resolução n.º 294/2009, Aprova o Plano de Ordenamento e Gestão da Ponta de São Lourenço (POGPSL), de 29 de dezembro. Região Autónoma da Madeira: *Jornal Oficial da Região Autónoma da Madeira*, 1.ª série, n.º 100.

- Resolução n.º 61/105, de 8 de Dezembro de 2006, da Assembleia Geral das Nações Unidas, parágrafos 80 e 83, alínea c) (A/RES/61/105, publicada em 6 de Março de 2007).
- Resolução n.º 70/2009, Aprova as medidas de propostas no Programa de Medidas de Gestão e Conservação do sítio de importância comunitária “Ilhéu da Viúva (PTMAD0004)”. Região Autónoma da Madeira: Jornal Oficial da Região Autónoma da Madeira, 2.ª série, n.º 119.
- Resolução n.º 882/2010, Aprova o Plano Especial de Ordenamento e Gestão do Território da Reserva Natural Parcial do Garajau (PEOGRNPG), cujo Regulamento e respetivas Plantas de Síntese e de Condicionantes, 12 de agosto. Região Autónoma da Madeira: Jornal Oficial da Região Autónoma da Madeira, 1.ª série, n.º 70.
- Ribeiro, C. C. 2008. *Comparison of rocky reef fish communities among protected, unprotected and artificial habitats in Madeira island coastal waters using underwater visual techniques*. PhD Thesis, Faculdade de Ciências da Universidade de Lisboa Lisboa.
- Roark, E.B., Guilderson, T.P., Dunbar, R.B., Fallon, S.J., Mucciarone, D.A. (2009). Extreme longevity in proteinaceous deep-sea corals. *Proc. Natl. Acad. Sci. U. S. A.*, 106, 5204–5208. doi:10.1073/pnas.0810875106
- Roberts, J.M., Wheeler, A.J., Freiwald, A., Cairns, S.D. (2009). *Cold-water corals: the biology and geology of deep-sea coral habitats*. Cambridge University Press, Cambridge.
- Saldanha, L., 1982. Remarques sur *Taenioconger longissimus* et *Paraconger macrops* a Madère (Pisces, Congridae). *Cybiu* 6, 3–14.
- SALGADO, A.; CLAUDIA, F. et al, O que é o Património Cultural Subaquático, Comissão Nacional da UNESCO – Ministério dos Negócios Estrangeiros, Grafilinha, 2016.
- Sampaio Í, Braga-Henriques A, Pham C, Ocaña O, de Matos V, Morato T, and Porteiro F (2012). Cold-water corals landed by bottom longline fishery in the Azores. *Journal of the Marine Biological Association of the United Kingdom*, 92, 1547-1555. doi:10.1017/S0025315412000045
- Santos, A., Calado, R., Araújo, R., 2008. First record of the genus *Periclimenaeus* Borradaile, 1815 (Decapoda: Palaemonidae: Pontoninae) in the northeastern Atlantic, with the description of a new species, *Periclimenaeus aurae*. *Journal Crustacean Biology* 28, 156–166.
- SANTOS, R., GANHO, R., ANTUNES, P., SANTOS, R., SARINHA, J., JORDÃO, L. (1999) – Plano Estratégico de Resíduos da Região Autónoma da Madeira, Universidade Nova de Lisboa, Faculdade de Ciências e Tecnologia, Secretaria Regional do Equipamento Social e Ambiente do Governo Regional da Madeira.
- SERVIÇO DO PARQUE NATURAL DA MADEIRA – *Plano de Ordenamento e Gestão da Ponta de São Lourenço*.
- SERVIÇO DO PARQUE NATURAL DA MADEIRA – *Plano de Ordenamento e Gestão da Rede de Áreas Marinhas Protegidas do Porto Santo*.
- SERVIÇO DO PARQUE NATURAL DA MADEIRA – *Plano Especial de Ordenamento e Gestão da Reserva Natural Parcial do Garajau*.
- SERVIÇO DO PARQUE NATURAL DA MADEIRA – *Programa de Medidas de Gestão e conservação do Sítio da Rede Natura 2000*.
- Silva, J., 2015. Os Cruzeiros de Investigação Científica Estrangeiros nas Zonas Marítimas Sob Soberania ou Jurisdição Portuguesa, *Revista de Ciências Militares*, novembro de 2015 III (1), pp. 241-267.
- SOPHIA - Conhecimento para a Gestão do Ambiente Marinho (2015). Acedido a 29 de março de 2018, em: <https://www.sophia-mar.pt/>
- Soto, D., Aguilar-Manjarrez, J., Brugère, C., Angel, D., Bailey, C., Black, K., Edwards, P., Costa-Pierce, B., Chopin, T., Deudero, S., Freeman, S., Hambrey, J., Hishamunda, N., Knowler, D., Silvert, W., Marba, N., Mathe, S.,

- Norambuena, R., Simard, F., Tett, P., Troell, M. & Wainberg, A. 2008. Applying an ecosystem-based approach to aquaculture: principles, scales and some management measures. In D. Soto, J. Aguilar-Manjarrez and N. Hishamunda (eds). Building an ecosystem approach to aquaculture. FAO/Universitat de les Illes Balears Expert Workshop. 7–11 May 2007, Palma de Mallorca, Spain. FAO Fisheries and Aquaculture Proceedings. No. 14. Rome, FAO. pp. 15–35.
- Soto, D., Aguilar-Manjarrez, J., Brugère, C., Angel, D., Bailey, C., Black, K., Edwards, P., Costa-Pierce, B., Chopin, T., Deudero, S., Freeman, S., Hambrey, J., Hishamunda, N., Knowler, D., Silvert, W., Marba, N., Mathe, S., Norambuena, R., Simard, F., Tett, P., Troell, M. & Wainberg, A. 2008. Applying an ecosystem-based approach to aquaculture: principles, scales and some management measures. In D. Soto, J. Aguilar-Manjarrez and N. Hishamunda (eds). Building an ecosystem approach to aquaculture. FAO/Universitat de les Illes Balears Expert Workshop. 7–11 May 2007, Palma de Mallorca, Spain. FAO Fisheries and Aquaculture Proceedings. No. 14. Rome, FAO. pp. 15–35.
- Sousa, R., P. Henriques, M. Biscoito, A. R. Pinto, J. Delgado, T. Dellinger, L. Gouveia & M. R. Pinho, 2014. Considerations on the biology of *Plesionika narval* (Fabricius, 1787) in the Northeastern Atlantic. *Turkish Journal of Fisheries and Aquatic Sciences*, 14: 727-737.
- Sousa, R., P. Henriques, M. Biscoito, A. R. Pinto, J. Delgado, T. Dellinger, L. Gouveia & M. R. Pinho, 2014. Considerations on the biology of *Plesionika narval* (Fabricius, 1787) in the Northeastern Atlantic. *Turkish Journal of Fisheries and Aquatic Sciences*, 14: 727-737.
- Thompson, A., Sanders, J. Tandstad, M. Carocci, F. (2016) – *Vulnerable Marine Ecosystems: Processes and Practices in the High Seas*, FAO Fisheries and Aquaculture Technical Paper, n.º595, Rome, Italy.
- Timóteo, V. - Relatório dos Censos Visuais do Conjunto Recifal Jardim do Mar e Paul do Mar, 2007, Relatório n03 /2008, Publicação Interna da DSIP-DTAP.
- Torres C., Andrade, C. (2010). Spatial decision Analysis Process for selection Marine Aquaculture suitable zones: The exemple of Madeira Island. *Journal of Integrated Coastal Zone Management*, 10(3): 321-330.
- Tuset, Víctor M., José A. Pérez-Peñalvo, João Delgado, Mário R. Pinho, José I. Santana, Manuel Biscoito, José A. González and Dalila Carvalho, 2009. Biology of the deep-water shrimp *Heterocarpus ensifer* (Caridea: Pandalidae) off the Canary, Madeira and the Azores islands (northeastern Atlantic). *Journal of Crustacean Biology*, 29(4): 507-515
- UNDER 2 MOU, Global Climate Leadership memorandum of Understanding. Disponível em: <http://under2mou.org/>
- UNESCO, Convenção sobre a proteção do património cultural subaquático.
- Universidade de Aveiro (2018) – Relatório de Avaliação Ambiental do Plano de Situação do Ordenamento do Espaço Marítimo. Disponível em: <http://www.participa.pt/consulta.jsp?loadP=2249>
- Wang, X. & Müller, W. E. G. (2009) Marine biominerals: perspectives and challenges for polymetallic nodules and crusts. *Trends in Biotechnology*, 27: 375-383.
- Watling, L. and Norse, E. A.: Disturbance of the seabed by mobile fishing gear: a comparison with forest clear-cutting, *Conserv. Biol.*, 12, 1180–1197, 1998.
- Wille, P. C. (2005) *Ampère Seamount*. pp. 131-132 in: Wille, P. C. (2005) *Sound Images of the Ocean in Research and Monitoring*. Springer-Verlag, Berlin.
- Wirtz P, Canning-Clode J., 2009. The invasive bryozoan *Zoobotryon verticillatum* has arrived at Madeira Island. *Aquatic Invasions* 4: 669–670, <http://dx.doi.org/10.3391/ai.2009.4.4.11>
- Wirtz, P., 1994. Three shrimps, five nudibranchs, and two tunicates new for the marine fauna of Madeira. *Boletim do Museu Municipal do Funchal (História Natural)* 46, 167–172.

- Wirtz, P., 1995. One vascular plant and ten invertebrate species new to the marine flora and fauna of Madeira. *Arquipélago* 13A, 119–123.
- Wirtz, P., 1998. Twelve invertebrate and eight fish species new to the marine fauna of Madeira, and a discussion of the zoogeography of the area. *Helgol. Meeresunters.* 197–207.
- Wirtz, P., 2006. Ten invertebrates new for the marine fauna of Madeira. *Arquipélago Life Mar Sci* 23A, 27–30.
- Wirtz, P., 2007. On a collection of hydroids (Cnidaria, Hydrozoa) from the Madeira archipelago. *Arquipélago - Life and Marine Sciences* 24, 11–16.
- Wirtz, P., 2013. Seven invertebrates new for the marine fauna of Madeira Archipelago. *Arquipél. Life Mar Sci* 31.
- Wirtz, P., Araújo, R., and Southward, A. J., 2006. Cirripedia of Madeira. *Helgoland Marine Research* 60, 207–212. doi:10.1007/s10152-006-0036-5.
- Wittmann, K.J., Wirtz, P., 1998. A first inventory of the mysid fauna (Crustacea: Mysidacea) in coastal waters of the Madeira and Canary archipelagos. *Bol. Mus. Munic. Funchal História Nat.* Supl. 05-B, 511–533.
- WW e PRIMA (2002). *Estudo do Plano Diretor do Porto Santo*, Administração dos Portos da Região Autónoma da Madeira, S.A.
- WW e PRIMA (2012). *Estudo do Plano Diretor do Porto do Funchal*, Administração dos Portos da Região Autónoma da Madeira, S.A.
- WW, PRIMA, CISEN (2008). *Estudo do Plano Diretor do Porto do Caniçal*, Administração dos Portos da Região Autónoma da Madeira, S.A.
- Yesson, C., Wright, E., and Braga-Henriques, A. (2018). Population genetics of *Narella versluysi* (Octocorallia: Alcyonacea, Primnoidae) in the Bay of Biscay (NE Atlantic). *Marine Biology* 165: 135. <https://doi.org/10.1007/s00227-018-3394-z>.