Maritime spatial planning in the Black Sea
ISBN 978-973-614-977-1 | 161-174

Mangalia – Shabla area. Threats, pressures and activities with impacts on the Natura 2000 protected areas – factors to be considered for a sustainable maritime spatial planning

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ABSTRACT. Any socio-economic development of coastal areas currently cannot be conceived without taking into account environmental issues. European legislation currently requires environmental impact assessment for any activity in the vicinity or within protected areas of community interest and protected species also benefit from a special status. A chaotic development that ignores environmental protection requirements is not currently possible, and an initiative such as maritime spatial planning cannot overcome these issues. In the maritime and coastal zone between Mangalia and Shabla there are 9 Natura 2000 protected areas, covering a large area in both states. For these particular protected areas, a number of 53 risk factors for Natura 2000 network were identified for Romanian sector and 68 for Bulgarian one, most of them being from urbanisation, residential and commercial development (22), human intrusions and disturbances (18) and agriculture (9) categories.

KEYWORDS. Human activities; environmental protection; marine spatial planning.

I. INTRODUCTION

Any socio-economic development of coastal areas currently cannot be conceived without taking into account environmental issues. Be it simple pollution, the effects of mass tourism or those of current port activities, they have a direct or indirect effect on marine habitats, flora and fauna. European legislation currently requires environmental impact assessment for any activity in the vicinity or within protected areas of community interest and protected species also benefit from a special status [1], [2]. A chaotic development that ignores environmental protection requirements is not currently possible, and an initiative such as maritime spatial planning cannot overcome these issues.

In the maritime zone between Romanian and Bulgarian coastline there are 9 Natura 2000 protected areas, covering a large area of sea in both states – 4 for Romania and 4 for Bulgaria. In addition, in Romania's case, a Special Bird Protection Area (ROSPA0076 Black Sea), cover virtually the entire length of the coast, from Sulina to Vama Veche. In this case, any activity on the Romanian coast of the Black Sea and any sustainable maritime spatial planning should take into account the protection of marine avifauna. In the Bulgarian we don't have a similar area, the four protected areas having a lower surface.

II. NATURA 2000 AREAS IN THE MANGALIA SHABLA ZONE

In the south of the Romanian seaside - Vama Veche – Mangalia area, and in the northern part of the Bulgarian seaside - the Durankulak – Shabla area, environmental issues are quite

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different. Thus, in Romanian area studied is found the southern part of the ROSPA0067 Black Sea [3], covering the entire marine area, with a width of about 3.5 to 4.5 km wide offshore. In the northern extremity of the analyzed area is found ROSCI0281 Cap Aurora [4], which extends offshore up to 17.8 km and in South ROSCI0269 Vama Veche 2 Mai [5], which extends offshore up to 11.8 km. Between the two areas of community interest, near the town of Mangalia, lies a third SCI - ROSCI0094 Sulphurous springs from Mangalia [6], with a smaller surface and extending offshore to only 1.42 -1.45 km. Another small SPA - ROSPA0066 Limanu – Herghelia [8] – is situated in the northern part of Mangalia, covering the surface of a small pondlake with reed vegetation, in the vicinity of ROSCI0114 Mlaştina Hergheliei - Obanul Mare şi Peştera Movilei [9]. These areas do not extend in the marine zone of Romania.

In the Bulgarian seaside right in the marine area there are overlapping four protected Natura 2000 areas. These are two protected areas for birds (SPA) of smaller area in the marine zone - BG0002050 Durankulashko ezero [10] and BG0000156 Shablenski ezeren kompleks [11] - and two protected areas of community interest (SCI) - BG0000154 Ezero Durankulak [12] and BG0000621 Ezero Shabla – Ezerets [13]. In the marine area, bird protection areas extend up to about 1 km wide, first among the Romanian-Bulgarian border and the town Krapets and the second between the towns Ezerets and Shabla. Sites of Community importance in general extend to about 2.5 - 3 km, covering an important part of the continental shelf in the vicinity of the shoreline.

A. NATURA 2000 HABITATS IN MANGALIA SHABLA AREA

In the Romanian part of the littoral were identified 24 marine protected habitats at EU level [14]. Almost all these habitat types are included in three Natura 2000 areas: ROSCI0281 Cap Aurora; ROSCI0094 Izvoarele sulfuroase submarine de la Mangalia; ROSCI0269 Vama Veche – 2 Mai. Among these habitats, 8 of them are habitats with priority conservative interest *(1110-4 Well sorted sands, 1110-8 Sandy muds and muddy sands bioturbated by Upogebia, 1140-3 Midlittoral sands*, 1170-2 *Biogenic reefs with Mytilus galloprovincialis, 1170-8 Infralittoral rock with photophilous algae, Infralittoral rock with Mytilus galloprovincialis, 1170-10 Infralittoral hard clay banks with Pholadidae, 8330 Sulphurous springs*).

In the Bulgarian part of the sector, the two marine protected Natura 2000 areas - BG0000154 Ezero Durankulak; BG0000621 Ezero Shabla – presents a smaller number of marine habitats protected at EU level**:** *1110 Sandbanks which are slightly covered by sea water all the time, 1140 Mudflats and sand flats not covered by seawater at low tide, 1150 Coastal lagoons* and *8330 Submerged or partially submerged sea caves*.

Concerning terrestrial Natura 2000 protected habitats, in the Romanian sector, there are no such type of habitats. All the Natura 2000 areas are situated in the sea, with their western limit on the shoreline. Coastal environment is highly affected by agriculture and human settlement developments, and the high cliffs are in continuous process of natural evolution.

In the Bulgarian sector, the shore is covered by sand vegetation and vegetation characteristic of marsh areas (in the vicinity of Durankulak and Shabla lakes). The two protected Natura 2000 areas included terrestrial and marine habitats. In this area, there were mentioned 9 terrestrial habitats - 1210 Annual vegetation of drift lines, 1410 Mediterranean salt meadows (*Juncetalia maritimi*), 2110 Embryonic shifting dunes, 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"), 2130 Fixed coastal dunes with herbaceous vegetation ("grey dunes"), 2190 Humid dune slacks, 3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation, 6110 Rupicolous calcareous or basophilic grasslands of the Alysso-Sedion albi, 62C0 Ponto-Sarmatic steppes. Most of these habitats are present in BG0000154 Ezero Durankulak SCI, where the human impact is very

low. The habitats with *Ammophila arenaria* and with herbaceous vegetation (2120 "white dunes" and 2130 "grey dunes") are extremely important from conservative point of view.

B. NATURA 2000 SPECIES IN MANGALIA SHABLA AREA

The number of Natura 2000 species included in European Environmental Agency Standard data Forms is different for the two sectors – Romanian and Bulgarian.

In the Romanian sector [15], there are mentioned a total number of 98 bird species. 37 of them are mostly marine, mentioned from ROSPA Black Sea (18 of them mentioned in annex I of the EU Council Directive 79/409/CEE, 10 in annex I of the Bird Directive, 20 in annexes of the Bonn convention for migratory birds and 2 endangered species at global level. In ROSPA0066 Limanu – Herghelia are mentioned other 77 bird species, specified in annex I of the EU Council Directive 79/409/CEE. Also, 2 species of dolphins are mentioned, 2 species of fishes and over 100 other conservative interest fauna and flora species.

In the Bulgarian sector the situation is quite different. There are mention from this area by instance 177 bird species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and 34 other important species of birds; 14 species of reptiles, 6 species of amphibians, 37 species of fishes, 10 species of terrestrial invertebrates and 22 species of mammals, among them 3 species of dolphins. Also, 29 species of plants and over 100 other conservative interest fauna and flora species are added for the list of Bulgarian Natura 2000 species.

The explanation for this difference is that in Bulgarian sector there are large protected inland areas, especially wetlands and forests that are missing in the Romanian sector. In Romanian sector there are also two inland protected areas, but in this case that areas had no relevant importance for coastal activities and for marine spatial planning.

C. IMPACT FACTORS IN MANGALIA SHABLA AREA

In the analyzed region, human impact is diverse and different on both sides of the border. In the Romanian sector there are four villages – the city of Mangalia and Limanu, 2 Mai and Vama Veche. The number of inhabitants in the region is about 42 634 according to the 2011 census [16], of which 6270 in the village Limanu – wich includes the localities 2 Mai and Vama Veche and 36364 in the city of Mangalia.

In the Bulgarian sector there are five settlements: Durankulak, Vaklino, Krapets, Ezerets and Shabla. These villages are - except Krapets - at a distance of 2-5 km from the coast. The number of inhabitants is much lower those in Romanian sector: 6075, of which 5069 in Shabla, 415 in Durankulak, in Krapets 301, 124 and 166 in Ezerets in Vaklino [17].

Regarding economic development, the most important centre of the entire sector is the city of Mangalia, who focused on activities in transport port business (general merchandise, chemicals, fertilizers, bitumen, etc.), industrial activities (two construction sites and ship repair, food industry, textile industry), not least the tourism activities. Also in town it is located a military port. In the littoral area between Mangalia and Vama Veche also runs activities related to agriculture and activities related with marine fisheries. Due to the economic development of the past 20 years, both in the citiesas Mangalia and Limanu, 2 Mai, Vama Veche expanded areas where an industry of vacation homes flourished.

In the Bulgarian sector, most economic activities are in the field of agriculture and tourism. Nearby the coastline, in Shabla – Ezerets area, there are oil drilling, but with very little capacity.

In Mangalia - Shabla area were identified from data forms and field observations, a number of 53 risk factors for Romanian sector and 68 for Bulgarian one, most of them being from urbanisation, residential and commercial development (22), human intrusions and disturbances

(18) and agriculture (9) categories [18], [19], [20], [21], [22], [23], [24]. Most of these risk factors are mentioned also in the management plans of some protected areas [25], [26], [27] (Table 1).

Table 1

RISK FACTORS IDENTIFIED IN THE AREA

	Romania	Bulgaria
A. Agriculture	1	9
B. Sylviculture, forestry	0	3
C. Mining, extraction of materials and energy production	1	4
D. Transportation and service corridors	6	4
E. Urbanisation, residential and commercial development	6	11
F. Biological resource use other than agriculture & forestry	9	5
G. Human intrusions and disturbances	10	3
H. Pollution	5	3
I. Invasive, other problematic species and genes	1	1
J. Natural System modifications	4	4
K. Natural biotic and abiotic processes (without catastrophes)	5	8
L. Geological events, natural catastrophes	1	1
M. Climate change	2	2
X. No threats or pressures	2	2
Total	**53**	**68**

In these circumstances, the analysis of the impact factors on the natural habitats of the Romanian and Bulgarian show significant differences (Table 2a, Table 2b). What should be noted is the fact that a number of industrial activities taking place in the Romanian sector, considering the direction of marine currents, can indirectly affect the Bulgarian sector. Analyzing the quantified impact of the factors in this sector also reveals differences due to the nature protected areas. In the Romanian sector are almost no impact factors related with agriculture and forestry, while in Bulgaria they are present, but there are absent most of the factors from the industry. An analysis of the factors mentioned in the Natura 2000 data forms in both sectors shows that some natural factors were not mentioned - and here it is especially the situation of invasive alien species and natural habitats changes.

A. Agriculture

From the agriculture domain, in Romanian sector a single factor is mentioned – A10 Restructuring agricultural land holding - with reference at the area between Mangalia and Vama Veche, where the former agricultural areas were replaced on approximately 45% with buildings. In these areas some of the seabirds take refuge in winter period. The impact level of the factor is a negative one.

In Bulgarian sector, 9 factors were mentioned - A01 Cultivation, A03 mowing / cutting of grassland, A04 grazing, A04.01.02 intensive sheep grazing, A05.01Animal breeding, A07 use of biocides, hormones and chemicals, A08 Fertilisation, A09Irrigation, A10 Restructuring agricultural land holding. Most of these factors are present in SCI BG0000154 Ezero Durankulak (with low impact), SPA BG0002050 Durankulashko ezero (with high impact) and SPA BG0000156 Shablenski ezeren kompleks (with medium and low impact). One of these factors – A01 Cultivation is considered a benefit in SPA BG0002050 Durankulashko ezero, as an result of the ecology of some birds who feeds on crops over the winter period.

B. Sylviculture, forestry

In Romanian sector no factor from this category was mention. In Bulgarian sector, we find 3 factors – B01Forest plantation on open ground, B01.02 Artificial planting on open ground (non-native trees) and B02.02 Forestry clearance. The first two factors had both an positive and negative impact on biodiversity in SCI BG0000154 Ezero Durankulak with low and medium impact and B01.02 and B02.02 had a medium and low impact in SPA BG0000156

Shablenski ezeren kompleks and SPA BG0002050 Durankulashko ezero. Both factors had impat on nesting bird populations.

C. Mining, extraction of materials and energy production

Only in ROSPA Marea Neagra and in ROSCI Vama Veche 2 Mai is mention the removel of sand or rocks for buildings or beach improvement (C01.01.02), but the impact in local even medium one. In Bulgarian sector, there are mentioned 3 factors: C01.01 Sand and gravel extraction (with medium impact in SPA BG0002050 Durankulashko ezero and low impact in SPA BG0000156 Shablenski ezeren kompleks) and C01.01.02 Removal of beach materials and C02 Exploration and extraction of oil and gas (with medium impact inside, respectively outside SPA BG0000156 Shablenski ezeren kompleks).

D. Transportation and service corridors

In Bulgarian sector, four factors, with low and medium impact were mentioned for all of the four protected areas: D01.01paths, tracks, cycling tracks, D01.02roads, motorways, D02.01electricity and phone lines, D02.02pipe lines.

In Romanian sector, 6 factors were identified: 4 with medium and low impact – D01.02 roads, motorways, D02.03 communication masts and antennas, D05 improved access to site and D03.01.03 Fishing harbours. Two of the factors had by instance high impact in ROSPA Marea Neagra – D03.01 Port areas and D03.02 Shipping lanes.

E. Urbanisation, residential and commercial development

Romanian sector is the most affected by this category of risk factors. Large land areas are covered with urban structures, with almost no natural habitats. E01Urbanised areas, human habitation, E01.01continuous urbanisation, E01.03dispersed habitation, E03 Discharges, E03.01disposal of household / recreational facility waste, E03.04.01costal sand suppletion/ beach nourishment are mentioned from the Mangalia – Vama Veche area, but the impact on birds and marine life is almost no affected, so the impact is a low and medium one. Only one of these factors - E01Urbanised areas, human habitation – had an high impact outside ROSPA Marea Neagră.

In Bulgarian sector, 10 factors for this category - E01.01 continuous urbanisation, E01.02 discontinuous urbanisation, E02.02 industrial stockage, E02.03 other industrial / commercial area, E03 Discharges, E03.01 disposal of household / recreational facility waste, E03.03 disposal of inert materials, E 03.04Other discharges, E 05 Storage of materials, E06 Other urbanisation, industrial and similar activities – were identified. The impact is a high one the two special protected areas for birds, where natural habitats are under pressure from three of these factors – the construction of recreation and touristic facilities, waste discharges and industrial or commercial facilities. The rest of the factors had a low or medium impact.

F. Biological resource use other than agriculture & forestry

In Romanian sector, 9 factors were identified: F01Marine and Freshwater Aquaculture, F02.01Professional passive fishing, F02.01.01 potting, F02.01.02 netting, F02.01.03 demersal long lining, F02.02.02pelagic trawling, F02.03 Leisure fishing, F03.02 Taking and removal of animals (terrestrial), F03.02.09other forms of taking animals, all of them with low impact.

In Bulgarian sector, four factors were mentioned for this category: F02.01.02 netting, F02.03 Leisure fishing, F02.03.01 bait digging/collection, F03.01 Hunting, F06 Hunting, fishing or collecting activities not referred to above. Three of them had a high impact in SPA BG0002050 Durankulashko ezero and other two F02.01.02 netting and F02.03.01 bait digging/collection in SCI BG0000621 Ezero Shabla – Ezerets and SPA BG0000156 Shablenski ezeren kompleks.

G. Human intrusions and disturbances

Factors like G01 Outdoor sports and leisure activities, recreational activities, G01.01 nautical sports, G01.01.01motorized nautical sports, G01.03motorised vehicles, G01.07scubadiving, snorkelling, G02Sport and leisure structures, G02.08camping and caravans, G02.09wildlife watching, 690 other leisure and tourism impacts not referred to above, G04.01Military manoeuvres were identified for Romanian sector. Only 3 of them - G04.01Military manoeuvres, G02Sport and leisure structures, G02.08camping and caravans are mentioned with high impact in ROSPA Marea Neagră and ROSCI Vama Veche 2 Mai. The rest of these factors had an medium and low impact.

In Bulgarian sector, almost all these factors were also identified - G01 Outdoor sports and leisure activities, recreational activities, G01.03 motorised vehicles, G 01.04.01 mountaineering & rock climbing, G01.08 other outdoor sports and leisure activities, G02Sport and leisure structures, G02.05hippodrome, G02.08camping and caravans, G02.10other sport / leisure complexes, G04.01Military manoeuvres, G05Other human intrusions and disturbances, G05.01Trampling, overuse. The number of the factors of this category is higher than in Romanian sector because of the particular situation of terrestrial protected areas, and the impact is more severe – 4 of the factors had a high impact and 6 a preponderant medium one. Most affected are SCI BG0000154 Ezero Durankulak, SCI BG0000621 Ezero Shabla – Ezerets and SPA BG0000156 Shablenski ezeren kompleks, with terrestrial areas in the vicinity of recreation facilities.

H. Pollution

5 pollution factors - H01 Pollution to surface waters (limnic, terrestrial, marine & brackish), H01.02 pollution to surface waters by storm overflows, H01.09 diffuse pollution to surface waters due to other sources not listed, H03.03 marine macro-pollution (i.e. plastic bags, Styrofoam), H04 Air pollution, air-borne pollutants - were identified for the Romanian sector, all of them with low and medium impact. Only one - H01 Pollution to surface waters – is considered with high impact in ROSCI Vama Vecte 2 Mai.

Pollution factors - H05 Soil pollution and solid waste (excluding discharges), H06.01 Noise nuisance, noise pollution, H07 Other forms of pollution - are considered on the other hand with high and medium impact in all the Bulgarian sector protected areas with the exception of SCI BG0000621 Ezero Shabla – Ezerets.

For these particular factors, we must add that all the western coast of the Black Sea is vulnerable at any pollutant originated on land and discharged in the sea by Danube and the north-western sea tributaries rivers, as an result of the marine current direction and the wind direction.

Table 2a

ROMANIAN SECTOR – RISK FACTORS

		ROSPA0076 Marea Neagra				ROSCI0269 Vama Veche – 2 Mai				ROSCI0094 Izvoarele sulfurose de la Mangalia				ROSCI0281 Cap Aurora			
		Negative		Pozitive		Negative		Pozitive		Negative		Pozitive		Negative		Pozitive	
Code	**Description**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**
A	**Agriculture**																
A10	restructuring agricultural land holding		H														
B	**Sylviculture, forestry**																
C	**Mining, extraction of materials and energy production**																
C01.01.02	removal of beach materials	M				M											
D	**Transportation and service corridors**																

D01.02	roads, motorways		M										
D02.03	communication masts and antennas											L	
D03.01	port areas	H	H										
D03.01.03	fishing harbours	M	M										
D03.02	shipping lanes	H	H			L				M			
D05	improved access to site								L				L
E	**Urbanisation, residential and commercial development**												
E01	urbanised areas, human habitation		H										
E01.01	continuous urbanisation									L			M
E01.03	dispersed habitation		L										
E03	discharges				L	L							
E03.01	disposal of household / recreational facility waste									M			L
E03.04.01	costal sand suppletion/ beach nourishment		L										
F	**Biological resource use other than agriculture & forestry**												
F01	marine and freshwater aquaculture								L				
F02.01	professional passive fishing				L								
F02.01.01	potting	L	L										
F02.01.02	netting	L	L										
F02.01.03	demersal longlining	L	L										
F02.02.02	pelagic trawling											L	
F02.03	leisure fishing				L				L			L	
F03.02	taking and removal of animals (terrestrial)	L	L										
F03.02.09	other forms of taking animals								L	M			L
G	**Human intrusions and disturbances**												
G01	outdoor sports and leisure activities, recreational activities									L			
G01.01	nautical sports								L				
G01.01.01	motorized nautical sports	M	M										
G01.03	motorised vehicles					L							
G01.07	scubadiving, snorkelling				L								
G02	sport and leisure structures		H										
G02.08	camping and caravans					H							
G02.09	wildlife watching						M						
	690 other leisure and tourism impacts not referred to above								M				L
G04.01	military manouvres	H	H										
H	**Pollution**												
H01	pollution to surface waters (limnic, terrestrial, marine & brackish)				H	M			L	L		L	L
H01.02	pollution to surface waters by storm overflows		L										
H01.09	diffuse pollution to surface waters due to other sources not listed	L	L										
H03.03	marine macro-pollution (i.e. plastic bags, styrofoam)	L	L		M	M			M	M		M	M
H04	air pollution, air-borne pollutants	L	L										
I	**Invasive, other problematic species and genes**	L	L										

I01	invasive non-native species	H	H			H	H			H	H			H	H		
J	**Natural System modifications**																
J02.02.02	estuarine and coastal dredging		L														
J02.11.02	other siltation rate changes														H		
J02.12	dykes, embankments, artificial beaches, general									H							
J02.12.01	sea defense or coast protection works, tidal barrages										H			H			
K	**Natural biotic and abiotic processes (without catastrophes)**																
K01.01	erosion		H			M	L										
K02.03	eutrophication (natural)						M										
K03.01	competition					H				H				H			
K03.04	predation					H				H				H			
K03.05	antagonism arising from introduction of species					H				H				H			
L	**Geological events, natural catastrophes**																
L10	other natural catastrophes	L?	L?			L?	L?			L?	L?			L?	L?		
M	**Climate change**																
M02.01	habitat shifting and alteration	L?	L?			L?	L?			L?	L?			L?	L?		
M02.03	decline or extinction of species	L?	L?			L?	L?			L?	L?			L?	L?		
X	**No threats or pressures**																
XO	threats and pressures from outside the Member State	M	M			L?	L?			L?	L?			L?	L?		
XE	threats and pressures from outside the EU territory	M	M			L?	L?			L?	L?			L?	L?		

I – inside protected area, O – outside protected area

Table 2b

BULGARIAN SECTOR – RISK FACTORS

		SCI BG0000154 Ezero Durankulak				**SPA BG0002050 Durankulashko ezero**				**SCI BG0000621 Ezero Shabla - Ezerets**				**SPA BG0000156 Shablenski ezeren kompleks**			
		Negative		**Pozitive**		**Negative**		**Pozitive**		**Negative**		**Pozitive**		**Negative**		**Pozitive**	
Code	**Description**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**
A	**Agriculture**																
A01	cultivation		L					H	H		H			L	M		
A03	mowing / cutting of grassland					H								L			
A04	grazing	M				M								M			
A04.01.02	intensive sheep grazing					L											
A05.01	animal breeding,		L			H	H							M			
A07	use of biocides, hormones and chemicals					H								L	M		
A08	fertilisation		L				H							M			
A09	irrigation					H	H							M	M		
A10	restructuring agricultural land holding		L														
B	**Sylviculture, forestry**																
B01	forest planting on open ground		M		M												
B01.02	artificial planting on open ground (non-native trees)	L	M	L	M									M			
B02.02	forestry clearance					L								L			
C	**Mining, extraction of materials and energy production**																
C01.01	sand and gravel extraction					M								L			
C01.01.02	removal of beach materials													M			

C02	exploration and extraction of oil or gas												M
D	**Transportation and service corridors**												
D01.01	paths, tracks, cycling tracks											L	
D01.02	roads, motorways	M								L			
D02.01	electricity and phone lines	L								M			
D02.02	pipe lines					M							
E	**Urbanisation, residential and commercial development**												
E01	urbanised areas, human habitation												
E01.01	continuous urbanisation					M							
E01.02	discontinuous urbanisation	L								M			
E02.02	industrial stockage					M							
E02.03	other industrial / commercial area					H	H						
E03	discharges	M											
E03.01	disposal of household / recreational facility waste	L	M			H			M			H	H
E03.03	disposal of inert materials								M			M	M
E03.04	other discharges					H	H					H	H
E05	storage of materials					M							
E06	Other urbanisation, industrial and similar activities	M											
F	**Biological resource use other than agriculture & forestry**												
F02.01.02	netting					H			H			M	
F02.03	leisure fishing	L	L	L	L	H							
F02.03.01	bait digging / collection					M						H	
F03.01	hunting	M	M			H			M	M		M	
F06	hunting, fishing or collecting activities not referred to above					H			M				
G	**Human intrusions and disturbances**												
G01	outdoor sports and leisure activities, recreational activities											M	
G01.03	motorised vehicles												
G01.04.01	mountaineering & rock climbing	L											
G01.08	other outdoor sports and leisure activities	L							M	H			
G02	sport and leisure structures	L											
G02.05	hippodrome	L											
G02.08	camping and caravans	M	H							H			
G02.10	other sport / leisure complexes								H			M	
G04.01	military manouvres								M	H			H
G05	other human intrusions and disturbances					L						M	
G05.01	trampling, overuse	L											
H	**Pollution**												
H05	soil pollution and solid waste (excluding discharges)					M	H					M	H
H06.01	noise nuisance, noise pollution		H										
H07	other forms of pollution					H							
I	**Invasive, other problematic species and genes**												

I01	invasive non-native species	H	H		H	H		H	H		H	H
I03.01	genetic pollution (animals)				M						H	
J	**Natural System modifications**											
J01	fire and fire suppression					M					M	H
J02.01.01	polderisation				H						M	
J02.03	canalisation & water deviation				H							H
J02.05	modification of hydrographic functioning, general			H						H		
K	**Natural biotic and abiotic processes (without catastrophes)**											
K01	abiotic (slow) natural processes											
K01.01	erosion				M						M	
K02.02	accumulation of organic material										H	
K02.03	eutrophication (natural)										H	
K02.04	acidification (natural)				H							
K03.04	predation				M							
K04	interspecific floral relations				L							
K05.01	reduced fecundity/ genetic depression in animals (inbreeding)				M						M	
K03.01	competition	M	M		M	M		M	M		M	M
K03.05	antagonism arising from introduction of species	M	M		M	M		M	M		M	M
L	**Geological events, natural catastrophes**											
L10	other natural catastrophes	L?	L?		M			L?	L?		M	
M	**Climate change**											
M01	changes in abiotic conditions											
M02.01	habitat shifting and alteration	L?	L?		L?	L?		L?	L?		L?	L?
M02.03	decline or extinction of species	L?	L?		L?	L?		L?	L?		L?	L?
X	**No threats or pressures**											
XO	threats and pressures from outside the Member State	L	L		L	L		L	L		L	L
XE	threats and pressures from outside the EU territory	L	L		L	L		L	L		L	L

I – inside protected area, O – outside protected area

I. Invasive, other problematic species and genes

Invasive species are an important environment issue with negative impact on all natural habitats. Almost 10 alien species per decade entered and acclimatised in the Black Sea in the last century and some of them – like *Mya arenaria, Anadara kagoshimensis, Rapana venosa, Mnemiopsis leidyi, Beroe ovata, Mugil soyui* became dominant in some native habitats, replacing in some cases native species. But, this factor is almost ignored in the Bulgarian sector, where is mentioned only one factor from this category – I03.01genetic pollution (some of the birds could hybridise with domestic or invasive species). We consider that in all Natura 2000 protected areas, invasive marine species (I01Invasive non-native species) are a factor with a high impact on native habitats. In the future, we expect that the number of these species will grow as a consequence of economic development of harbour areas.

J. Natural System modifications

In Romanian sectors, the four factors from this category - J02.02.02 estuarine and coastal dredging, J02.11.02 Other siltation rate changes, J02.12 Dykes, embankments, artificial

beaches, general, J02.12.01s ea defence or coast protection works, tidal barrages – had an high impact in the case of two protected areas - ROSCI0094 Izvoarele sulfurose de la Mangalia and ROSCI0281 Cap Aurora and almost no impact in the others. We should lso mention that the impact is local, in shore area in ROSCI Cap Aurora, but affect almost all the sulphurous springs in the vicinity of the beach in Mangalia area. For this reason, in the case of these factors all future actions had to take into account the environment and biodiversity protection not only the protection of the beaches.

In Bulgarian sector, the factors of this category are quite different, affecting terrestrial protected areas; no impact is mention on marine habitats, flora and fauna. The impact of these factors - J01Fire and fire suppression, J02.01.01 polderisation, J02.03Canalisation & water deviation, J02.05Modification of hydrographic functioning, general – is considered a high one in all protected areas, because they had a semnificative impact on natural habitats in wetland areas.

K. Natural biotic and abiotic processes (without catastrophes)

Five factors included in this category are identified in Romanian sector - K01.01 Erosion, K02.03 eutrophication (natural), K03.01competition, K03.04 predation, K03.05antagonism arising from introduction of species. Eutrophicaton had a medium impact in present, because of the low quantities of nutrients in the sea water, but the rest of the factors had an high impact. K03.01competition, K03.04 predation and K03.05 antagonism arising from introduction of species are in connection with alien invasive species as *Mya arenaria*, *Mnemiopsis leidyi* and *Anadara kagoshimensis*. *Rapana venosa* and *Mnemiopsis* combjellise are also top predators for native species.

In Bulgarian sector, the factors identified affected in particular terrestrial fauna and flora - K01abiotic (slow) natural processes, K01.01Erosion, K02.02 accumulation of organic material, K02.03 eutrophication (natural), K02.04 acidification (natural), K03.04 predation, K04 Interspecific floral relations, K05.01 reduced fecundity/ genetic depression in animals (inbreeding). Assessment of these factors was focused especially on wetlands and less on marine habitats. For marine habitats the same factors as for Romanian sector should be considered, even they were not mention in EEA Standard Data forms for Bulgarian Natura 2000 areas in the sector. The impact of these factors - K03.01competition and K03.05 antagonism arising from introduction of species - should be considered a medium one, because the marine habitats in Bulgarian sector are less affected.

L. Geological events, natural catastrophes

For this category, geological risk events such as earthquakes, landslides in cliffs areas, even tsunamis can be considered. However, considering the socio-economic structure of the area and the possible indirect impact on the environment by damaging some structures such as fuel tanks, we consider that such factors would have a higher potential in the Romanian sector.

M. Climate change

Factors in this category have an impact hard to predict now. Clearly we are witnessing a general process of global warming, which results in slow restructuring of terrestrial and marine ecosystems. But if we consider the analyzed sector in the near future at least not foresee major changes. The only aspect taken into account the possible penetration of new invasive species favoured by changing climatic conditions, and in this case we can talk for both sectors of the analyzed area of factors as M02.01 habitat alteration and M02.03 decline or extinction of species. The possible impact on both sectors is, by now, a low one.

X. No threats or pressures

In this category we should include events like oil pollution from north-western continental shelf (a major oil spill from these oil fields could affect all the western littoral of the Black Sea south of Cape Midia). Also, in the same category can enter any nuclear accidents in states nearby. For these factors, we appreciate a low value for both sectors of the area.

III. CONCLUSION

For the development of any economic activities in the area analyzed, we must consider for a sustainable maritime spatial planning the cumulative impact of the factors identified both in the Romanian and Bulgarian sector. Taking into account the provisions of EU environmental legislation, any economic activity framed as a risk factor with high or even moderate impact should be carried out with maximum responsibility in areas close to protected areas and prohibited within them.

ACKNOWLEDGEMENT

This work has been supported by the European Commission through the European Maritime and Fisheries Fund, grand No. EASME/EMFF/2014/1.2.1.5/2/SI2.707672 MSP LOT 1 /BLACK SEA/MARSPLAN-BS.

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