



MINISTERO DELL'AMBIENTE
E DELLA TUTELA DEL TERRITORIO E DEL MARE



Torre del Cerrano Strunjan

*Twinning
Programme
MPAs/SPAMIs*





Torre del Cerrano - Strunjan

Twinning Programme MPAs/SPAMIs



MINISTERO DELL'AMBIENTE
E DELLA TUTELA DEL TERRITORIO E DEL MARE



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1. Preamble

Preamble: Twinning Programme MPAs/SPAMIs



1.1 SPA/RAC: Specially Protected Areas / Regional activity Center

The *Regional Activity Centre for Specially Protected Areas* (SPA/RAC) is the main UNEP/MAP centre. The United Nations Environment Programme (UNEP), established at the Stockholm Conference in 1972, is the United Nations' authority designated to address environmental issues at the global and regional level by coordinating the development of a harmonised environmental policy, thus keeping the global environment under control and bringing emerging issues to the attention of governments and international communities. The *Mediterranean Action Plan* (MAP or UNEP/MAP) is the first Mediterranean Plan, which was adopted in 1975 within the Regional Seas Programme by 16 states under the aegis of the UNEP. In 1976, these Parties adopted the Convention for the Protection of the Mediterranean Sea against pollution (the *Barcelona Convention*). In 1995, the *Action Plan for the Protection of the Marine Environment and the Sustainable Development of the Coastal Areas of the Mediterranean* (MAP Phase II) was adopted by the Contracting Parties to replace the MAP of 1975. At the same time, the Contracting Parties adopted a modified version of the Barcelona Convention of 1976, renamed the *Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean*.

The Contracting Parties to the Barcelona Convention and its Protocols are determined to address the marine environment and coastal region protection challenges through integrated planning, and the management of coastal areas by strengthening regional and national plans to achieve sustainable development, acting on the

basis of the precautionary principle. The MAP is the result of a regional cooperation involving the European Community and 21 states bordering the Mediterranean Sea: Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, Syria, Tunisia and Turkey. In particular, MAP Phase II seeks to ensure the sustainable management of natural resources by integrating the environment into economic development and regional planning, and to protect the marine environment and the coastal area by preventing and reducing pollution to preserve and enhance the value of sites and landscapes of ecological or cultural interest. The Convention and its seven Protocols form what is known as the Barcelona system or MAP's legal framework (www.isprambiente.gov.it; www.rac-spa.org).

1.2 SPAMI TWINNING



The *Protocol Concerning Specially Protected Areas and Biological Diversity* (the SPA/BD Protocol) was adopted in Barcelona in 1995, and it represents the principal instrument of the Mediterranean for the implementation of the Convention on Biological Diversity of 1992, which concerns the sustainable

management of coastal and marine biodiversity. It provides for three main objectives: the creation, protection and management of Special Protection Areas (SPA); the drawing up of a list of Special Protection Areas of Mediterranean Importance (SPAMI); and the protection and conservation of animal and plant species.

Through the SPA/BD Protocol, the Contracting Parties to the Barcelona Convention have established a list of the Special Protection Areas of Mediterranean Importance (the SPAMI List) with the aim of promoting cooperation in their management, the conservation of natural areas, and the protection of endangered species and their habitats. The SPAMI Project, implemented as part of a Memorandum of Understanding between the United Nations Environment Programme and the Italian Ministry of the Environment and the Protection of the Land and the Sea (MATTM), aims to contribute to the achievement of the Aichi Biodiversity Target 11 (from the Conference of Parties held in 2010 in Nagoya, in the Aichi Prefecture of Japan) and of the Sustainable Development Goal (SDG) 14.5 for the Mediterranean (within the framework of the 2030 Agenda, approved by the United Nations by more than 150 international leaders in 2015) by developing and strengthening the effective management of Marine Protected Areas and, in particular, SPAMI, thanks to Twinning Programmes (SPAMI TWINNING) with the objective of promoting the creation of networks and standardising management by supporting the best practices involving Civil Society Organizations (www.aics.gov.it; www.rac-spa.org).

1.2.1 SPAMI TWINNING

Strunjan LP - Torre del Cerrano MPA

On Tuesday, 26 February 2019, in the Torre del Cerrano Marine Protected Area (MPA), Landscape Park Strunjan (LPS) and Torre del Cerrano MPA signed the Twinning, together with three other pairs of Mediterranean Marine Protected Areas, aimed at exchanging experiences and joint projects to share best practice and management strategies (Photo 1-4).



1. The President of the Torre del Cerrano MPA, Leone Cantarini, and the Director of Strunjan Nature Reserve, Robert Smrekar, signing the Twinning within the SPAMI Project (2018-2019)



2-3. SPAMI Twinning meeting, 26/02/2019 Silvi (Teramo)





4. SPAMI Twinning meeting, 26/02/2019 Silvi (Teramo).

Between 16 and 18 April 2019, three days of work were carried out by the Torre del Cerrano MPA staff and the Strunjan LP staff, together with local artisanal fishermen, in Slovenia at Landscape Park Strunjan, with the aim, among other things, of drawing up a management plan agreed between the entities and the operators (Photo 5-6).



5-6. Visit by the Torre del Cerrano MPA staff to LP Strunjan (Slovenia)



Between 4 and 7 June 2019, three days of work were carried out by the LP Strunjan staff in Italy at the Torre del Cerrano Marine Protected Area, the Centre for Cetacean Studies “L. Cagnolaro”, the Pescara coastguard operations room, and in meeting with local fishing operators (Photo 7-8-9).



7-8-9. Visit by the LP Strunjan staff to the Torre del Cerrano Marine Protected Area (Teramo, Italy)



Part A

Development of Management Measures in the Torre del Cerrano Marine Protected Area

A.1 Torre del Cerrano MPA

The Torre del Cerrano Marine Protected Area is located in the Italian region of Abruzzo and extends over an area of approximately 37 square kilometres, including 7 kilometres of Adriatic coast between the towns of Pineto and Silvi in the Teramo province, with 2.5 kilometres of sand dunes which continue up to 3 nautical miles into

the Adriatic Sea (Figure 1).

The Italian Ministry for the Environment, the Protection of Natural Resources and the Sea (MATTM) established the Torre del Cerrano MPA by the Ministerial Decree (MD) of 21 October 2009 and, subsequently, with the MD of 28 December 2018, it recognised its transformation from a site of community interest (SCI) IT7120215 to a special area of conservation (SAC), a true Natura 2000 site.

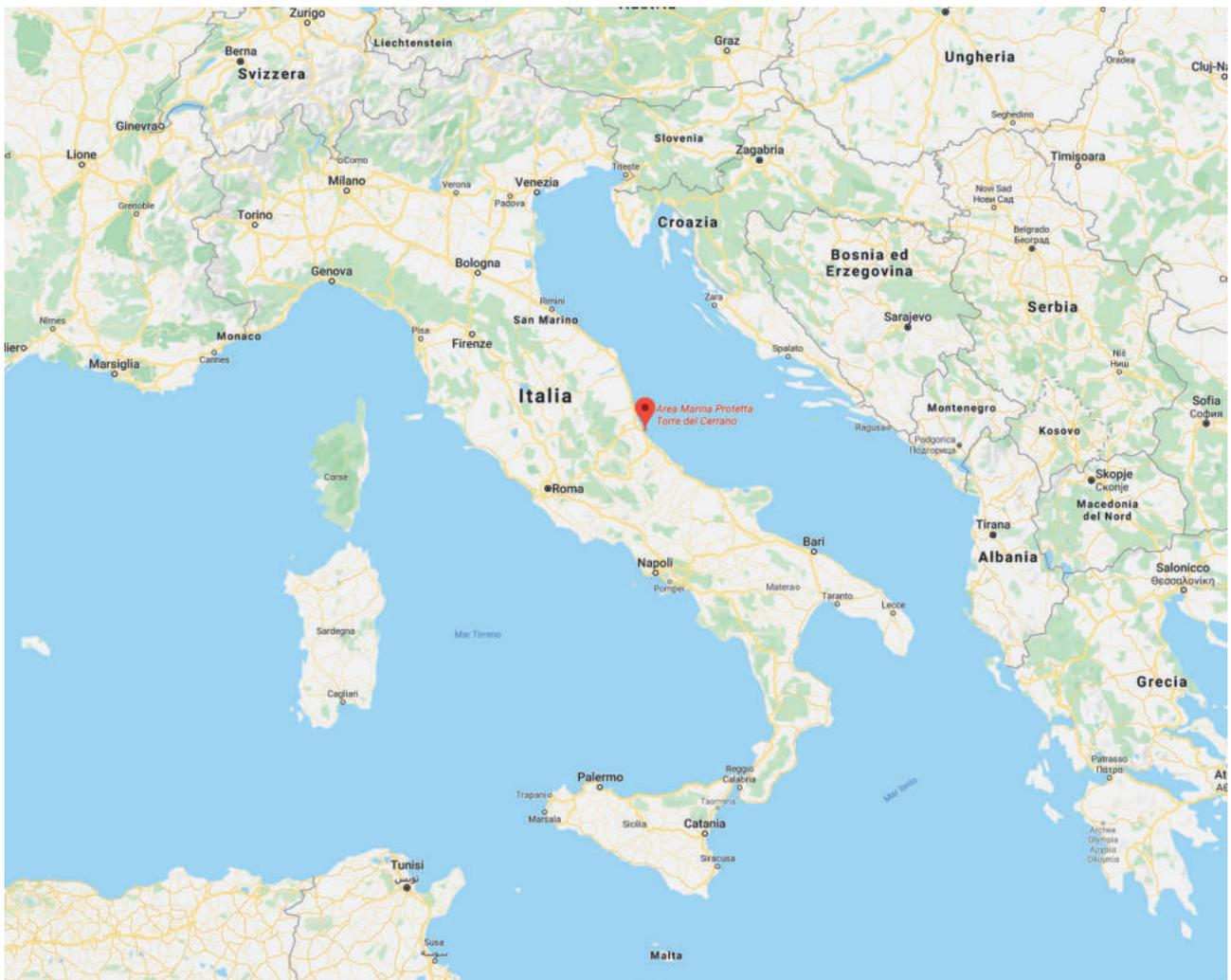


Figure 1: Location of the Torre del Cerrano MPA (www.googlemaps.it)

With the MD of 1 March 2018, Italy permanently assigned this area to the Management Association

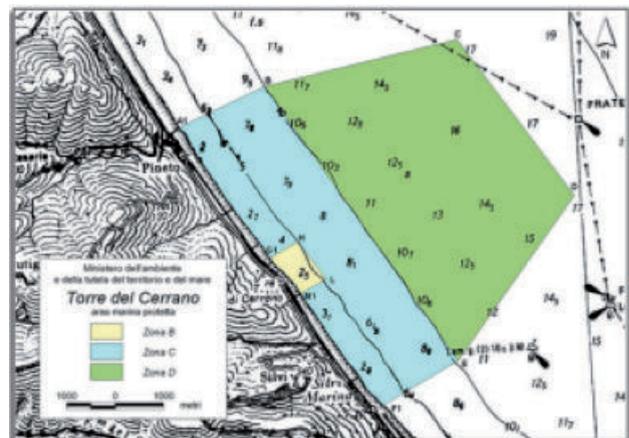
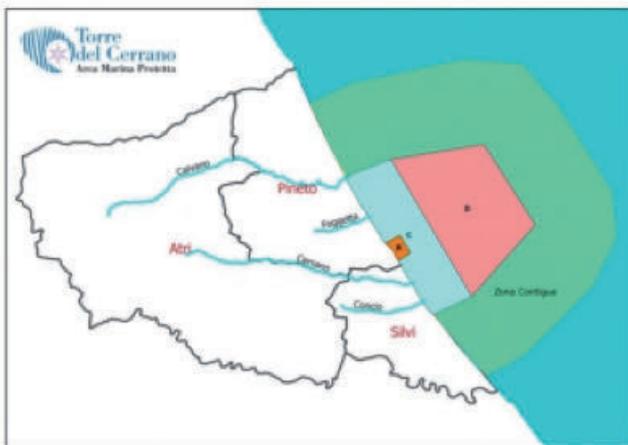


10. The tower (Torre) before 1915 (V. Scordella, 2014)

(Consorzio di Gestione) established by the municipalities of Pineto and Silvi, the Province of Teramo and the Abruzzo Region.

The Torre del Cerrano MPA takes its name from an ancient tower, torre in Italian (Photo 10), dating back to the 13th century; this tower is one of the symbols of the MPA, together with the various habitats inhabited by numerous animal and plant species which are specific to the different protected areas (Figures 2 and 3):

- Zone B (1 km²) of general reserve in front of the Torre del Cerrano tower;
- Zone C (14 km²) of partial reserve, up to approximately 2 km from the coast;
- Zone D (22 km²), which has a 'respect' function, up to a limit of 3 nautical miles;
- The adjacent Zone or Strip, transitional.



Figures 2 and 3: Hydrographic map and zoning protection areas, with details, of the Torre del Cerrano MPA (www.torredelcerrano.it; www.minambiente.it)

A.2 Involvement of the civil society in SPAMIs/MPAs management activities - The S.E.T.P.I.A. Project (Cetacean Studies Centre)

S.E.T.P.I.A. Project

Description and Aims

Description of Activities

- Inventory of Fishing Activities and Gear
- Catch and Discard Monitoring
- Monitoring of Interactions with Protected Species (Cetaceans and Turtles)
- Assessment of the Effectiveness of Acoustic Deterrent Devices for Dolphins
- Monitoring of the Sale of Local Fish Products
- Inventory and Contact of Catering Providers with Tourist Operators
- Assessment of the Demand for Fish Products
- Meetings with fishermen, caterers and tourism operators

Preliminary Results

Description and Aims

The S.E.T.P.I.A. Project (Sustainable Enhancement for Tourism Purposes in AMP Torre Del Cerrano) was created with the aim of establishing a short and sustainable supply chain for the enhancement of small-scale artisanal fishing products within the Torre del Cerrano MPA.

Due to its low impact on the marine habitat, the small quantities caught, and the selectivity of the equipment, small-scale fishing is considered the most sustainable of the various fishing systems. To guarantee such sustainability in a Marine Protected Area, it is important to constantly monitor the quality and quantity of the catch in relation to the various types of equipment used, the geographical area, and the time of the year, in order to rationally implement – or promptly correct – the fisheries management plan. Interactions between the main protected marine species (cetaceans and turtles) and the fishing gear occur frequently in the Torre del Cerrano MPA – events which in some cases have a lethal outcome for the animals, and which require specific monitoring and mitigation actions aimed at reducing the impact on fauna, and the long-term coexistence

of fishing activities and protected species.

In the study area, artisanal fishing is permitted exclusively for fishermen residing in the two Municipalities of Silvi and Pineto who have been authorised by the MPA; it is therefore tightly connected to the local tradition and culture pertaining to a small community. Despite being the primary source of upkeep for a few families only, it still represents a cultural and historical heritage that belongs to the territory and, as such, it must be protected and passed on, and also valued as a tourism resource. For this purpose, local fish products, with their typicality and sustainability, should be brought to the attention of a very broad public through the involvement of tourism operators and with the help of advertising media; however, it is equally important to create a market that brings these products from the nets of the fishermen directly to the tables of local restaurants, where tourists can discover and enjoy them and appreciate their qualities. The meeting and discussion between fishermen, caterers and tourism operators is therefore a key point of the S.E.T.P.I.A. Project, because it substantially contributes to broadening the sustainable tourism services of the MPA. With the same purpose, the MPA suggested to caterers that they adhere to a set of environmental and social sustainability guidelines to obtain the “Friends of the Marine Park” label. The specific objectives of this project relating to the above can be summarised as follows:

- a) Increase the effectiveness of measures aimed at mitigating the impact of fishing activities in the MPA, with particular reference to protected marine species (cetaceans and turtles);
- b) Promote the tourism value of local small-scale artisanal fishing products from a short supply chain by involving catering activities.

The Project, which was carried out between June and December 2019 by the Onlus Cetacean Studies Centre (Centro Studi Cetacei Onlus), involved a team of veterinarians and marine biologists who operated daily in the Abruzzo Region to protect its environment and marine fauna, and to make best use of its resources.

Description of Activities

Inventories of Fishing Activities and Gear

After obtaining the list of professional fishermen authorised to operate in the MPA in 2019, a survey was carried out at the Community Fishing Fleet Register to collect the main technical data of the latter (Table 1). The list includes 17 vessels, registered by 14 individual or associated fishermen, some of whom do not carry out small-scale fishing throughout the year, but only in the spring, when they are allowed to catch cuttlefish.

During the study period, six inspections were

carried out when the fish were landed (Photo 11), at the slipway areas where the fishermen sell directly to the public (Photo 12).

During the inspections the operators were interviewed and the entire catch was subjected to a quantitative evaluation, the identification of the individual species, and an investigation of the quantity and species which constituted the “discard”. Set nets of a length varying between 1000 and 3200 metres were used in five cases, whereas traps were used in one case only (Table 2). The fishing area often includes external sea areas, which nevertheless border the MPA.

Ext. marking	Vessel name	Port name	Gt tonnage (grt)	LOA (m)	Main power (hp)	Year of construction	Main Gear type	Secondary gear type
06PC469	SIRENA 2001	Silvi	7.00	13.27	145.6	2001	LLS - Set longlines	GNS - Set gillnets (anchored)
06PC486	NICOLA	Silvi	2.00	7.50	69.30	2007	GNS - Set gillnets (anchored)	-
06PC468	NIKITA	Silvi	1.00	5.56	18.40	2001	GNS - Set gillnets (anchored)	-
06PC487	GIANLUCA	Silvi	1.00	5.78	0.00	2007	GNS - Set gillnets (anchored)	-
06PC495	INSIDIOSO	Silvi	1.00	6.30	0.00	2015	LLS - Set longlines	GNS - Set gillnets (anchored)
06PC485	PALU'	Silvi	1.00	5.78	84.60	2007	GNS - Set gillnets (anchored)	SB Beach seines
06PC479	GIULIO CESARE	Silvi	1.00	7.44	37.00	2004	OTB - Bottom otter trawls	GNS - Set gillnets (anchored)
01OR092	SANTA RITA	Vasto	1.00	6.00	0.00	2005	GNS - Set gillnets (anchored)	-
06PC447	ELY	Silvi	1.00	6.00	0.00	1996	GNS - Set gillnets (anchored)	-
06PC465	GIOSIMAR C.	Silvi	2.00	6.40	36.77	1999	GNS - Set gillnets (anchored)	-
06PC488	CATERINA	Silvi	1.00	5.40	0.00	2008	GNS - Set gillnets (anchored)	-
06PC459	MOMO I	Silvi	1.00	6.18	0.00	1995	GNS - Set gillnets (anchored)	-
06PC464	ALFONSO	Silvi	1.00	6.10	0.00	1999	GNS - Set gillnets (anchored)	-
06PC429	ANGELA	Silvi	1.00	5.14	0.00	1980	GNS - Set gillnets (anchored)	-
06PC462	ARGO	Silvi	1.00	5.94	0.00	1999	GNS - Set gillnets (anchored)	-
07PC403	KILLER	Roseto d. Abruzzi	1.00	6.57	32.00	1993	GNS - Set gillnets (anchored)	-
06PC481	VITTORIA	Silvi	1.00	5.99	0.00	2005	GNS - Set gillnets (anchored)	-

Table 1: MPA fishing boats (Source: Community Fishing Fleet Register)

Survey number	Survey date	Type of fishing net/traps	Length of fishing nets/ Number of traps
Sur-01	June 28	Traps (pots)	n.200 per boat (2 boats)
Sur-02	July 31	Set nets	2000 m
Sur-03	August 30	Set nets	2100 m
Sur-04	September 26	Set nets	2000 m
Sur-05	October 29	Set nets	3200
Sur-06	October 30	Set nets	1000

Table 2: Fishing gear data



11. Landing point at one of the MPA beaches (Cetacean Studies Centre)



12. Selling the catch to the public (Cetacean Studies Centre)

Catch and Discard Monitoring

At each inspection the catch was photo-documented, the species of commercial interest were identified (Photos 13-16) and the related quantities, as well as the presence of juvenile specimens smaller than the minimum sizes allowed by national and community legislation, were recorded.

The list of species and the related quantities by sampling is shown in Table 3.

The discard from fishing (Photos 17-18), represented by the minimum quantities of commercial species (of small dimensions or physically damaged) and non-commercial species caught by accident, was analysed in addition to the above-stated species. The discard is usually disposed of with urban waste, consumed on the



13. *Lithognathus mormyrus* (Cetacean Studies Centre)



14. *Sepia officinalis* (Cetacean Studies Centre)



15. *Squilla mantis* (Cetacean Studies Centre)



16. *Mullus barbatus* (Cetacean Studies Centre)

spot by seagulls, or used for the production of bait for catching the sea snail *Nassarius mutabilis*. The



17. *Liocarcinus vernalis* (Cetacean Studies Centre)



18. *Bolinus brandaris* (Cetacean Studies Centre)

Scientific name	Number of specimens						total
	Sur-01	Sur-02	Sur-03	Sur-04	Sur-05	Sur-06	
<i>Squilla mantis</i>		7	3,5	6	10	1	27,5
<i>Sepia officinalis</i>	25						25
<i>Solea solea</i>		12	5	1,4	5	0,5	23,9
<i>Chelon ramada</i>					2	20	22
<i>Chelidonichthys lucerna</i>		8	1,5	3	5	2	19,5
<i>Octopus vulgaris</i>	10						10
<i>Pteroplatytrygon violacea</i>			3,5	2,5			6
<i>Lithognathus mormyrus</i>	3			0,8	1		4,8
<i>Trachurus trachurus</i>		4	0,2	0,4			4,6
<i>Mullus barbatus</i>		0,2	1	1	1	0,5	3,7
<i>Aetomylaeus bovinus</i>			3				3
<i>Raja asterias</i>		0,2	0,3	1	1	0,5	3
<i>Pegusa impar</i>		0,3	0,2	0,5	0,4	0,5	1,9
<i>Melicertus kerathurus</i>		0,1	0,3	0,7	0,4		1,5
<i>Liocarcinus vernalis</i>	1						1
<i>Eledone</i> spp.					0,8		0,8
<i>Diplodus annularis</i>	0,5						0,5
<i>Scophthalmus rhombus</i>			0,3		0,2		0,5
<i>Diplodus sargus</i>	0,4						0,4
<i>Gobius niger</i>	0,2		0,1			0,1	0,4
<i>Liza aurata</i>			0,4				0,4
<i>Umbrina cirrosa</i>	0,4						0,4
<i>Uranoscopus scaber</i>			0,1	0,1	0,1		0,3
<i>Balistes capriscus</i>	0,3						0,3
<i>Pagellus erythrinus</i>		0,3					0,3
<i>Seriola dumerili</i>			0,3				0,3
<i>Boops boops</i>					0,2		0,2
<i>Diplodus puntazzo</i>					0,2		0,2
<i>Sparus aurata</i>				0,2			0,2
<i>Spicara</i> spp.					0,2		0,2
<i>Arnoglossus</i> sp.				0,1			0,1
<i>Scomber colias</i>						0,1	0,1
<i>Scorpaena porcus</i>					0,1		0,1

Table 3: All survey data for commercial species

Scientific name	Number of specimens					
	Sur-01	Sur-02	Sur-03	Sur-04	Sur-05	Sur-06
<i>Acanthocardia</i> spp.			<10			
<i>Alosa fallax</i>	1					
<i>Alpheus glaber</i>		1				
<i>Anadara</i> spp.				<10		
<i>Aporrhais pes pelecani</i>	1	<10		1	1	
<i>Astropecten irregularis pentacantus</i>	1	<10	<10	<10		
<i>Bolinus brandaris</i>	<10	<10	<10	>10	>10	<10
<i>Chamelea gallina</i>	<10					
<i>Cotylorhiza tuberculata</i>			1			
<i>Cymothoa exigua</i>		1				
<i>Dardanus calidus</i>					1	
<i>Echinocardium cordatum</i>			1		1	
<i>Flexopecten glaber</i>			1			
<i>Flexopecten</i> spp.		1	1			
<i>Goneplax rhomboides</i>		<10				
<i>Hippocampus hippocampus</i>				<10		
<i>Ilia nucleus</i>				1	1	
<i>Liocarcinus vernalis</i>		<10	>10	>10	>10	>10
<i>Medorippe lanata</i>		<10				<10
<i>Mytilus galloprovincialis</i>			1			
<i>Mnemiopsis leidyi</i>					1	
<i>Nassarius mutabilis</i>				<10		<10
<i>Nassarius nitidus</i>					1	
<i>Ocypode cursor</i>		1				
<i>Ostrea edulis</i>			<10	<10		
<i>Pagurus cuanensis</i>		1				
<i>Partenope angulifrons</i>		1		1	<10	
<i>Pleurobranchaea meckelii</i>		1				
<i>Styela plicata</i>		1				
<i>Tonna galea</i>		1			<10	

Table 4: All survey data for discarded species

Monitoring of Interactions with Protected Species (Cetaceans and Turtles)

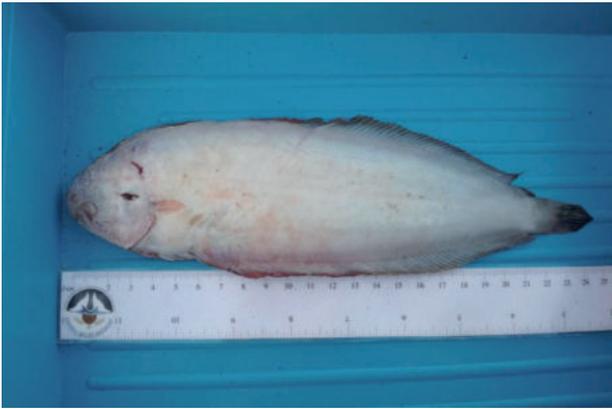
The fishermen were interviewed about the frequency of the sighting of cetaceans and turtles in the MPA waters. In one case only, a *Tursiops truncatus* individual was sighted on a sampling day; however, the sighting of dolphins by fishermen is very common. Continual damage to the nets (Photo 19) and the catch, exhibiting bite indentations caused by bottlenose dolphins (Photo 20), has been reported, which results in huge economic losses for the fishermen.

Sightings of sea turtles are less common: adult individuals were reported to have been seen about 500 metres from the coast in the period prior to the sampling in three interviews. Turtles are sometimes subject to accidental capture, and in these cases



19. A fisherman shows a net damaged by dolphins (Cetacean Studies Centre)

they are immediately released back into the sea. In general, turtles seem to be responsible for fewer economic losses for the fishermen, so there is a greater tolerance with respect to their presence. It has been reported that during the study period one of the MPA fishermen was asked to rescue



20. Dolphin bite indentation on a common sole *Solea solea* (Cetacean Studies Centre)

and recover two *Caretta caretta* specimens caught in a longline, which enabled the treatment and rehabilitation of the animals and their subsequent release into nature. Such events are considered uncommon in the study area.

Assessment of the Effectiveness of Acoustic Deterrent Devices for Dolphins

At the end of 2018, two MPA fishermen were given some deterrent devices ("pingers") for dolphins, to test their functionality in the field with respect to the type of bottom and gear and the specific fishing techniques adopted. Instructions for use and a form for the collection of monitoring data were provided together with the deterrent devices. After a short period of use, one of the two fishermen ceased his professional fishing activity, and he no longer provided useful data.

The other fisherman highlighted the presence of bottlenose dolphins in the vicinity of the active deterrent devices on several occasions, so he decided to discontinue their use, fearing that the animals had become addicted to the signal of the pingers. The onset of addiction cannot be excluded; however, it is a known fact that bottlenose dolphins are particularly resistant to the action of acoustic deterrent devices, which can cause a decrease in predation in the nets, but frequently does not eliminate it completely. A more constant and prolonged use of the deterrent devices could reveal an effective reduction in the interactions of the dolphins with the nets.

Monitoring of the Sale of Local Fish Products

During the interviews, information was collected about the selling arrangements of the catch. Fishermen may sell fish directly to the public at the landing sites corresponding to the slipway areas, and at specially equipped stations. Since they cannot refrigerate the products, they must sell everything within a few hours of landing, and they rarely record surpluses. Three fishermen reported occasionally delivering products to caterers, two of whom run seasonal activities (seaside resorts). In other cases, the fish is sold directly to the final consumer. Some fishermen consider it inconvenient to supply fish to restaurateurs due to the low sale price requested.

Inventory and Contact of Catering Providers with Tourist Operators

A web search was used to inventory 48 catering providers serving fish-based dishes in the two municipalities included in the MPA. Of all the contacted managers, 15 (31%) made themselves available for an information conversation and an interview. More than half of those interviewed said they did not know about small-scale fishing in the Torre del Cerrano MPA, but 13 of them (86%) would be willing to serve dishes based on the "catch of the day" in addition to their standard menu, characterised by the freshness, typicality and seasonality of the "zero-kilometre" fish.

During these meetings, the caterers were asked if they would be interested in adhering to the "Marine-Park-Friendly Restaurant" Guidelines, currently at the approval stage by the MPA, which represent a quality and sustainability standard aimed at protecting the environment and the local identity. Approximately 80% of the respondents said they were interested in joining the initiative. In addition, local tourism operators were also inventoried; there are 14 of them in total. A sample of 4 operators were contacted for an interview and involvement in the project. It turned out that 50% of the respondents were not aware of the

small-scale fishing activity carried out in the MPA, but all of them said they were willing to promote restaurants that serve local and sustainable fish products and, in general, to adhere to the “Marine-Park-Friendly Restaurant” Guidelines.

Assessment of the Demand for Fish Products

The interviewed caterers declared the quantity of the fish products they purchased on a daily or monthly basis, for the three categories of fish, molluscs and crustaceans. The obtained data were multiplied by six weekly working days and by fifty annual working weeks in order to obtain the total annual quantity (Table 5).

In addition, the average customer preferences were examined, recording the dishes that were requested the most, in a progressive descending order for each restaurant. The most sought-after dishes in 11 out of 15 cases included molluscs (clams, mussels, squid) and crustaceans (scampi), the collection or capture of which does not occur within the MPA. Considering the first three most sought-after dishes for each restaurant, less than a third of them were based on local fish.

Meetings with fishermen, caterers and tourism operators

A preliminary meeting between the fishermen, the caterers interested in becoming Friends of the Marine Park, the staff of Landscape Park Strunjan (the Park twinned with the Torre del Cerrano MPA within the SPAMI Programme) and other interested parties was organised in collaboration with the MPA staff (Photo 21). Thanks also to



21. First S.E.T.P.I.A. Project meeting (Torre del Cerrano MPA)

the experience of Landscape Park Strunjan, it was possible to identify at the first meeting the common goals for the tourist promotion, starting with the fishing and catering activities and continuing all the way to the promotion of typical products and the civil society of the area. Another

Restaurateur Code	Daily (kg)			Weekly (kg)			Yearly (kg)		
	Fish	Molluscs	Crustaceans	Fish	Molluscs	Crustaceans	Fish	Molluscs	Crustaceans
Res-01				2	6	1	100	300	50
Res-02	20	30	10	120	180	60	6000	9000	3000
Res-03	4	4	4	24	24	24	1200	1200	1200
Res-04	2	2	2	12	12	12	600	600	600
Res-05				4	100	5	200	5000	250
Res-06	10	10	5	60	60	30	3000	3000	1500
Res-07	5	5	10	30	30	60	1500	1500	3000
Res-08	3	10	3	18	60	18	900	3000	900
Res-09	20	20	15	120	120	90	6000	6000	45000
Res-10	-	-	-	-	-	-	-	-	-
Res-11	6	15	5	36	90	30	1800	4500	1500
Res-12				16	10	6	800	500	300
Res-13								100	
Res-14	10	5	5	60	30	30	3000	1500	1500
Res-15	5	10	6	30	60	36	1500	3000	1800

Table 5: Quantity of seafood purchased by restaurateurs



22. Second S.E.T.P.I.A. Project meeting (Torre del Cerrano MPA)



23. Second S.E.T.P.I.A. Project meeting (Torre del Cerrano MPA)

meeting, held a few months later (Photo 22-23), allowed the discussion to be taken to a practical level, opening a dialogue between the parties on their respective needs and mutual expectations. On this occasion, the founding of a “Slow Food community” was proposed as a tool for defining the common goals and the activities necessary to achieve them. This idea is still being examined by the interested parties.

Preliminary Results

The onsite monitoring of small-scale fishing, carried out within the S.E.T.P.I.A. Project, is the continuation of a previous study project implemented in the previous year (S.E.P.P.I.A. Torre del Cerrano Project) and the supplementation of the normal data collection which was carried out by the MPA on the basis of forms about the catch that were filled in by fishermen.

The data obtained helped to broaden the knowledge of the fishing activities and traditional practices typical of this geographic region, and the fish fauna and its evolution over time, as well as of the interactions between the protected species and fishing itself.

The research has confirmed that catching undersized, i.e. juvenile, specimens is very rare with these fishing methods, and the overall discard, represented in particular by non-edible species, is limited to a minimum.

The positive impact of small-scale fishing on

protected species is undeniable, since the interactions with bad outcomes are documented. The mitigation actions undertaken (awareness-raising activities, use of acoustic deterrent devices), which are still in an initial and experimental phase, must be improved, intensified and extended to obtain more visible results.

Small-scale fishing and its local products are little known to the majority of the caterers and tourism operators in the area, and so are gastronomic recipes that could enhance them. Thanks to the meetings organised between the interested stakeholders, it was possible to attract their attention and start an open dialogue, which later developed into spontaneous exchanges.

The suggested “Marine-Park-Friendly Restaurant” Guidelines generated a fair amount of interest among the caterers. This is a sign that the latter could play an important role in the construction and promotion of a truly sustainable and short supply chain.

It was observed that tourists and consumers in general are unaware of the quality, variety, typicality and seasonality of the fishing products found in the area; this is why there is lack of demand that could in fact support the market and feed this virtuous supply chain. To help fill this gap, a promotional brochure illustrating the sustainability characteristics of the precious “catch of the day” of the Torre del Cerrano MPA, from primary production all the way to being served at the table, is being designed.

A.3 Small-Scale Coastal Fishing in the Torre del Cerrano MPA

The European Union defines small-scale coastal fishing as “fishing carried out by vessels of less than 12 metres and not using fishing gear as listed in Table 3 of Annex I to the Council Regulation (EC) No. 25/2004”, i.e. not using towed gear, including purse seiners and bottom trawls (PHAROS4MPAs Project, 2019), thus reducing the impact of the fishing activity on the marine ecosystem. In the Torre del Cerrano MPA, this environmental sustainability footprint is on the one side accentuated by regulations, and on the other – while emphasising the proper relationships between the ecological and anthropogenic systems – it is closely linked to socio-economic reality.



24. A small-scale fishing unit (www.torredelcerrano.it)

A3a Rules Governing Small-Scale Fishing in the Torre del Cerrano MPA

In the Torre del Cerrano Marine Protected Area professional fishing activity is governed by the Execution and Organisation Regulation (Regolamento di Esecuzione e Organizzazione),

which was approved by the Italian Ministry for the Environment, the Protection of Natural Resources and the Sea (MATTM) by a Ministerial Decree (MD) dated 12 January 2017 (O.G. No. 24 of 30/01/2017). This activity is prohibited in Area B, whereas in Areas C (minimum distance from the coast: 500 metres) and D it can only be carried out with the prior permission of the governing body. The following is not permitted: active restocking; aquaculture; the unloading of untreated water from bilges or other devices of the fishing unit and any toxic or polluting substance into the sea; and the discharge of solid or liquid waste. The Regulation also prohibits the use of light sources, towing equipment, dragnets, turbo-blowers, drift nets and seiners. The only fishing activity permitted is small-scale fishing (Photo 24), which has been carried out by the residents of the Pineto and Silvi Municipalities since the day of establishing the MPA. In addition, fishing exclusively using bottom gillnets (nets with a mesh of less than 40 millimetres and a maximum length of 4,000 metres per fishing unit), and pots and baskets (not exceeding 200 and 300 pieces, respectively, per fishing unit) is allowed.

For the purposes of control and monitoring, the managing body issues specific permits with an MPA sign, which the beneficiaries must affix to the maritime signalling of fishing gear as provided for by applicable law. In order to be granted a one-year renewable permit, beneficiaries must submit a request to the managing subject by 31 January each year and, at the same time, an official statement of their familiarity with the MD on the Establishment of the MPA and with the regulations pertaining to the activity. The validity of the permit is renewed on an annual basis, under the same conditions, on the basis of an application addressed to the MPA managing body with the corresponding forms (Table 6). These forms have been specially prepared by the managing body for the purpose of monitoring fishing, and concern the activity carried out during in the previous year – they should be completed with information on fishing periods, gear used, fishing methods, fishing area, species caught (commercial and Latin designation, Alpha 3 code, quantity in

CATCH MONITORING FORM - SMALL-SCALE FISHING				
VESSEL NAME: _____		REG. No.: _____		
OWNER: _____		CAPTAIN: _____		
EXIT DATE: ____ / ____ / ____		DISEMBARKATION POINT: _____		
Distance from coast (miles)	ZONE C - North	ZONE D - North	CONTIGUOUS AREA - North	
	ZONE C - Centre	ZONE D - Centre	CONTIGUOUS AREA - Centre	
	ZONE C - South	ZONE D - South	CONTIGUOUS AREA - South	
SPECIES	ALFA CODE 3	QUANTITY (Kg)	Presence of UNDERSIZED specimens	
			YES	NO
CHANGEABLE NASSA (<i>Nassarius mutabilis</i>)	NSQ			

Table 6. Details of the form for monitoring fishing activities in the MPA (www.torredelcerrano.it)

kilograms and possible presence of undersized specimens in accordance with the applicable law). The Execution and Organisation Regulation of the Torre del Cerrano MPA also provides that in the case of a specific request for environmental protection based on monitoring results, the managing body reserves the right to regulate with further measures the procedures for catching fishery resources (in proportion to the characteristics and amount of fishing gear that may be used per fishing unit), the calendar of fishing activities, minimum measures concerning the catch of species, protective measures relating to vulnerable or threatened species, and the prohibition of access to certain areas during specific periods (www.minambiente.it).

A3b A Social and Eco-Friendly Reality which becomes the Community of Cerrano

Thanks to the meetings (Figures 4 and 5) organised between fishermen authorised by the Torre del Cerrano MPA and caterers interested in becoming “Friends of the Marine Park” which took place during the S.E.T.P.I.A. Project, promoted by SPA/RAC within the framework of the SPAMI Twinning Programme, some of the aspects and problems of the two different local socio-economic realities



Figures 4: Documents about the meetings between the different local socio-economic activities

were addressed, with the aim of determining a single shared reality in order to promote, including with the tourism sector involved in the Project, the fish products caught in the MPA according



Figures 5: Documents about the meetings between the different local socio-economic activities

to a short and sustainable supply chain, and to rediscover the dishes of the traditional Middle Adriatic cuisine.

The discussions relating to the issues during these meetings have since produced proactive relationships between the different commercial activities, united by the objective to enhance the sustainability of a fish product which is not on “the daily menu” and its supply chain, with the aim of finding, within the international non-profit association Slow Food, the possibility of becoming the “Community of Cerrano”. This is a reality which, by developing ideas of socio-economic development, will share a common end, and which is currently being realised through various activities, together with the Torre del Cerrano MPA

A3c Interactions with Marine Mammals and Reptiles (Cetacean Studies Centre)

Data on interactions between the fishing activity

and cetaceans and marine turtles in the Torre del Cerrano MPA are extrapolated from the Geocetus geo-referenced database of the Cetacean Studies Centre (CSC) (<https://geocetus.spaziogis.it/>), which collects information about the stranding and rescue of these animals along the Italian coasts. With regard to the Abruzzo region, the data relate to the activity of a regional intervention network which, in addition to the CSC, involves the coastguard, public veterinary services, the Experimental Zooprohylactic Institute (Istituto Zooprofilattico Sperimentale), the Cites Office of the Forestry Carabinieri and the municipalities in the rescue and recovery of animals in distress and dead specimens. The interventions of the regional network allow the specialised staff to collect a great deal of information about the populations and health of animals and the marine environment, either by providing shelter for sea turtles living at the nearby Recovery and Rehabilitation Centre (Centro di Recupero e Riabilitazione) of Pescara, or by carrying out regular necropsy examinations of carcasses found at sea and on the beaches.

In the five-year period 2015-2019, six cetaceans were stranded within the boundaries of the Torre del Cerrano MPA, which rises to 14 if we consider the contiguous area (2 nautical miles around the perimeter); of these 13 were specimens of *Tursiops truncatus* and one was a *Stenella coeruleoalba*. The cause of death was ascertained as anthropic interaction in 5 out of the 14 cases. In more detail, 4 of the deaths were linked to the ingestion of a fragment of a net or net entanglement, and one case concerned the intentional mutilation of a very young specimen (Photo 25), undoubtedly after



25. Young *Tursiops truncatus* exhibiting signs of mutilation and cutting injuries (Cetacean Studies Centre)

being captured. All the other deaths resulted from natural or non-determinable causes due to the condition of the carcass; therefore, other cases of anthropic interaction as the cause or a concause of death cannot be excluded.

In the same five-year period, 44 turtles of the *Caretta caretta* species were picked up within the Torre del Cerrano MPA, four of which were alive. Anthropic interactions were ascertained in only five cases: two specimens exhibited signs of entanglement in nets and fishing lines, one had died as a result of a collision with a vessel, one had ingested a longline hook, and the longline coming out of its beak was tightly wrapped around a second turtle (Photo 26).



26. *Caretta caretta* exhibiting signs of entanglement in a fishing line at neck level (Cetacean Studies Centre)

For all the other numerous dead specimens, which did not exhibit signs of disease or debility, we can only hypothesise that they died from drowning due to interaction with the gillnets, because the fishermen of the MPA report catching turtles only occasionally – they prefer to release them immediately at sea, and in most cases they do not request the intervention of the regional network for animal rescue or for necropsy investigations.

A3d Preliminary Data on Climate Change Effects in the Middle Adriatic Sea: Impacts on the Ecosystem and Presence of Non-Indigenous Species or Native Invaders

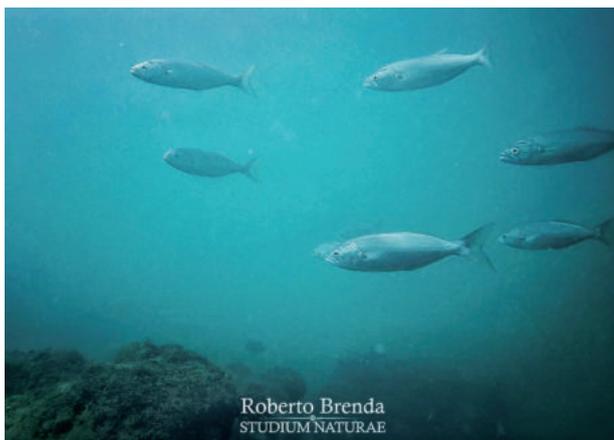
The redistribution of species at a global level is among the most evident consequences of climate

change, which predominantly occurs in the marine environment where, for example, even seemingly modest changes in water temperature may quickly trigger cascade alterations with effects on biological communities which, if they survive, often react by moving to more suitable areas, especially, if equipped with motor skills, towards the northern hemisphere. Even the excessive exploitation of the marine environment and water pollution, together with other anthropic factors, contribute to these changes in ecosystem biodiversity, and this occurs particularly clearly in the Mediterranean as a “semi-closed” sea that is warming faster than any other marine region in the world (Azzurro *et al.*, 2019; Schroeder *et al.*, 2016; Vargas-Yañez *et al.*, 2008).

Some ecological socio-economic effects caused by alterations in the interactions between species and in the food web can be well observed in the Mediterranean coastal environments, including the marine protected areas, which will have to address this new environmental problem in order to preserve natural ecosystems (www.italiaambiente.it, 2019).

Regardless of the enormous impact on natural ecosystems, as well as on human populations all over the world, studies are still limited, due to pragmatic investigative difficulties in vast natural spaces, and to the necessity for integrated monitoring data evaluation systems (Azzurro *et al.*, 2019; Crall *et al.*, 2010; Guidetti *et al.*, 2006). On the other hand, the exchange of knowledge of fishermen from different countries has allowed researchers to reconstruct recent changes in the distribution of 75 Mediterranean fish species, based on the experience and knowledge of small-scale fishermen, who spend a considerable part of their lives in close contact with the environment, thus becoming familiar with the local fish species. In this study, entitled “Climate change, biological invasions, and the shifting distribution of Mediterranean fishes: a large-scale survey based on local ecological knowledge” and published on 22 May 2019 by Global Change Biology magazine, more than 500 fishermen, recognised as holders of

Local Ecological Knowledge (LEK), who come from 9 Mediterranean countries (Albania, Montenegro, Tunisia, Greece, Cyprus, Lebanon, Slovenia, Turkey and Italy), were interviewed between 2009 and 2016. This allowed the researchers to obtain data by observing native fish species which expanded northward taking advantage of more favourable climate conditions (*native invaders*), such as *Pomatomus saltatrix* (Bluefish), as well as tropical fish species “Lessepsiane” (coming from the Red Sea), i.e. non-autochthonous and non-indigenous species (NIS), such as *Lagocephalus sceleratus* (silver-cheeked toadfish). Data from the survey conducted within the S.E.P.I.A. Torre del Cerrano Project (2018) showed that *Pomatomus saltatrix* (Photo 27) has been found in the Torre del Cerrano MPA, and it will be the subject of forthcoming studies.



27. *Pomatomus saltatrix* in the sea in front of the town of Silvi (Teramo).

The AlienFish Project, “Monitoring uncommon and non-indigenous fish in Italian waters: one year of results of the AlienFish project” (Tiralongo *et al.*, 2019), carried out in 2018, highlights that the abundance of NIS in Italian waters is still low and cannot be compared with the density these species may reach in the more eastern sectors of the Mediterranean Sea (Katsanevakis *et al.*, 2014a; Golani *et al.*, 2002), where they may remain confined for years before beginning to expand (Azzurro *et al.*, 2016a).

In a study entitled “Lessepsian fish invasion in Mediterranean marine protected areas: a risk assessment under climate change scenarios” (D’Amen e Azzurro, 2019), published by ICES Journal of Marine Science on 23 November 2019, marine protected areas are indicated as instruments for the support of marine ecosystems; however, current protection measures may not be effective in preserving these areas from global threats, particularly those caused by climate change and invasive species (Monzón *et al.*, 2011; Keller *et al.*, 2009), which represent a challenge for preservation (Katsanevakis *et al.*, 2014). In this regard, recommendations have already been produced (e.g. SPA/RAC - UNEP/MAP, 2014; Mazaris e Katsanevakis, 2018). At the same time, MPA managers must be provided with instruments to shape appropriate strategies to mitigate correlated impacts (Fulton *et al.*, 2015).

Part B

Development of Management Measures in the Strunjan Marine Protected Area

B.1 Landscape Park Strunjan

Landscape Park Strunjan was established on 2nd February 1990 by the Ordinance on the declaration of Landscape Park Strunjan by the municipalities of Izola and Piran. In 1999, a new basic regulation for the protection of nature in Slovenia was adopted, namely the Nature Conservation Act, on the basis of which the Government of the Republic of Slovenia adopted the Decree on Landscape Park Strunjan.

In 2008, the amended Decree stated that the Government of the Republic of Slovenia would establish a Public Institute which carries out public services in the field of protection of nature, manages databases related to the Park within the framework of public powers, and carries out direct nature protection supervision in the area of the Park.

The objectives of the protected area as stated in the legal act are as follows:

- the protection of natural values
- the conservation of biodiversity
- the conservation of the populations of rare, threatened, nationally and internationally protected species,
- assuring the good conservation status of the Natura 2000 habitat types and species,
- the conservation of the landscape diversity of the area and the ecological characteristics of the salt pans, the coastal lagoon and the coastline, as well as the natural processes between the supra-, - medio and infralittoral.

Landscape Park Strunjan is situated in the south-western part of Slovenia on the Adriatic coast. It comprises the area of the Strunjan peninsula



28. Strunjan Peninsula

(Photo 28), projecting into the Gulf of Trieste, the northernmost part of the Mediterranean; the 200m-long shoreline; and the entire bay of Strunjan. The area of the park, covering 428.6 hectares, expands over two municipalities: Piran and Izola. The Park has three narrow protected areas: Strunjan Nature Reserve, Strunjan-Stjuža Nature Reserve and Natural Monument Pine trees avenue (Figure 6).



29. Marine biodiversity

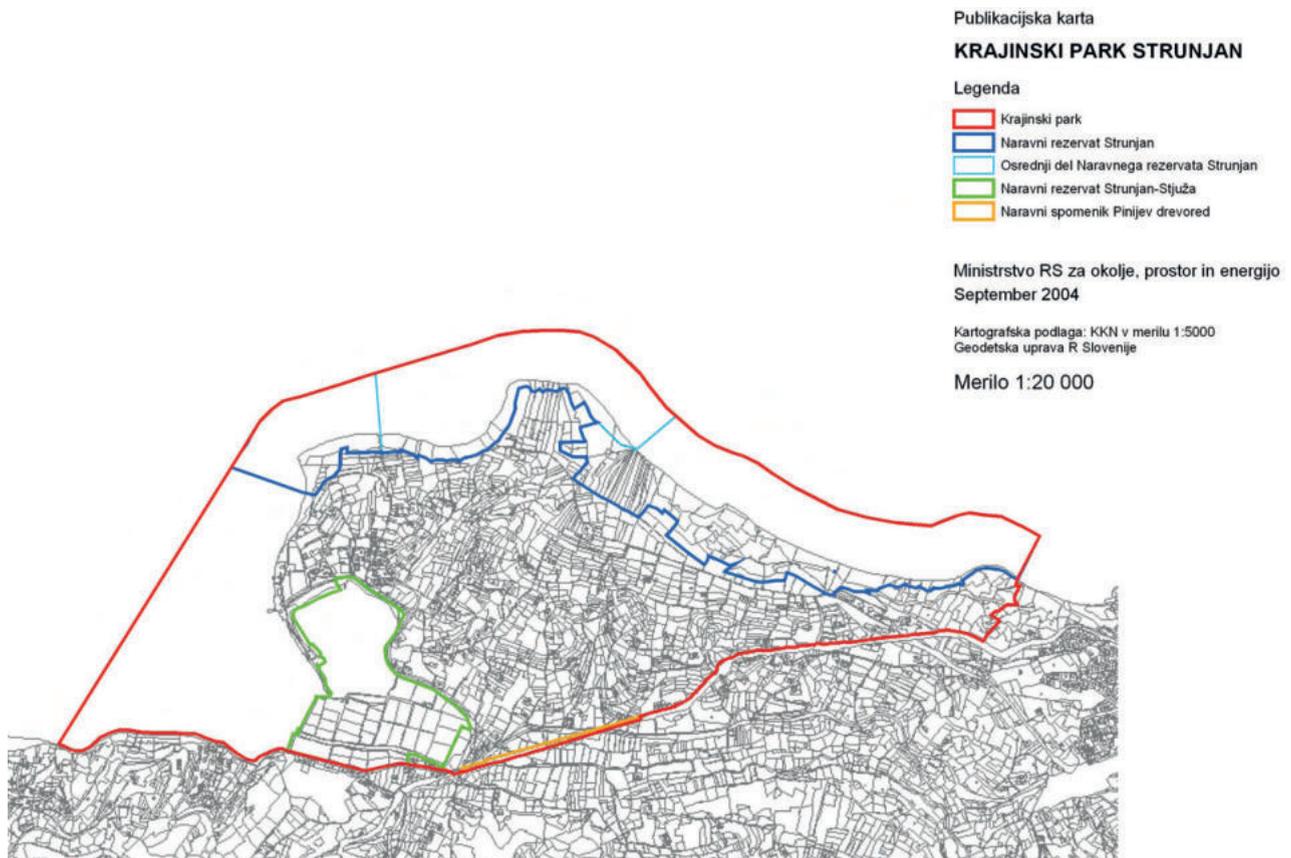


Figure 6: The boundaries of the Park and the narrow protected areas are shown on the annexed map at a 1:20,000 scale, which is an integral part of the Decree on Landscape Park Strunjan (the legal declaration of the area).

- Legend:
- Krajinski park – Landscape Park
 - Naravni rezervat Strunjan – Strunjan Nature Reserve
 - Osrednji del Naravnega rezervata Strunjan - Strunjan Nature Reserve core area
 - Naravni rezervat Strunjan Stjuža –Strunjan Stjuža Nature Reserve
 - Naravni spomenik Pinjjev drevored – Natural Monument Pine trees avenue

The coastal and marine part of the KPS is mainly characterized by rocky coast under Eocene flysch cliffs, an artificial marine lagoon and a small sized salt pans. The spatial heterogeneity is very high and is one of the main reasons explaining the outstanding biodiversity in this area (Photo 29).

B.2 Involvement of the civil society in SPAMIs/MPAs management activities: Incorporating marine mammals into MPA management to improve overall marine conservation (Morigenos)

(Genov *et al.*, 2019b; Genov *et al.*, 2019a; Genov *et al.*, 2017; Genov *et al.*, 2008)

Incorporating marine mammals into MPA management to improve overall marine conservation:

- Morigenos – Slovenian Marine Mammal Society
- Ecological monitoring
- Education and awareness activities

Morigenos Slovenian Marine Mammal Society

During summer 2019, a project “Incorporating marine mammals into MPA management to improve overall marine conservation”, was carried out by Morigenos – Slovenian Marine Mammal Society, in collaboration with Landscape Park Strunjan, within the framework of the SPA-RAC’s

call for projects “Involvement of the civil society in SPAMIs/MPAs management activities” and part of the SPAMI Twinning Programme.

Morigenos – Slovenian Marine Mammal Society is an independent, scientific, non-profit, non-governmental organisation, which combines scientific research, monitoring, education, public awareness and capacity building, towards effective marine biodiversity conservation. Morigenos discovered, documented and continues to study a population of common bottlenose dolphins (*Tursiops truncatus*) in the Gulf of Trieste, northern Adriatic Sea, which has been continuously studied since 2002. Other protected species of international relevance, such as sea turtles and seabirds, also inhabit these waters.

In addition, Morigenos carries out extensive education, outreach and public awareness activities nationally and internationally, through a number of approaches. The Strunjan marine protected area (MPA) is one of 3 MPAs in Slovenia, and the only one with a proper management body and a management plan. The general purposes of the project were: 1) to improve monitoring of relevant protected species (marine mammals, sea turtles and seabirds) within the Strunjan MPA; 2) to specifically incorporate marine mammals into monitoring within the MPA; 3) to increase awareness of MPA visitors and the local community, and highlight marine mammals as part of the local biodiversity; and 4) to provide added value to the Strunjan MPA by including marine mammals in education programmes.

This project combined scientific ecological monitoring of large marine vertebrates (marine mammals, sea turtles and seabirds) within the Strunjan MPA with education and public awareness activities focusing on these species, via collaboration with the MPA management body.

Ecological monitoring

Ecological monitoring was carried out via at-sea boat surveys, covering the entire Strunjan MPA (Figure 7). The presence of various target species was recorded, along with the number of recreational vessels anchored within the MPA area, as well as any potential violations of the MPA regulations. No marine mammals or sea turtles were encountered during the surveys, but data collected in previous years showed that common bottlenose dolphins do regularly use these waters. However, several species of seabirds were recorded (Figure 8), including the yellow-legged gull (*Larus michahellis*, Photo 30), Mediterranean shag (*Phalacrocorax aristotelis demarestii*), black-headed



30. Yellow-legged gull (*Larus michahellis*) resting on the marking buoy of the Strunjan MPA



Figure 7. Survey transects used for the ecological monitoring

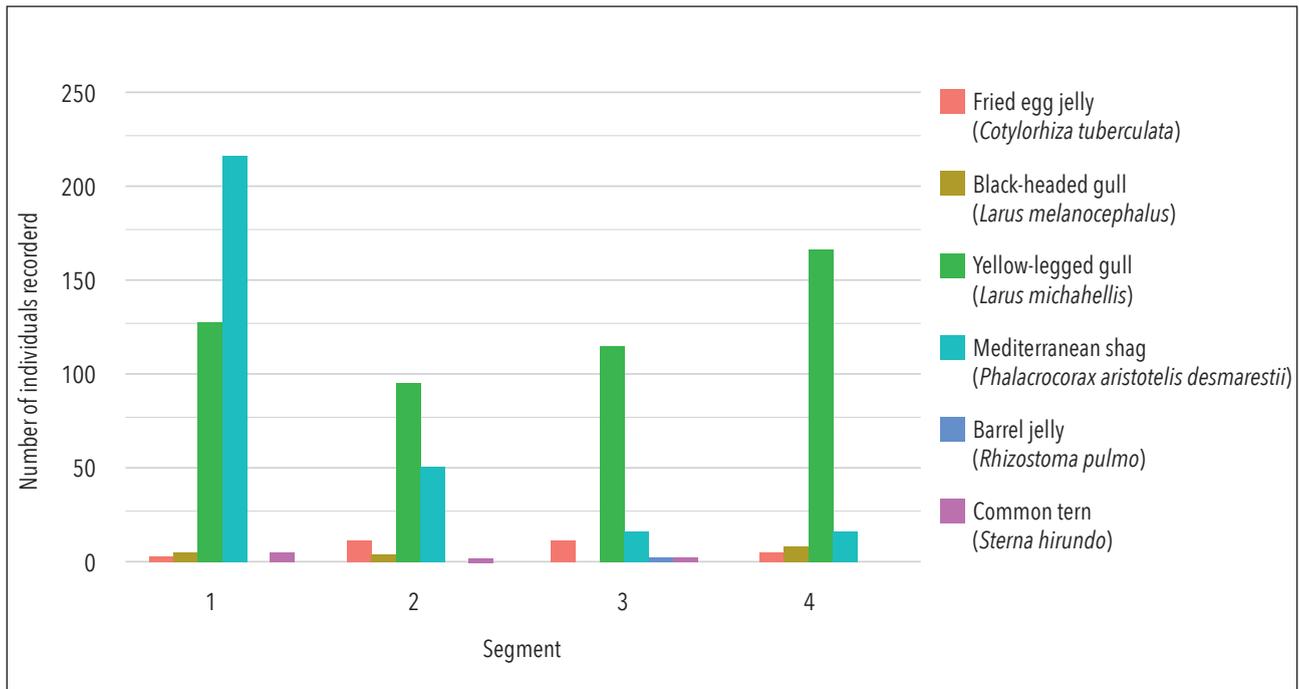


Figure 8. Number of recorded individuals of various animal species in different segments of the Strunjan MPA

gull (*Larus melanocephalus*) and the common tern (*Sterna hirundo*). A total of 5 violations of the MPA regulations were recorded. Of these, 3 pertained to illegal anchoring inside the MPA and 2 to illegal



31. Unauthorised anchoring within the Strunjan MPA

navigation within the MPA. In all these cases, photographic documentation was performed, the Strunjan Landscape Park staff were notified, and the violators politely informed about their misconduct.

Education and awareness activities

Education and awareness activities were carried out via public lectures on the biology and presence

of marine mammals (Photo 32); the portable



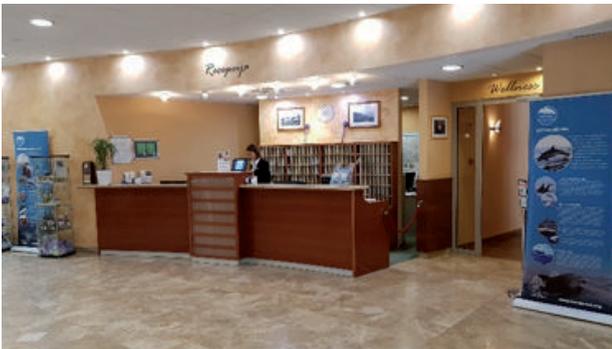
32. Public lecture about dolphin biology and conservation at the Strunjan Landscape Park visitor centre

education exhibition; and via online platforms such as various social media outlets. Lectures were organised at the Strunjan MPA visitor centre, at the local elementary school in Lucija (Photo 33) at the Škocjanski zatok visitor centre in Koper (in collaboration with BirdLife Slovenia), and at Persimon festival in Strunjan. An educational exhibition was set up at the Hotel Salinera in Strunjan, as a collaborative education action between Morigenos, Strunjan Landscape Park and



33. Lecture about dolphin biology and conservation for schoolchildren at a local elementary school

Hotel Salinera (Photo 34). Throughout the summer, information about the project was shared through various social media.



34. Educational exhibition in Hotel Salinera, Strunjan

The project managed to successfully achieve the planned objectives. Valuable new data on both the presence and the absence of various species in space and time were obtained, which can be incorporated into future monitoring and management plans. The educational activities involving local people, tourists, school children and

participants of Morigenos dolphin research courses led to an increased awareness of the public about the presence and importance of marine mammals. Finally, the follow-up activities of this project will hopefully lead to a greater recognisability of the area as an attractive and most importantly sustainable tourism destination.

B.3 Local Small-Scale Fishing in Landscape Park Strunjan

In the area of the Park, an important role, in addition to agriculture and salt production, is played by local small-scale fishing (Photo 35). In the past decade, six fishermen had licences for commercial fishing in the renovated small fishing port in Strunjan. Commercial fishing is conducted with small vessels and, most importantly, with bottom-set gillnets and trammel nets – rarely with fish traps. According to the weight, the largest proportion of catches



35. Local small-scale fishing

consisted of the following species: common sole (*Solea solea*), common cuttlefish (*Sepia officinalis*), sea bream (*Sparus aurata*), European flounder (*Platichthys flesus*), common pandora (*Pegellus erythrinus*), European bass (*Dicentrarchus labrax*), black scorpionfish (*Scorpaena porcus*) and flathead grey mullet (*Mugil cephalus*).

In 2014 the Public Institute Landscape Park Strunjan began the improvement of the management of Small-Scale Fisheries in the MPA. The first activities were carried out through a project on Sustainable Management of Coastal

Fishing financed by the independent organization MedPAN, which currently connects nearly 100 institutions and non-governmental organizations which either directly manage marine protected areas in the Mediterranean or participate in their development. The principal aims of the Park's project were the monitoring of catch and by-catch in collaboration with professional fishermen; the training of fishermen in the identification of marine species; the analysis of the data gathered from an inventory of marine life compiled by marine biologists in various locations of the marine reserve; the assessment of the conditions for signing and implementing an agreement between the fishermen and the Park; the organization of an international seminar in Strunjan to present examples of good practice in co-management of fishery resources; and delivering a press conference. The project, which was terminated in early 2016, involved fishermen and experts from Landscape Park Strunjan and the Piran Marine Biological Station, who jointly worked towards achieving the set objectives. At the press conference following the completion of the project, the Park presented the impacts of the current fishing regime valid in the area of Strunjan Nature Reserve, and laid down a path towards a new agreement with the fishermen.

The Management Plan for Landscape Park Strunjan for the period 2018-2027, adopted by a Government Regulation in February 2019, describes a detailed definition of the protection arrangements, including for commercial fishing in Strunjan Nature Reserve, and provides for the arrangement of an agreement on the conditions of commercial fishing in the area of Strunjan Nature Reserve between the managers of the MPA and the local professional fishermen. The aim of this agreement is the conservation and protection of Strunjan Nature Reserve with the collaboration of the small-scale fishery, which has a long tradition in the protected area and significantly contributes to the conservation of biodiversity and resources in the MPA.

Within the SPAMI TWINNING PROGRAMME with SPA/RAC (Specially Protected Areas Regional Activity Centre), Landscape Park Strunjan carried out "Participatory processes involving stakeholders and delivering efficient fishery management strategies". Within this project, the Park had the opportunity to continue its activities towards the final harmonization of the Agreement on the Implementation of Commercial Fishing in the area of Strunjan Nature Reserve, and the collaboration of fishermen with Landscape Park Strunjan together with the Ministry of Agriculture, Forestry and Fisheries, the Institute of the Republic of Slovenia for Nature Conservation, the Fisheries Research Institute and, last but not least, commercial fishermen (Photo 36). The activities of



36. Meeting with commercial fishermen

the project were directed towards the definition of the scientific background from the preliminary studies; the definition of the legal basis; the evaluation of the existing outputs on the current fishing regime and proposed recommendations; the selection of the type of fishing gear; and the definition of the mode of cooperation of local fishermen with the manager

B3a Regulations governing coastal commercial fishing in Strunjan Nature Reserve

In Landscape Park Strunjan, the basic guidelines for conducting commercial fishing as defined in the articles of association, i.e. the Decree on Landscape

Park Strunjan, which defines the area of the park, the narrower protected areas in the park, the rules of conduct and protection regimes, the manner of managing the Park, the surveillance in the park and other practices related to the purpose of this Decree. This Decree also sets out development guidelines in the Park, which respect the principle of sustainable development.

The Decree also stipulates that the carrying out of fishery activity is defined in more detail in the management plan, which is a programming measure and defines the development policies, methods of implementation of protection, and the use and management of the protected area, as well as more detailed guidelines for the protection of natural values. It is taken into consideration during spatial management, the pursuit of activities, and the management and use of natural resources in the Park, their governance, the conservation of landscape diversity, and the provision of utilities and other public services in the Park.

The Decree on Landscape Park Strunjan provides for a prohibition on carrying out commercial fishing except during the periods from 1 April to 1 June and from 1 October to 1 December, in accordance with the Management Plan. The Management Plan further specifies that only commercial fishermen may fish in Strunjan Nature Reserve during the stated period, in accordance with an agreement defining the maximum number of nets that can be used by fishermen in the area at the same time, which the Ministry of Agriculture, Forestry and Food determines in co-operation with the Park Manager, the Institute of the Republic of Slovenia for Nature Conservation, the Fisheries Research Institute of Slovenia, and commercial fishermen.

There are two fishing reserves in the Slovenian part of the Adriatic Sea intended for the protection of fishery resources: the Portorož Fishing Reserve and the Strunjan Fishing Reserve with the salt pans. The latter partly falls within the boundaries of Landscape Park Strunjan. According to the Marine Fisheries Act, commercial and non-commercial fisheries are prohibited in the area of the fishing reserves. However, notwithstanding

the prohibition in the reserves, fishing of winter shoaling of mullet may be allowed on the basis of a special commercial fishing permit issued by the Minister responsible for fisheries. Strunjan Nature Reserve further defines the core area (Photo 37), including the sea enclosed by Zaliv Sv. Križa bay, and in front of the Ronek headland, where more



37. Core area of Strunjan Nature Reserve

strict protection arrangements apply (no-take zone) with a complete ban on fishing.

Laws and secondary legislation governing coastal commercial fisheries in the Strunjan NR:

1. The framework law is the **Zakon o morskem ribištvu** (OG of the RS, No. 115/06, 76/15 and 69/17, English title: Marine Fisheries Act), enabling the implementation of the common fisheries policy for the conservation and exploitation of fisheries resources, conditions for access to fisheries resources, structural measures, controls, market organization and international relations regarding fisheries in accordance with the regulations of the European Union.
2. **Council Regulation (EC) No 1967/2006 of 21 December 2006** concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea, amending Regulation (EEC) No 2847/93 and repealing Regulation (EC) No 1626/94
3. **Pravilnik o dovoljenju in posebnem dovoljenju za gospodarski ribolov** (OG of the RS, No. 90/15, Eng Rules on licences and special licences for commercial fishing).
4. **Pravilnik o programu usposabljanja za**

- izvajanje gospodarskega ribolova, potrdilo o opravljenem izpitu in o vodenju evidenc o izdanih potrdilih o opravljenih izpilih (OG of the RS, No. 44/05, Eng: Rules on the training programme for the implementation of commercial fishing, certificate of the exam performed and records of issued certificates of exams).
5. **Pravilnik o trgovskih imenih rib** (OG of the RS, No. 46/05, Eng: Rules on trade names for fish).
 6. **Uredba o spremljanju ulova in prodaji ribiških proizvodov** (Uradni list RS, št. 38/16, Eng Decree on the monitoring of catches and sales of fisheries products).
 7. **Pravilnik o vsebini in načinu vodenja evidence ribičev - fizičnih oseb** (OG of the RS, No. 109/07, Eng: Rules on contents and manner of keeping of records of the fishermen - natural persons).
 8. **Pravilnik o prostočasnem ribolovu na morju** (OG of the RS, No. 64/08, Eng: Rules on leisure sea Fishing).
 9. **Pravilnik o podrobnem označevanju ribolovnih orodij in zagotavljanju trajnostne rabe rib** (OG of the RS, No. 87/08 in 11/10, Eng: Rules on detailed marking of fishing gear and to ensure sustainable use of fish).
 10. **Pravilnik o načinu nabiranja in dnevni količini nabranih školjk** (OG of the RS, No. 88/15, Eng: Rules on the collecting method and daily quantity of collected bivalve molluscs).
 11. **Pravilnik o dovoljenju in posebnem dovoljenju za gospodarski ribolov** (OG of the RS, No. 90/15, Eng: Rules on licences and special licences for commercial fishing).
 12. **Pravilnik o evidenci ribiških plovil in evidenci plovil, ki se uporabljajo v marikulturi** (OG of the RS, No. 60/16, Eng: Rules on the register of fishing vessels and vessels used in mariculture).
 13. **Uredba o Krajinskem parku Strunjan** (OG of the RS, No. 107/04, 114/04 – amended, 83/06, 71/08, 77/10 and 46/14 – ZON-C, Eng: Decree on the Strunjan Landscape Park).
 14. **Uredba o Načrtu upravljanja Krajinskega parka Strunjan za obdobje 2018–2027** (OG

of the RS, No. 13/19, Eng: Decree on the management plan for the Strunjan Landscape Park 2018–2027).

15. **Uredba o Načrtu upravljanja Krajinskega parka Strunjan za obdobje 2018–2027** (Uradni list RS, št. 13/19, angl: Decree on the management plan for the Strunjan Landscape Park 2018–2027).

B3b The Variety of Fish Populations in Landscape Park Strunjan and the Role of Small-Scale Fishing

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National Institute of Biology, Slovenia

At the turn of the previous century it was already known that, due to overfishing, populations of several fish species had been seriously decimated. The findings of numerous research studies revealed arguments showing that marine protected areas are a good approach to mitigating the trend of decrease in fish populations. In addition, they highlighted some facts showing that traditional fishing methods in a small area (small-scale fishing) is considerably less damaging and therefore more sustainable from this viewpoint. Within this framework, a research study entitled “*Trajnostno upravljanje priobalne ribolova v Krajinskem parku Strunjan*” (Sustainable Management of Small-Scale Fishing in Landscape Park Strunjan) was carried out in the stretch of sea by the Slovenian coast. The aim of this research, coordinated by MedPAN, was to improve the manner of monitoring the situation, with the help of fishermen, in the marine reserve of Landscape Park Strunjan (hereinafter LPS).

Methods

The research area concerned the sea in Strunjan Nature Reserve – a protected area characterised by preserved flysch cliffs which extend from the bay of Simonov zaliv to Strunjan. This is in general the longest section of natural coastline in the Gulf

of Trieste, covering an area of approximately 90 hectares. Between 2014 and 2015, fish sampling in the marine park was carried out twice a year using fishing nets: four times in the part of the reserve pertaining to the Municipality of Izola, and four times in the area pertaining to the Municipality of Piran. The fish populations were also inventoried by researchers from the Piran Marine Biology Station using underwater inventories. They used a non-destructive technique to identify the fish, recognised today as a standard method of establishing the presence and density of fish species. This technique has no adverse effects on the fish fauna, which is particularly important when carrying out sampling in protected areas. We used transects parallel to the coast which appear in a more or less uniform habitat type at constant depth, and vertical transects were used to inventory the fish community 100 metres distant from the coast. A total of 109 parallel (50 m in length) and 36 vertical inventory transects (100 m) were carried out. All the established fish specimens were determined on the spot and noted on a dive slate. The density of the fish species were calculated in 125 m².

Comparison of Three Methods

The inventory with parallel transacts revealed 47 fish species, whereas the vertical inventory revealed 54 fish species (Figure 9). The outtake confirmed 37 fish species. The sampling outtake used by fishermen in the sea of the LPS showed that many types of commercial fish species appear in the reserve. It also happened that several fish species which were confirmed during sampling dives were not caught in the fishing nets. Only 14 out of a total of 69 species were common to all three methods, with 9 species appearing solely either in the outtake or in vertical transects, and only 3 species inventoried solely in parallel transects. Despite being a pilot research study of the monitoring of fish populations within a reserve, the obtained results show that the combination of all three, albeit very different, methods is useful

for establishing fish stocks. Species that were not inventoried with the outtake include fish that do not stay in the reserve (e.g. sharks from the genus *Mustelus*, *Clupea pilchardus*, *Alosa fallax*, *Pagellus acarne*, etc.), appearing only transitionally when crossing this environment. It is also obvious that the experimental outtake within the reserve did not particularly affect the resident fish, but only the transitional fish.

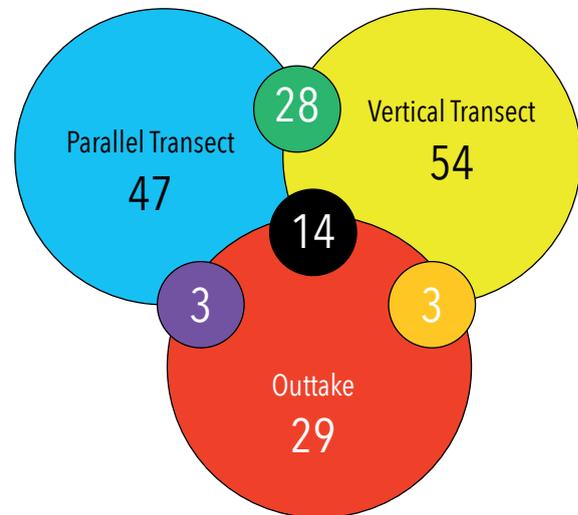


Figure 9: The number of fish species established by the three different sampling methods. The intersections of individual sets represent the number of species that were established in both (or all) sets

The Importance of Including Fishermen in Research

The results confirm the findings that sustainable fishing of limited extent (small-scale fishery) is compatible with the role played by marine protected areas. In this specific case, the LPS has habitat types where several juvenile fish find shelter from predators and safety, and can therefore develop into adult specimens. Such habitat types are mainly seagrass meadows and shallow environments densely overgrown with algae (Photo 38-39). In this respect, marine protected areas spread over neighbouring areas, with new recruits inhabiting them. The inclusion of fishermen in the management of marine protected areas is reasonable from many viewpoints, and in this respect the contribution of data on diversity and other organisms and phenomena in the sea is particularly important. In recent years, the trend towards including



38. Dreamfish (*Sarpa salpa*) are a common species of fish in Landscape Park Strunjan (L. Lipej)



39. A school of golden grey mullets (*Liza aurata*) on a noble pen (L. Lipej)

fishermen and other stakeholders associated with fish populations, known as LEK (local ecological knowledge), has emerged, especially in the Mediterranean Sea (Azzurro *et al.*, 2017). Based on a survey of fishermen carried out in several Mediterranean countries, researchers have confirmed the current trends in the spread of species northward and the arrival of various non-indigenous fish species, so their inclusion in modern marine research is very useful and desirable.

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B3c Small-scale fishery and marine protected areas: recommendations for managers

Robert Turk (Turk R., 2019)

The principal objective of the majority of Marine Protected Areas (hereinafter: the MPAs) is nature conservation. In addition, they may also seek to protect or restore habitats and/or species that are also fishery resources. Strictly protected areas – nature reserves – bring the greatest ecological benefits, such as an increase in stocks, biomass, density and reproduction of fish populations. The “reserve effect” is reflected in the passing of fish biomass to fishing areas, and thus in the improvement of conditions for small-scale coastal fishing.

The establishment of MPAs in the Mediterranean is a relatively new phenomenon affecting the small-scale coastal fishery sector. While MPAs and other spatial tools, such as fishery restricted areas, may also support ecosystem-based fishery management, defining coastal MPAs results in new limitations for fishermen. This results in frequent conflicts, which in some cases make it difficult to promote co-operation between MPAs and fishermen. The situation has recently improved, and considerably more MPA managers and fishermen believe that they can establish, through dialogue, a common vision and goals, which include the restoration of fish stocks and the conservation of fish habitats at different stages of life.

The managers of MPAs play the key role in the management of small-scale fisheries in their areas.

In this regard it is reasonable that they direct their activities towards:

- A proactive approach to building lasting and close collaboration with the small-scale coastal fisheries sector in terms of establishing co-management in the area;
- Monitoring the situation of the small-scale fishery with the intention of shaping appropriate measures;

- Carrying out an appropriate zonation of the MPA and, furthermore, defining the area by a strict reserve protection, thus reducing the possibility of conflicts with other area users;
- Designing their own plan for fishing management which could include the following measures:
 - Reducing fishing by seasonal or temporary fishing bans, with restrictions on gear or fishing time (maximum 24 hours);
 - Improving the selectivity of fishing gear;
 - Reducing accidental catches of sharks, rays, seabirds, turtles and sea mammals through risk mitigation measures;
 - Reducing by-catches and discards with regulations or economic incentives;
 - Reducing the impact of small-scale coastal fishing on vulnerable marine species by limiting gear and the minimum size or fishing season;
 - Reducing unwanted catches by removing lost fishing gear;
 - Implementing waste collection plans at landing sites;
 - Increasing the effectiveness of control and the enforcement of sanctions;
 - Supporting initiatives to increase the added value of small-scale coastal fisheries products by optimising distribution channels, promoting catches of low market value, granting quality labels to sustainable products obtained by small-scale fishing, educating and raising consumer awareness, etc.

Source: PHAROS4MPAs Project - Zaščita morskih zavarovanih območij ob rastočem modrem gospodarstvu v Sredozemlju (Protection of marine protected areas with the growing blue economy in the Mediterranean)

B3d Recent Changes in the Marine Part of Landscape Park Strunjan (Slovenia: North Adriatic): Climate Change and Bioinvasion-Related Phenomena

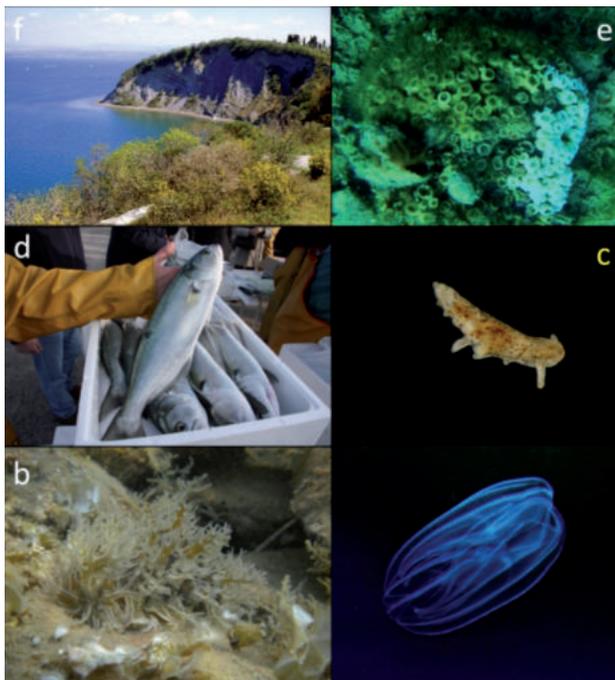
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In recent decades we have witnessed numerous changes faced by the Mediterranean's marine biodiversity. In particular, these are processes, such as the relative sea level rise, coral bleaching and phenomena related to the expansion of certain species northward and the arrival of non-native species from other bio-geographical provinces in the Mediterranean Sea. This applies also to its northernmost areas, which include the Slovenian part of the Adriatic Sea.

Landscape Park Strunjan (hereinafter: LPS) is an important protected area covering the largest part of the pristine natural coast in the Gulf of Trieste. This is why it is not surprising that it is the richest in terms of the number of species and diverse habitat types. Consequently it represents an important habitat for many marine organisms, which proliferate here and can then expand into the adjacent areas. This paper discusses recent phenomena related to climate change and bioinvasion within LPS (Photo 40).

Coral Bleaching

The Mediterranean stony coral (*Cladocora caespitosa*) is an excellent indicator of climate change. Coral bleaching may occur due to the high temperatures experienced in the past few decades, when as a consequence of physiologic stress endosymbiotic zooxanthellae are expelled from the coral's polyps. In LPS, cases of bleaching have been established several times. It seems that bleaching usually occurs when temperatures exceed 26–27°C, although it can also happen at slightly lower temperatures. Since 2011, when cases of stony coral bleaching were confirmed



40. a – Panoramic view of part of LPS; b – Coral bleaching: Mediterranean cushion coral (*Cladocora caespitosa*) – the left part of the colony is in a normal state, whereas on the right there are several dead polyps (necrosis); c - Bluefish (*Pomatomus saltatrix*); d – Non-native snail of the Gasteropode *opisthobranch* species; e – Non-native ragged sea hare (*Bursatella leachii*); f – non-native sea walnut (*Mnemiopsis leidyi*) (Photo: a, b, e and f – L. Lipej; c – B. Šuligoj; d – Domen Trkov)

within LPS, this phenomenon has reoccurred on a smaller scale every year during the summer months. The extent of the phenomenon may be reflected in the loss of endosymbionts, which can be regained by corals when the temperature drops – it is therefore a reversible process. However, if high temperatures persist for a longer period, this results in the death of a single polyps (necrosis), of the entire colony, or the mass death of all the colonies in a given environment.

Meridionalisation

Due to the higher temperatures of the past few decades, there has been a fall in the ecologic barriers which prevented the expansion of species northward, including in the northern parts of the Mediterranean Sea. Changes in the fish species areas are a good indicator of the effects of temperature changes, because fish are unable to regulate their temperatures with respect to the surrounding water (Stebbing *et al.* 2002). So far,

more than 20 fish species have been observed which are connected to the meridionalisation phenomenon. The majority of thermophilic fish appeared in one case only, and others occasionally, while some species are regular residents in the Slovenian part of the Adriatic. Some of them, such as the bluefish (*Pomatomus saltatrix*), are already causing problems in fish populations as they are successful predators. Within LPS, typical meridionalisation - related species appear irregularly. Other typical species associated with meridionalisation include the common dolphinfish (*Coryphaena hippurus*), the black ruff (*Centrolophus niger*), the pelagic stingray (*Pteroplatytrygon violacea*), the round sardinella (*Sardinella aurita*), and the blunthead puffer (*Sphoeroides cutaneus*), among others.

Non-Indigenous Species

In the past decade, more than 20 non-indigenous species (Figure 10) have been observed in LPS. Most appeared in only one or a few cases, although others regularly appear in LPS. Most of the species are associated with Lessepsian migration, maritime transport and mariculture. Within the LPS, the fishing port and bivalve mollusc farms in Strunjan Bay are the most important points

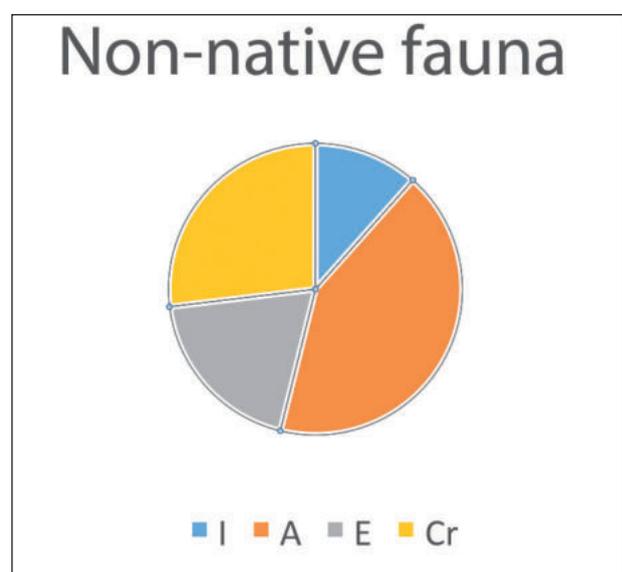


Figure 10: Non-indigenous marine fauna within LPS. Legend: I – Invasive species; E – established non-indigenous species; A – Non-indigenous species which appear rarely and/or irregularly; Cr – Cryptogenic species (unclear biogeographical origin)

for the presence of non-native species. The most common non-indigenous species, which is also invasive, is the Japanese oyster (*Magallana gigas*), which can be found practically everywhere in the intertidal zone. Some species have appeared in this environment for a longer period of time, which is also true for the non-indigenous ragged sea hare (*Bursatella leachi*). Fouling on vessels includes the non-indigenous bryozoans (*Amathia verticillata* and *Bugula neritina*), on which several non-indigenous species of crustaceans (Amphipoda, Isopoda) and sea slugs (Opisthobranchia) live.

Conclusion

Given the recent changes in the Mediterranean sea environment, which result in the arrival of non-indigenous species and species related to

climate change and coral bleaching, the regular monitoring of these types of phenomena is extremely important for the planning of measures to reduce or mitigate their consequences. Marine protected areas, such as the LPS, are particularly important from this point of view. Due to the protection status, which allows natural processes to function smoothly in protected areas, there is a significantly lower probability that species associated with meridionalisation and bioinvasion in such an environment will cause consequences to the native flora and fauna. On the other hand, coral bleaching is a matter of concern, as this phenomenon is entirely dependent on above-average summer sea temperatures. In this case, the reintroduction of young stony corals to make up the damage caused by coral death would be reasonable.

2. Conclusion

The SPAMI TWINNING between Landscape Park Strunjan (Slovenia) and the Torre del Cerrano Marine protected Area (Italy), promoted by SPA/RAC-UNEP/MPA, can be considered, between work meetings and sharing of experiences involving local populations, an excellent example of cross-border

collaboration where one's experience becomes another's project (Photos from 41 to 53). To conclude, we want to thank all those who contributed to the success of the project and in particular the SPA/RAC and Dr. Saba Guellouz for her professional skills and hearty participation.



41-43. The delegation of the Torre del Cerrano MPA (Italy) at Landscape Park Strunjan (Slovenia) to share work experiences within the framework of the SPAMI Twinning Programme, April 2019



44. Presentation of work in progress during the twinning programme Torre del Cerrano-Strunjan 2019 led by Dr Saba Guelloz, responsible of the SPAMI Twinning Programme (Landscape Park Strunjan, April 2019)



45. The summit of the Torre del Cerrano MPA (Italy) together with the delegation of Landscape Park Strunjan (Slovenia) visiting the region of Abruzzo in June 2019



46. Director Fabio Vallarola showing to the Landscape Park Strunjan staff the peculiarities of zoning during a visit to the Torre del Cerrano Marine Protected Area in June 2019



47. The Director of Landscape Park Strunjan, Robert Smrekar, during an excursion to the inland of the Torre del Cerrano MPA with the staff of twinned marine protected areas (SPAMI Twinning), June 2019



48. Release of Caretta caretta with the Cetacean Studies Centre in June 2019 in Pescara



49-53. Rome, 19 November 2019: SPAMI Twinning – Workshop at the Ministry for the Environment, the Protection of Natural Resources and the Sea



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