INŠTITUT ZA VODE REPUBLIKE SLOVENIJE | Institute for Water of the Republic of Slovenia

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EO8 Coastal Ecosystems and Landscapes Common Indicator 16 - Length of coastline subject to physical disturbance due to the influence of manmade structures - Slovenia

(EO8 Skupni kazalnik obalnih ekosistemov in krajin 16 - Dolžina obalne linije, ki je predmet fizičnih motenj zaradi vpliva pozidave obale - Slovenija)

REPORT

PAP/RAC

UN environment
United Nations Environment Programme

MAP
Mediterranean Action Plan
Barcelona Convention

TITLE:	EO8 COASTAL ECOSYSTEMS AND LANDSCAPES COMMON INDICATOR 16 - LENGTH OF COASTLINE SUBJECT TO PHYSICAL DISTURBANCE DUE TO THE INFLUENCE OF MANMADE STRUCTURES - SLOVENIA - REPORT
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1 INTRODUCTION

Contracting Parties to the Barcelona Convention, through the UNEP/ MAP system, have committed themselves to the implementation of an ecosystem approach (EcAp) as a strategy for a comprehensive and integrated management of activities influencing the marine and coastal ecosystems. At their 15th Meeting, Conference of the Parties (COP15 in 2008), the Contracting Parties have decided (through Decision IG.17/5) to progressively apply the EcAp to the management of human activities in the Mediterranean, with the ultimate objective to achieve a Good Environmental Status (GES) of the Mediterranean Sea.

The Republic of Slovenia participates in the United Nations Environment Programs (UNEP) in the field of coastal sea quality monitoring by adopting the Mediterranean Action Plan (MAP) for the prevention and detection of the effects of Mediterranean pollution and the signing of the Convention for the Protection of the Mediterranean Sea against Pollution from Land (Barcelona Convention).

One of the activities to comply with the Barcelona Convention is to report on the results of the implementation of the National Monitoring Program of Slovenia (NMP Slovenia) in the framework of the Protocol IMAP.

At COP19, in 2016, the Integrated Monitoring and Assessment Programme (IMAP) was adopted. The IMAP provides guidance to the Parties on how to practically implement quantitative monitoring and assessment of the ecological status of the Mediterranean Sea and coast in line with the EcAp. The COP19 Decision IG. 22/7 implies that "the existing national monitoring and assessment programmes will be reviewed and revised as appropriate so that national implementation of IMAP can be fulfilled in a sufficient manner". The core of the IMAP are the common indicators, belonging to 11 Ecological Objectives (EOs), that summarize data into a simple, standardised and communicable figure and are applicable in the whole Mediterranean Basin, monitored by the Contracting Parties.

Agreed EcAp/IMAP ecological objectives (EOs) are EO1. Biodiversity, EO2. Non-indigenous species, EO3. Commercial species, EO4. Marine food webs, EO5. Eutrophication, EO7. Hydrography, EO8. Coastal ecosystems and landscapes, EO9. Contaminants, EO10. Marine litter, EO11. Underwater noise.

Objective of EO8. Coastal ecosystems and landscapes is to maintain the natural dynamics of coastal areas and to preserve coastal ecosystems and landscapes.

One of its two common indicators is CI_16. Length of coastline subject to physical disturbance due to the influence of man-made structures. This indicator has not been yet defined for Slovenian coastline; therefore, this report provides the analysis, results and values for Slovenian coastline for this indicator.

To prepare the report on Monitoring of the Common indicator 16 for the whole coastline of Slovenia we used the Guidance Fact Sheet where the method is presented as well as the Data Standards and Dictionaries for the format of results to be provided.

The following reference documents should be taken into account that are integral part of the contract:

1. Indicator guidance factsheet for EO8 Coastal Ecosystems and Landscapes Common Indicator 16 "Length of coastline subject to physical disturbance due to the influence of manmade structures" (Annex 1) and
2. Information standards for the Common Indicator 16 (Annex 2).

Results, which are part of this report, are:

- Narrative Report with the presentation of the main characteristics of Slovenian coastline and its coastal area; the main results of monitoring, difficulties encountered while monitoring, experiences. The main indicator units are:
  - Percentage (%) of artificial coastline on the total coastline length.
  - Percentage (%) of natural coastline on the total coastline length.
- GIS layer (polyline; WGS 84 decimal degree): Artificial structures with location and extend of artificial structures, with attribute table;
- GIS layer: Coastline_AN: Artificial/Natural coastline with attribute table.

General description of Slovenian coast:

Slovenian Coast is situated at the far northern end of the Mediterranean, along the Gulf of Trieste, which is the northernmost part of the Adriatic Sea. The gulf has an approximate surface area slightly less than 600 km2 and sea volume of about 9.5 km3. It is a shallow marine basin, with maximum depths in its central part 20-25 m and average depth of 17 m, situated at the junction of the Dinaric Alps and the Alps. The Slovenian coast is only approximate 46 km long, which is only one thousandth of the entire Mediterranean coastline. The aquatorium itself is formed in two bays, the Bay of Koper and the Bay of Piran, which are wide submerged valleys of rivers Rižana and Dragonja. The whole coastal area is divided into three municipalities, namely, Koper, Izola and Piran, and managed (Vahtar, 2003).

Two distinctively different types of geomorphology on the Slovenian coast exists:
-the abrasive type (with characteristic abyssal cliffs and distinctively deeper undersea-ditches caused by streaming past exposed capes,
-accumulative type (distinctively flat in the mouths of valleys and rivers, Rižana and Badaševica Rivers, the brook of Strunjan and Dragonja River
- sediment deposits result in a gently shelving sea bottom (Bricelj et al., 2002) (Figure 1).

Most of the Slovenian Coast represents the abrasive type of coast with steep and crumbling cliffs of marl and sandstone in different phases of development, and with

different erosion driving forces prevailing. Majority of cliffs are in mature form having shingle beaches at toe. The main erosion factor there is weathering with occasional landslides and toppling, wave erosion being limited only to occasional extreme storm events. Minority of almost vertical cliffs is under constant erosion action of waves, rock falls and toppling being main failure modes there.

The accumulative type of coast is formed by large quantities of fine sediments, deposited by rivers: mainly by the Soča and to a smaller extent by Rižana, Badaševica and Dragonja. The sediment deposition resulted in coastal plains facing a shallow sea with muddy gently shelving sea bottom. Coastal plains are mostly highly changed by human activities. Some were developed to saltpans and artificial lagoons, while in Koper area there has been extensive dredging of navigational canals combined with deposition of material to build the docks.

Most of the coastline is protected by artificial structures. However, during extremely high tide events the stretches of low coast are flooded for some hours short periods several times a year (Vahtar, 2003).

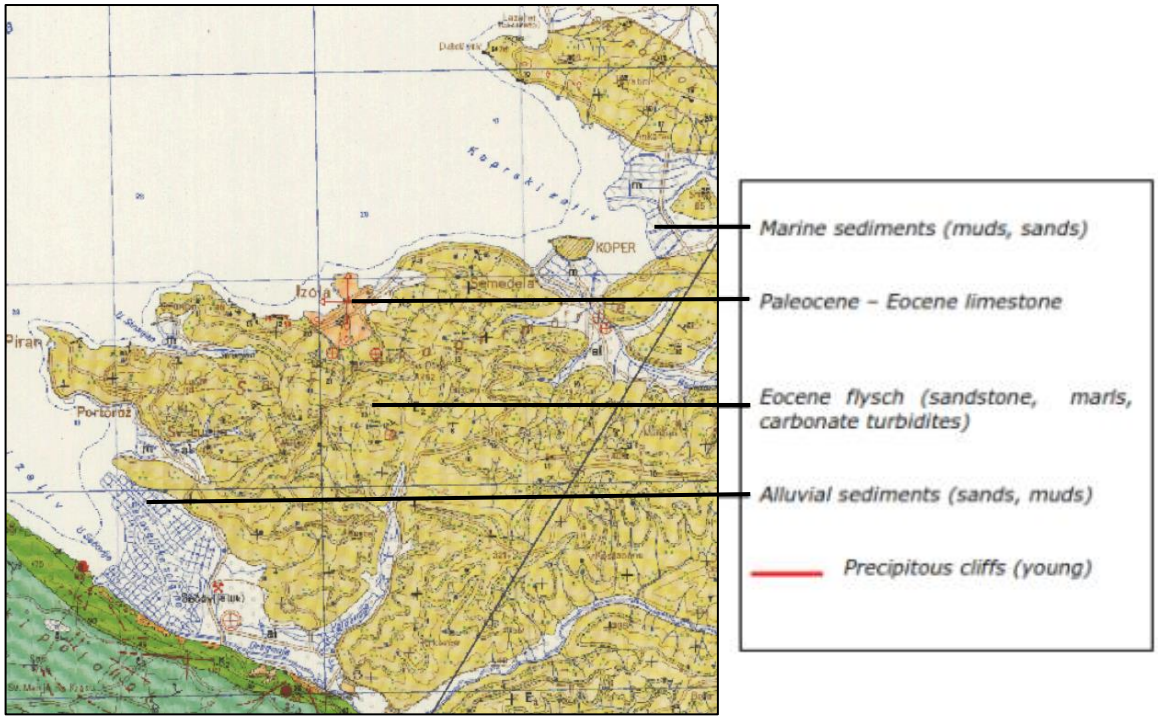

Figure 1: Geological map, scale 1:200.000. (Source: Geological map 1:100.000; https://biotit.geo-zs.si/ogk100/).

2 METHOD AND INPUT DATA

For the delineation of Slovenian coastline, official spatial data on delineation of marine water bodies were used. The marine water bodies are determined on the basis of Rules on the determination and classification of water bodies of surface waters (Official Gazette of the Republic of Slovenia, no. 63/05, 26/06, 32/11 and 8/18). Next figure presents the Slovenian marine water bodies (blue) and their border with terrestrial side (red line) (Figure 2).

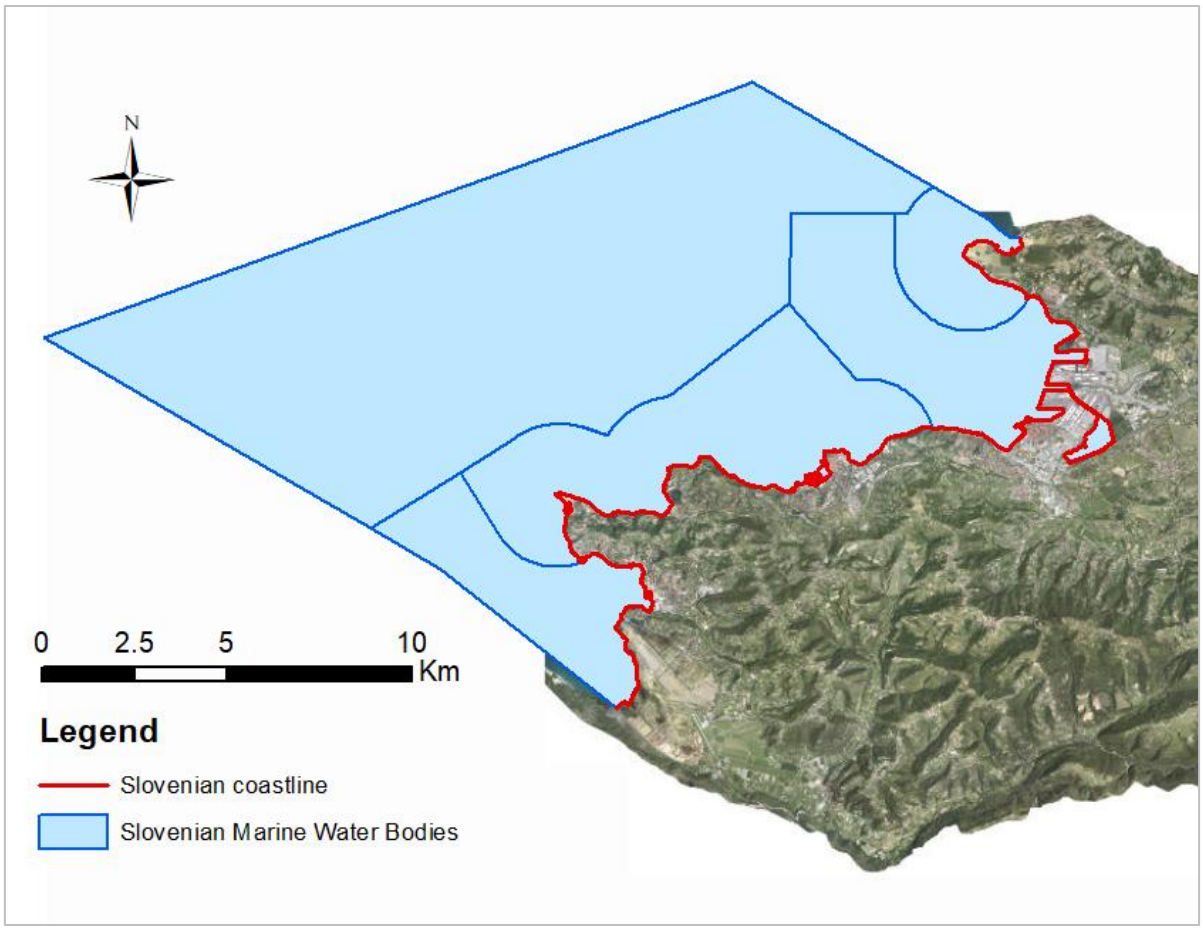

Figure 2: Spatial presentation of official coastline, as a coastal section of marine water bodies of Slovenia (Source: IWRS, 2019).

Slovenian official coastline has some sections which could be a part of deviation from other approaches for the determination of coastlines around Mediterranean countries. Such cases are for example:

- Third dock of Koper Port is delineated although it is not constructed at this time. The reason for that is that the national spatial plan was already adopted, when delineation of the marine water bodies was defined,
- Škocjanski zatok as preserved part of sea in the land reclamation process in the past etc.

Nevertheless, the delineation of the marine water bodies is official data, which is a part of implementation of water and marine directives, so it is appropriate the data used for tasks within Barcelona Convention are harmonized.

To support the correct determination of a type of the coastal segments coastline, beside photo digital data (DOF, 2016), other support was used:

- A study from 2013 (Peterlin et al., 2011 a) (Figure 3).

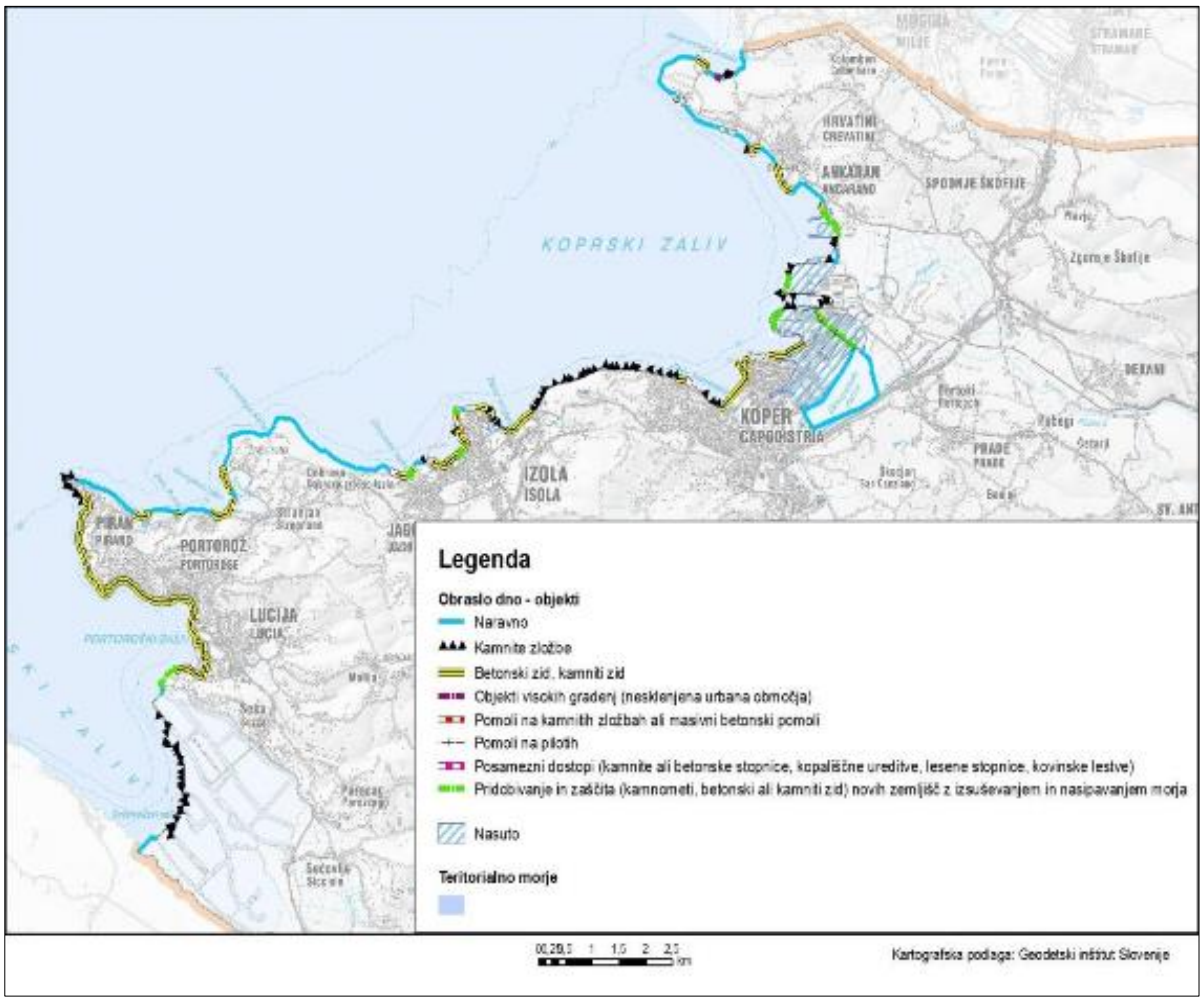

Figure 3: Spatial presentation of constructed structures in the coastal zone (Source: Peterlin et al., 2011 a).

- Field survey of unclear segments.

Figure 4: Bay of St. Katarina. Case of artificial coastline that is concrete hardened (Coastline section with ASCODE: 2) (Photo: IWRS, 2019).

Figure 5: Marina Portorož. Case of artificial coastline with so called mandrač, which is a small breakwater structure (Coastline section with ASCODE: 1) (Photo: IWRS, 2019).

Figure 6: Portorož coast. Case of jetty on piles (Coastline section with ASCODE: 4) (Photo: IWRS, 2019).

Figure 7: Coastal road from Koper to Izola. Case of artificial coastline with stone blocks (Coastline section with ASCODE: 2) (Photo: IWRS, 2019).

Figure 8: Stjuža Strunjan. Case of artificial coastline that is concrete coated (Coastline section with ASCODE: 2) (Photo: IWRS, 2019).

3 RESULTS

The results are prepared on the basis of instructions and are in digital version as shp file with required attributes. Digital data is a part of this report and are uploaded to INFO/RAC IMAP Info System.

Digital spatial data which were elaborated and uploaded to Info System of INFO/RAC IMAP of Slovenian official coastline are in *.shp format with attribute data if the coastline section is natural or artificial (ARTNAT: 0 – Natural, 1 – Artificial), and if artificial, what type of artificial structures (ASCODE: 1 - Breakwaters, 2 - Seawater/Rewetments/Sea dike, 4 - Jetties, 12 - ports and marinas).

Total length of used coastline is approximately 59 km, which is a bit longer than the official data of Slovenian coastal length, which is approximately 46 km long, because in this used coastline the data are more precise. The natural part of Slovenian coast represents 24,6 % of total Slovenian coast, and the artificial coastline represents 75,4 % of total length of Slovenian coast (Figure 9). Typical example of natural Slovenian coast represents

Table 1: Coastline delineation - Natural and artifical in %.

Lenght of coast (km)	Natural %	Artifical %
59,1	**24,6**	**75,4**

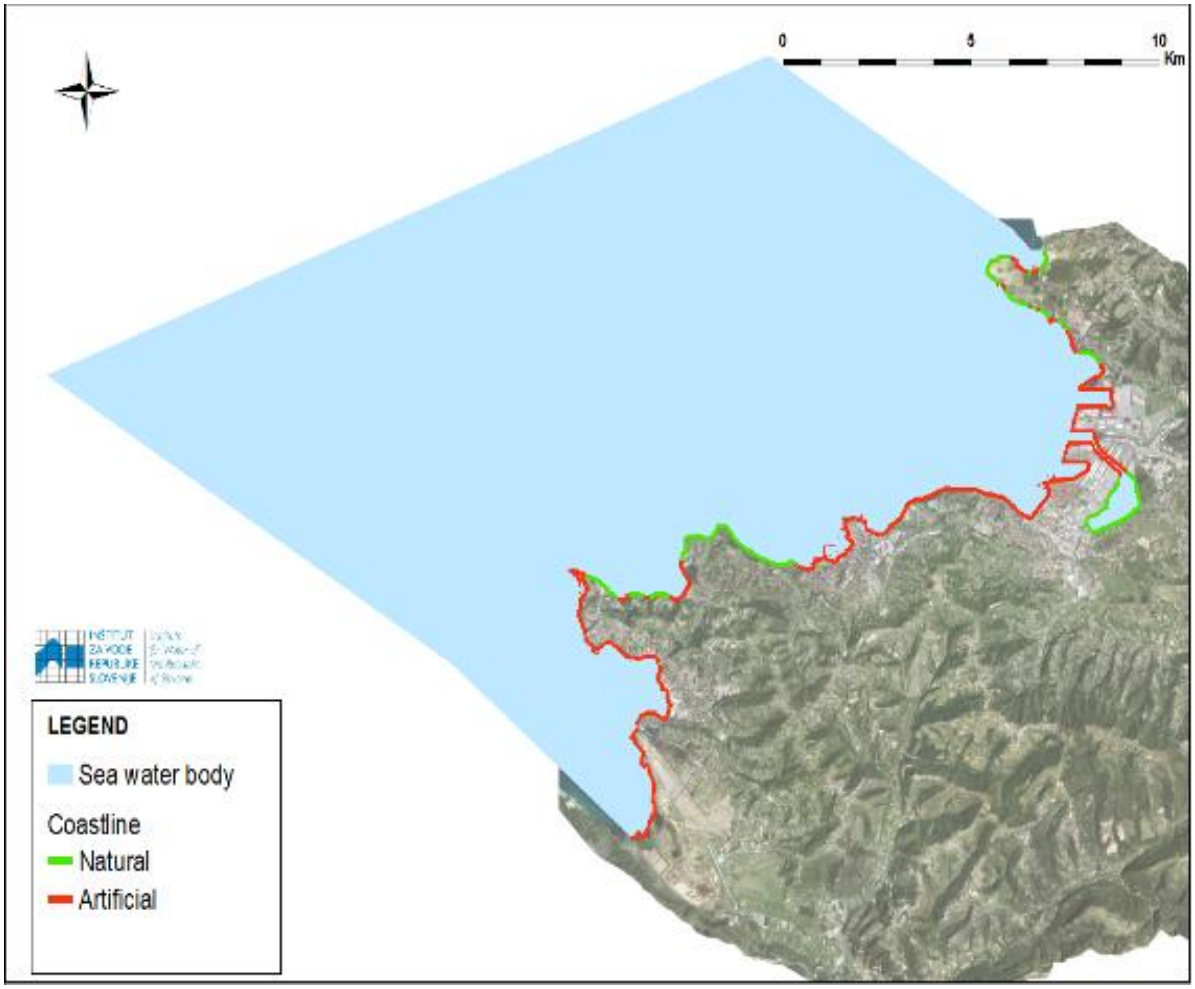

Figure 9: Figure of coastline with presentation of natural and artificial segments of coastline (Source: IWRS, 2019).

Figure 10: Example of natural Slovenian coastline at Strunjan (Source: https://www.terme-krka.com).

Furthermore, we delineated coastline by the type of artificial structures on the coastline. Natural coast represents about 24 %, Breakwaters represents about 0,9 %, Seawater/Revetments/Sea dike represents about 42 %, Jetties represents about 3 % and Ports/Marinas represents about 30 % (Figure 10).

Table 2: Coastline delineation - Artifical structures in % of total artificial coastline.

Ports (%)	Jetties (%)	Seawater/Revetments/Sea dike (%)	Breakwaters (%)	Natural (%)
29,4	**3,3**	**41,5**	**0,9**	**24,6**

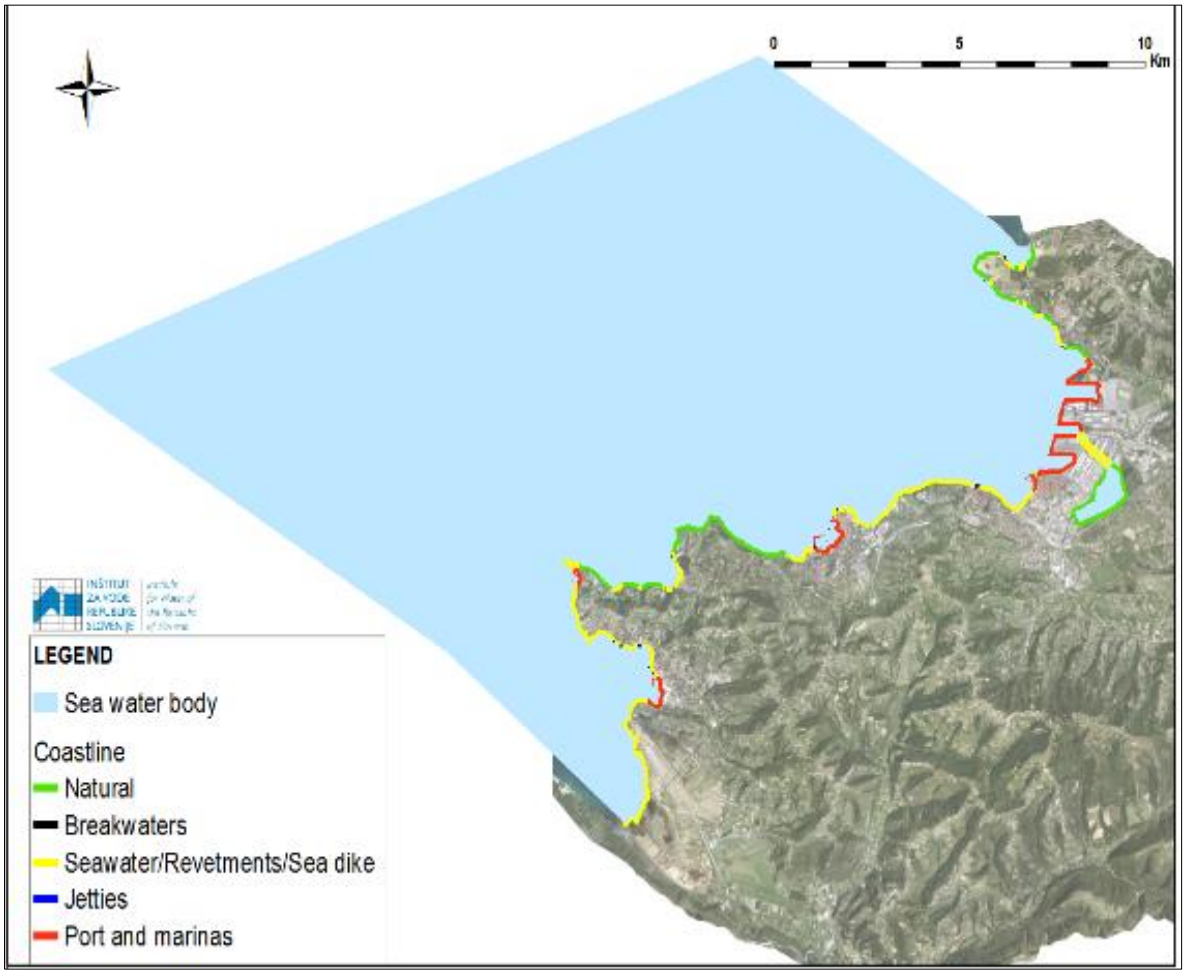

Figure 11: Figure of coastline with delineation of coast of different types of artificial structures (Source: IWRS, 2019).

4 CONCLUSIONS

Within this task Slovenian coast has been delineated according to official data of marine Slovene water bodies. For the purpose to define costal sections which has been a subject to this report also previous study was used and filed survey was performed. It was found out that around 75% Slovenian coastline is influenced by a man-made structures. Most of artificial changed coast is represented by structures assigned with ASCCODE No.2 (Seawater/Revetments/Sea dike), of which revetments (large stones fillings for preventing the erosion processes on human land use structures.) are the most present. The results are a part of digital spatial data, which are a part of this report and sent to INFO/RAC IMAP Info system.

Future development or renaturation planning processes and other human changes of the coast should be regularly monitored and recorded within monitoring programmes.

5 REFERENCES

1. Bricelj, M., Malej, A., Mezek, S. 2002. Sea the Sea. The Slovenian Mediterranean and Sustainable Development (*Moje tvoje morje: Slovensko Sredozemlje in trajnostni razvoj*, MOP RS, Ljubljana (last visit: 26.08.2019, http://www.mop.gov.si/fileadmin/mop.gov.si/pageuploads/publikacije/en/morje.pdf).
2. Peterlin M., Gabrijelčič E., Urbanič G., Smolar Žvanut N., Mohorko T., Bremec U. 2011a: Strokovne podlage za načrt upravljanja z morskim okoljem. Analiza obremenitev v zaledju. Poročilo za leto 2011. Inštitut za vode Republike Slovenije. 2011 str. 59.
3. Vahtar, M. 2003. Eurosion Case study Slovenian coast. WP 4.1 D.3. Report of UAB Pilot SitesEUROSION – Draft v.3 (February/2003).

6 ANNEXES

6.1 ANNEX 1

Indicator guidance factsheet for EO8 Coastal Ecosystems and Landscapes Common Indicator 16 "Length of coastline subject to physical disturbance due to the influence of manmade structures"

Ecological Objective 8: The natural dynamics of coastal areas are maintained and coastal ecosystems and landscapes are preserved

Indicator Title*	Length of coastline subject to physical disturbance due to the influence of manmade structures	
Relevant GES definition	**Related Operational Objective**	**Proposed Target(s)**
Physical disturbance to coastal areas induced by human activities should be minimized.	The natural dynamics of coastal areas are maintained and coastal ecosystems and landscapes are preserved.	Negative impacts of human activities on coastal areas are minimized through appropriate management measures.
The CORMON on coast and hydrography meeting (21-22 May 2019, Rome) agreed that the GES, targets and measures cannot be expressed quantitatively (as a threshold value) but due to country specific circumstances (socio-economic, cultural, historical) should be defined by the countries themselves. In doing so the CPs should take their spatial development and planning policies into account, as well as the legal obligations of the Barcelona Convention, in particular the ICZM Protocol. The above GES definition and Proposed target(s) are just examples.		
Rationale		
Justification for indicator selection Mediterranean coastal areas are particularity threatened by coastal development that modifies the coastline through the construction of buildings and infrastructure needed to sustain residential, commercial, transport and tourist activities. The land, intertidal zone and near-shore estuarine and marine waters are increasingly altered by the loss and fragmentation of natural habitats and by the proliferation of a variety of built structures, such as ports, marinas, breakwaters, seawalls, jetties and pilings. These coastal manmade infrastructures cause irreversible damage to landscapes, losses in habitat and biodiversity, and strong influence on the configuration of the shoreline. Indeed, physical disturbance due to the development of artificial structures in the coastal fringe can disrupt the sediment transport, reduce the ability of the shoreline to respond to natural forcing factors, and fragment the coastal space. The modification of emerged beach and elimination of dune system contribute to coastal erosion phenomena by lessening the beach resilience to sea storms. Coastal defence infrastructures have been implemented to solve the problem together with beach nourishment but preserving the natural shoreline system with adequate sediment transport from river has proved to be the best solution. Monitoring the length of coastline subject to physical disturbance due to the influence of manmade structures and its trend is of paramount importance to preserve habitat, biodiversity and prevent coastal erosion phenomena, as well as for its importance in land-sea interactions. Until now there has not been systematic monitoring in Mediterranean		

Indicator Title*	Length of coastline subject to physical disturbance due to the influence of manmade structures

regarding this, in particular not quantitatively based monitoring or any major attempt to homogenously characterize coastal ecosystems on a wider Mediterranean basis. The status assessment of EO8 aims to fill this gap.

Scientific References

Boak, E., H. & Turner I., L. (2005), Shoreline definition and detection: a review. Journal of Coastal Research 21(4), 688-703.

Deichmann, U., Ehrlich, E., Small, E., and Zeug, G. (2011). Using high resolution satellite data for the identification of urban natural disaster risk (GFDRR (Global Facility for Disaster Reduction and Recovery)).

European commission and Directorate General Environment (2004a). Living with coastal erosion in Europe: Sediment and Space for Sustainability. A guide to coastal erosion management practices in Europe (The Netherlands: Eurosion project).

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Rochette, J., Puy-Montbrun, G., Wemaëre, M., and Billé, R. (2010). Coastal setback zones in the Mediterranean: a study on Article 8-2 of the Mediterranean ICZM Protocol. n°05/10 December 2010, IDDRI

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Policy Context and targets

Policy context description

ICZM Protocol (Article 8, point 3):

Indicator Title*	Length of coastline subject to physical disturbance due to the influence of manmade structures

The Parties shall also endeavour to ensure that their national legal instruments include criteria for sustainable use of the coastal zone. Such criteria, taking into account specific local conditions, shall include, inter alia, the following:

(a) identifying and delimiting, outside protected areas, open areas in which urban development and other activities are restricted or, where necessary, prohibited;
(b) limiting the linear extension of urban development and the creation of new transport infrastructure along the coast;
(c) ensuring that environmental concerns are integrated into the rules for the management and use of the public maritime domain;
(d) providing for freedom of access by the public to the sea and along the shore;
(e) restricting or, where necessary, prohibiting the movement and parking of land vehicles, as well as the movement and anchoring of marine vessels, in fragile natural areas on land or at sea, including beaches and dunes.

Targets

Negative impacts of human activities on coastal areas are minimized through appropriate management measures.

Additional country-specific criteria should be taken into account for definition of targets, measures and interpretation of results regarding this indicator due to strong socio-economic, historic and cultural dimensions in addition to characteristic geomorphological and geographical conditions in each respective country (reflected in policy documents, strategies and other country-specific documents). Interpretation of results should be left to the countries taking above criteria into account.

Policy documents

Protocol on the ICZM in the Mediterranean - http://www.pap-thecoastcentre.org/pdfs/Protocol_publikacija_May09.pdf

Indicator analysis methods

Indicator Definition

The monitoring aim of the EO8 common indicator is twofold: (i) to quantify the rate and the spatial distribution of the Mediterranean coastline artificialisation and (ii) to provide a better understanding of the impact of those structures to the shoreline dynamics. It has an operational target on impact, thus it is associated to concrete implementation measures related to specific human activities (i.e. appropriate management measures) to minimize negative impacts and to inform about progress towards GES.

Methodology for indicator calculation

The monitoring of this Common Indicator entails an inventory of the length and location of manmade coastline (hard coastal defence structures, ports, marinas (see Figure 1). Soft techniques e.g. beach nourishment are not included.

With regard to the coastline to be considered: the fixed reference official coastline as defined by responsible Contracting Party should be considered. The optimal resolution

Indicator Title*	Length of coastline subject to physical disturbance due to the influence of manmade structures

should be 5 m or 1: 2000 spatial scale.

Once a proper geographic scale has been established, monitoring should focus, in particular, on the location, the spatial extent and the types of coastal structures taking into account the minimum coastal length that can be classified as artificial or natural.

The identification procedure of manmade structures should be carried on based on typical situations added to the indicator guidance factsheet, including the minimum size (length, width of manmade structures) to be taken into account.

As monitoring should be done every 6 years, every CP should fix a reference year in the time interval 2000-2012 in order to eliminate the bias due to old or past manmade infrastructures.

Positioning/Orientation respect to the shore	Type of structure	Action and purposes
Not connected to shore parallel or fish tail 	Breakwaters	Reduce the intensity of wave forces in inshore waters creating a low-energy zone behind the structure. Used for protecting ports, and as coastal defences.
Onshore parallel on open coasts 	Seawalls Bulkheads	Reduce the impact of waves on shore; used as a tool against coastal erosion and as a constituent of ports, docks and marinas.
	Revetments	A revetment is a facing of erosion resistant material, such as stone, geotextiles or concrete. Sloped structures which break up or absorb the energy of the waves used to reduce the landward migration of the beach due to coastal erosion. It is built to protect a scarp, embankment, or other shoreline feature against erosion.
	Sea dike	Large land-based sloped structures used to prevent overtopping during high tide and storm events. Instead of providing protection against wave action, sea dikes fix the land-sea boundary in place to prevent inland flooding.
Connected to shore perpendicular 	Groins	Reduce along-shore transport of sediments; used in coastal defence schemes, often in association with breakwaters.
	Jetties	Reduce wave- and tide-generated currents; used for developing, ports, harbours, marinas and as constituents of coastal defence schemes.
	Groins (composite)	Reduce along-shore transport of sediments; used in coastal defence schemes. Used to avoid the formation of stationary eddies.

Figure 1. Hard coastal defence structures, modified from the EUROSION Shoreline Management Guide, EU, 2004. Taken from IMAP guidelines, page 134, Table 1.

Indicator units

- Km of artificial coastline and % of total length of coastline.
- Percentage (%) of natural coastline on the total coastline length.

Indicator Title*	Length of coastline subject to physical disturbance due to the influence of manmade structures

The length of artificial coastline should be calculated as the sum of segments on reference coastline identified as the intersection of polylines representing manmade structures with reference coastline ignoring polylines representing manmade structures with no intersection with reference coastline. The minimum distance between coastal defence structures should be set to 10 m in order to classify such segments as natural, i.e. if the distance between two adjacent coastal defence structures is less than 10 m, all the segment including both coastal defence structures is classified as artificial.

List of Guidance documents and protocols available

Monitoring and assessment methodological guidance on EO8: coastal ecosystems and landscapes (within IMAP guidelines)

EUROSION Shoreline Management Guide (European Commission and Directorate General Environment, 2004, Annex 2)

Data Confidence and uncertainties

Regarding data confidence, both geographic scale and resolution of images have to be properly selected depending on type and density of coastal manmade structures. A specific cost/benefit analysis has to be carried on to choose the right balance among resolution, an acceptable level of uncertainties and the necessity to assure comparability of results at Mediterranean level.

Methodology for monitoring, temporal and spatial scope

Available Methodologies for Monitoring and Monitoring Protocols

Space and airborne earth observation systems are the most suitable tool to conduct the monitoring strategy of the EO8 common indicator, i.e. very high resolution (VHR) satellite imagery, aerial photographs, laser scanners etc. Beyond earth observation data, identification techniques and procedures used through GIS tools also have to be described

Available data sources

CORINE land cover, national spatial plans, World Imagery Basemap feature (in ArcGIS 10.1), Landsat satellite imagery, Google earth, aerial photographs surveys.

Spatial scope guidance and selection of monitoring stations

The exact territorial extent of the monitoring should be presented.
The optimum spatial scale for a proper identification of manmade structures should be 5 m by satellite imagery or aerial photographs.

Temporal Scope guidance

Monitoring manmade structures data should be updated at least every 6 years, while shoreline survey of sandy coastline under anthropogenic pressure should be, if possible, repeated annually (at the same time of the year)

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Data analysis and assessment outputs

Statistical analysis and basis for aggregation

The total length of coastline estimated as being subjected to physical disturbance due to the influence of manmade structures should be summed. In addition, the share of this coastline in total country's coastline should be determined. If an official coastline is available, i.e. an institutional body provides a GIS polyline, then such coastline can be used to "project" the identified manmade structures in order to classify parts of the coastline as being subjected to physical disturbance due to the influence of manmade structures. Geographic scale of maps and cartography used to identify manmade structures could be different but not too much form the ones used for the official coastline. In case if such official coastline is not available or its geographic scale is too coarse with respect to one needed to properly identify manmade structures, then coastline will be defined by the same maps/cartography used for manmade structures identification.

Expected assessments outputs

The total length of coastline influenced by manmade structures and the share of this coastline in total country's coastal length should be provided on a map showing the coastline subject to physical disturbance due to manmade structures (artificial segments) in red line and the rest (natural segments) in green line.
The assessment output should be reported as a common shape file format with GRS as WGS84.
Shape file with other GRS will also be accepted if provided with a complete .prj file that allows GRS transformations by standard GIS tools.

Known gaps and uncertainties in the Mediterranean

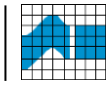
In order to implement EO8 indicator with an acceptable level of accuracy, recent data sources with proper spatial resolution and complete coastline coverage should be used jointly with adequate GIS tools and expert team.
Capacity building can be readily assessed for each CP as such resources are generally available for the Mediterranean Region also taking into account the increasing efforts on satellite imagery products (ESA Sentinels constellation). So, once a common framework of data sources, GIS procedures and way of representing the output of EO8 indicator are agreed, a common implementation work for all CPs could be in principle settle down.

Contacts and version Date

Key contacts within UNEP/MAP for further information

Version No	Date	Author
V.1	27/6/16	PAP/RAC & Giordano Giorgi
V.2	27/7/16	Giordano Giorgi
v.3	23 March 2018	PAP/RAC

* The CORMON on coast and hydrography meeting (21-22 May 2019, Rome) indorsed the change of the term 'manmade structures' with the term 'human made



structures' to respect the gender-neutrality. This change is pending EcAp Coordination Group and COP decision.

6.2 ANNEX 2

Information standards for the Common Indicator 16

GIS information standards:

- Artificial structures
- Coastline artificial/natural

Name of GIS layer: Artificial_structures

Type of GIS Layer: polyline

Geographical Reference Systems: WGS 84 decimal degree

Attribute table:

Content	**Description**
Ecological Objective	**EO8. Coastal ecosystem and landscape**
IMAP Common Indicator	**CI16. Length of coastline subject to physical disturbance due to the influence of manmade structures**
Parameter	**Location and extend of artificial structures**
Attribute table	Specify the following information in the attribute table associated with the GIS information layer: • CPCODE: Two-letter code of Country • ASCODE: Mandatory. Integer. Code of type of artificial infrastructure. The following code list should be used: ○ 1 Breakwaters ○ 2 Seawater/Revetments/Sea dike ○ 3 Groins ○ 4 Jetties ○ 5 River mouth structures ○ 12 Port and marinas • ASDES: Optional. Text. Description of type of artificial infrastructures • Municipal: Optional. Text. Name of municipality or local administrative region where the polygon of impervious surface is located • Year: Mandatory. Text. Year of production of the information layer
Variables	Border on the sea side of coastal artificial structures

Length of coastline subject to physical disturbance due to the influence of manmade structures - Slovenia

Content	Description
Ecological Objective	**EO8. Coastal ecosystem and landscape**
IMAP Common Indicator	**CI16. Length of coastline subject to physical disturbance due to the influence of manmade structures**
Spatial resolution	10 m or higher as produced by photo digitalization or CAD (Computer Aided Design) software
Vertical coverage	1 level at sea surface
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	Every 6 years
Data format	GIS Layer: polyline or polygon

Name of GIS layer: Coastline_AN

Type of GIS Layer: polyline

Geographical Reference Systems: WGS 84 decimal degree

Attribute table:

Content	**Description**
Ecological Objective	**EO8. Coastal ecosystem and landscape**
IMAP Common Indicator	**CI16. Length of coastline subject to physical disturbance due to the influence of manmade structures**
Parameter	**Artificial/Natural coastline**
Attribute table	Specify the following information in the attribute table associated with the GIS information layer: • CPCODE: Two-letter code of Country • ART_NAT: Mandatory. Integer. Code for type of segment of coastline. Use the following code list: ○ 0 Natural coastline ○ 1 Artificial coastline • Municipal: Optional. Text. Name of municipality or local administrative region where the polygon/polyline of segment of coastline is located • Year: Mandatory. Text. Year of production of the information layer • Ref_Year: Mandatory. Year of the reference coastline used to represent natural and artificial segments
Variables	Segment of artificial/natural of coastline
Spatial resolution	10 m or higher as produced by photo digitalization and interpretation
Vertical coverage	1 level at sea surface
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	Every 6 years
Data format	GIS Layer: polyline