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6th Forum
of the EU Strategy for the Adriatic and Ionian Region
Along the coasts of the shared sea
Izola, 11–12 May 2021

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Improving ecosystem quality and climate change resilience: A methodological proposal from the Italy-Slovenia Interreg project ECO-SMART

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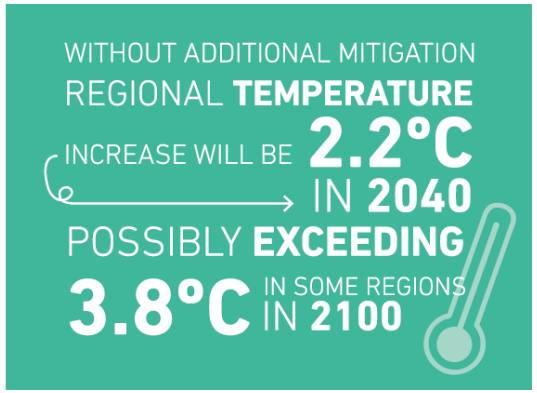
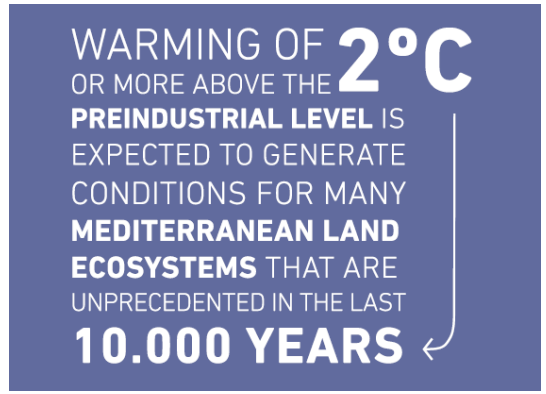
Climate change in the Mediterranean region

The main facts:

- Warming
- Extreme weather events
- Saltwater intrusion
- Water scarcity
- ….





Source: MedECC (2019) A *preliminary assessment by the MedECC Network Science-policy interface*

How to adapt complex coastal territories to unavoidable climate changes?

How to monitor the impact of such changes?

How can effective management measures be implemented?

ECO-SMART: Ecosystem Services Market for an Advanced Policy to Protect NATURA 2000 areas

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Project acronym	ECO-SMART
Program	Interreg V-A Italy-Slovenia 2014-2020
Project duration	01.04.2020 – 31.03.2022
Total Budget	€ 858.546,61
Co-financing European Regional Development Fund	€ 729.764,59

Lead partner: *Veneto Region (Italy)*

Project partners:

- *CESQA @ Industrial Eng. Dept., University of Padova (Italy)*
- *Municipality of Monfalcone (Italy)*
- *Koper Regional Development Centre (Slovenia)*
- *Science and Research Centre of Koper (Slovenia)*

Associate partners:

- *Italian Ministry for the Environment and safeguarding of Territory and Sea*
- *Natura 2000 network*
- *EUSAIR authority*
- *EUSALP authority*

Project aims

Goal: to assess ecosystem services vulnerability and test the economic feasibility to fund the protection of Biodiversity in NATURA 2000 sites located in the interregional area of Italy and Slovenia through pilot application of Paying for Ecosystem Services (PES) schemes

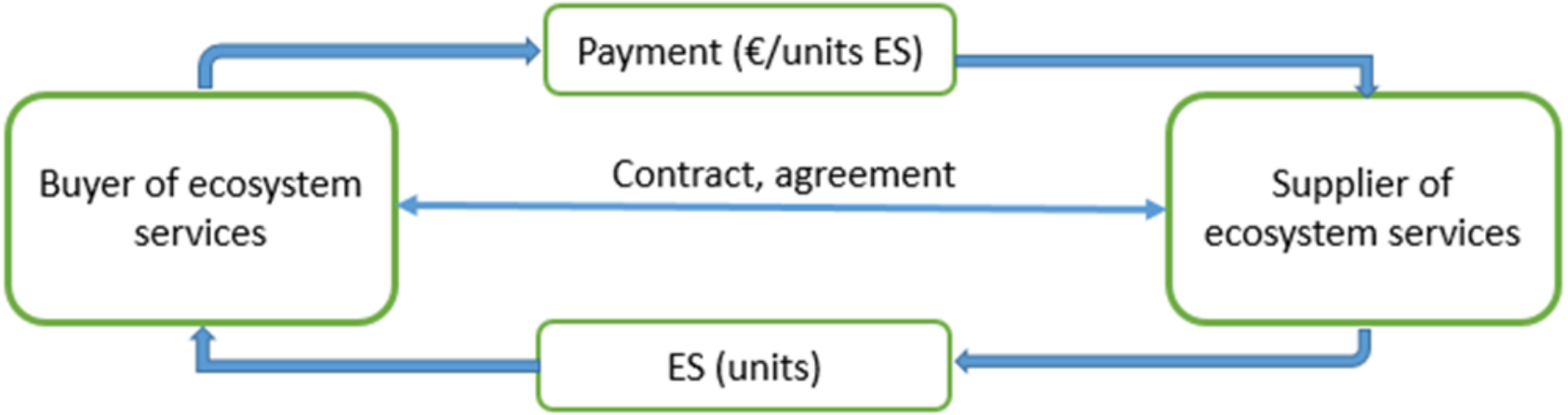
1. Climate Change Vulnerability assessment of 5 Sites belonging to the NATURA 2000 Network

2. Climate change adaptation plan supported by PES application in 3 pilot areas: 2 in Italy and 1 in Slovenia

3. Divulgation of harmonized procedures for their application related to ecosystem services and methods for the design and conservation of biodiversity in the NATURA 2000 Network

What is a PES?

Payment for Ecosystem Services scheme:



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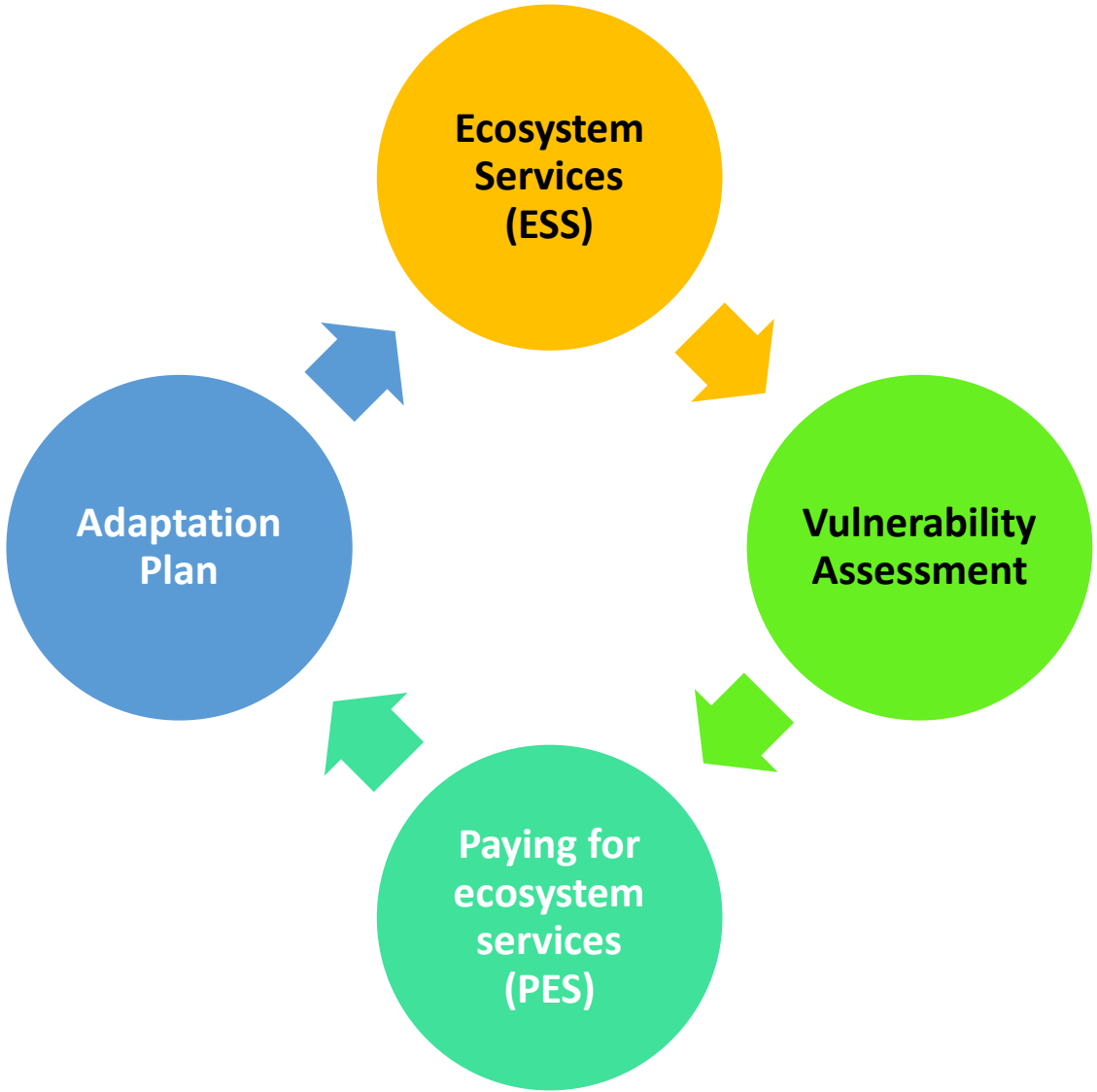
The approach of ECO-SMART to adaptation



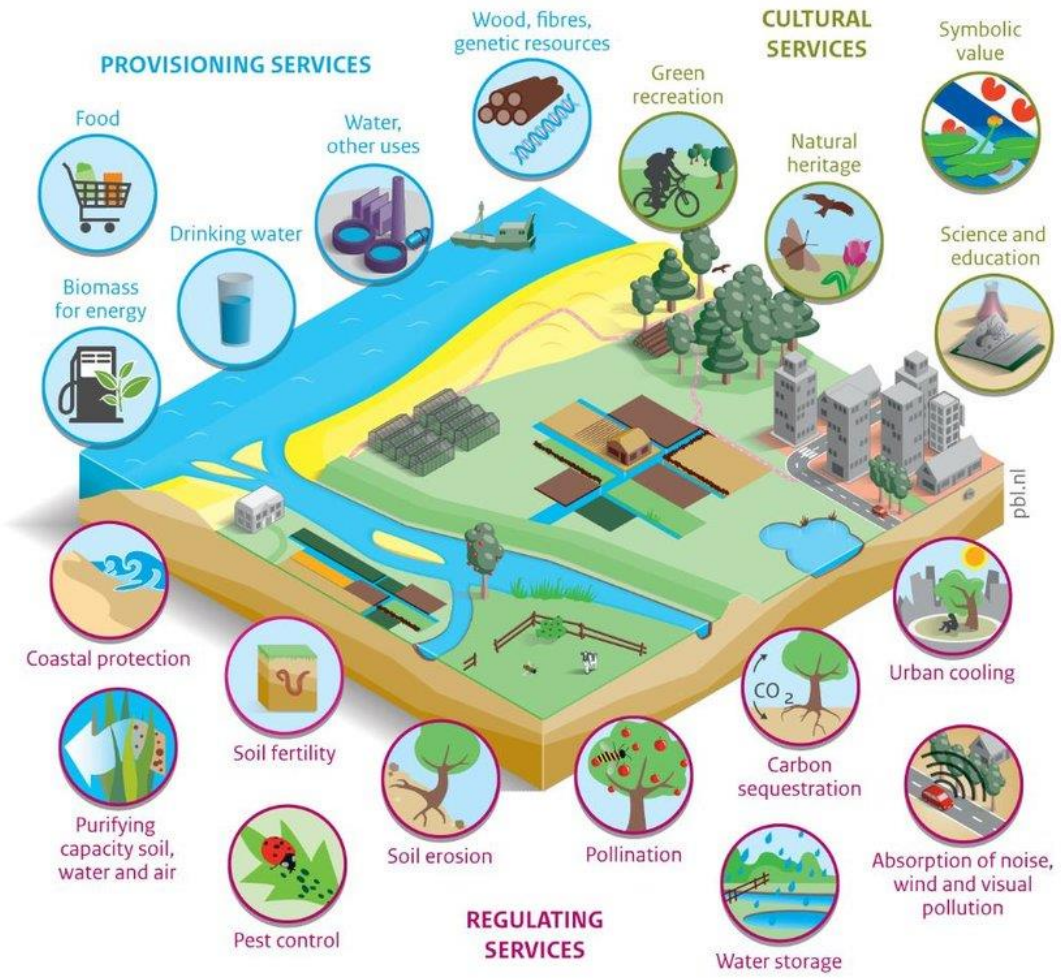
1) Ecosystem Services Identification

2) Vulnerability Assessment

3) Paying for Ecosystem Services

4) Adaptation plan…

1) Identification of ecosystem services (ESS)

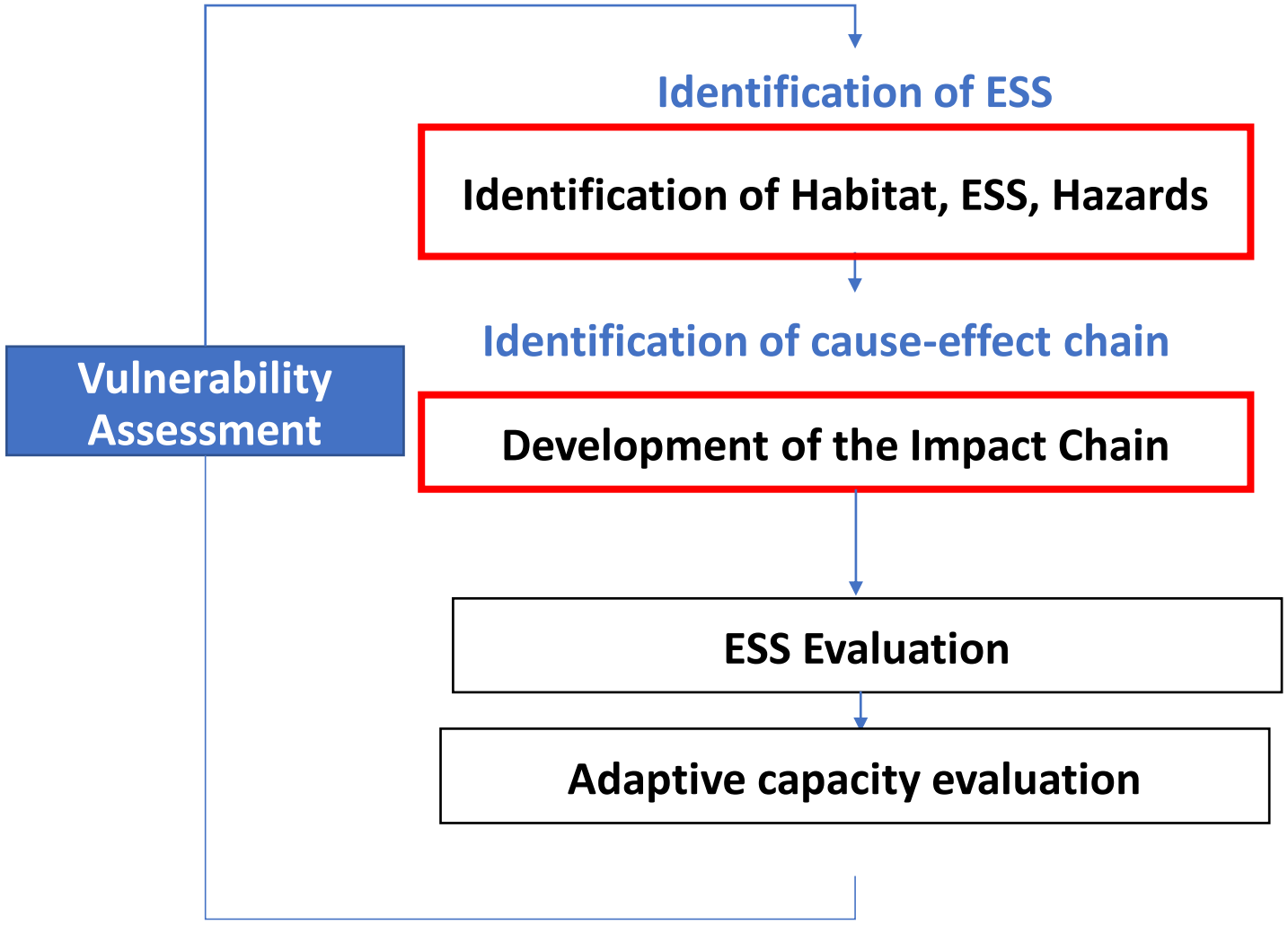


Source: PBL, WUR, CICES 2014

Ecosystem services (ESS) can be defined as contributions of ecosystem structure and function to human well-being.

(Burkhard et al., 2012; Burkhard B. & Maes J. Eds., 2017).

2) Vulnerability assessment



Based on the framework of ISO 14091 and the requirements of ISO 14090 (both on adaptation to climate change)

E.g. Knowledge based communities

The case of the Veneto region

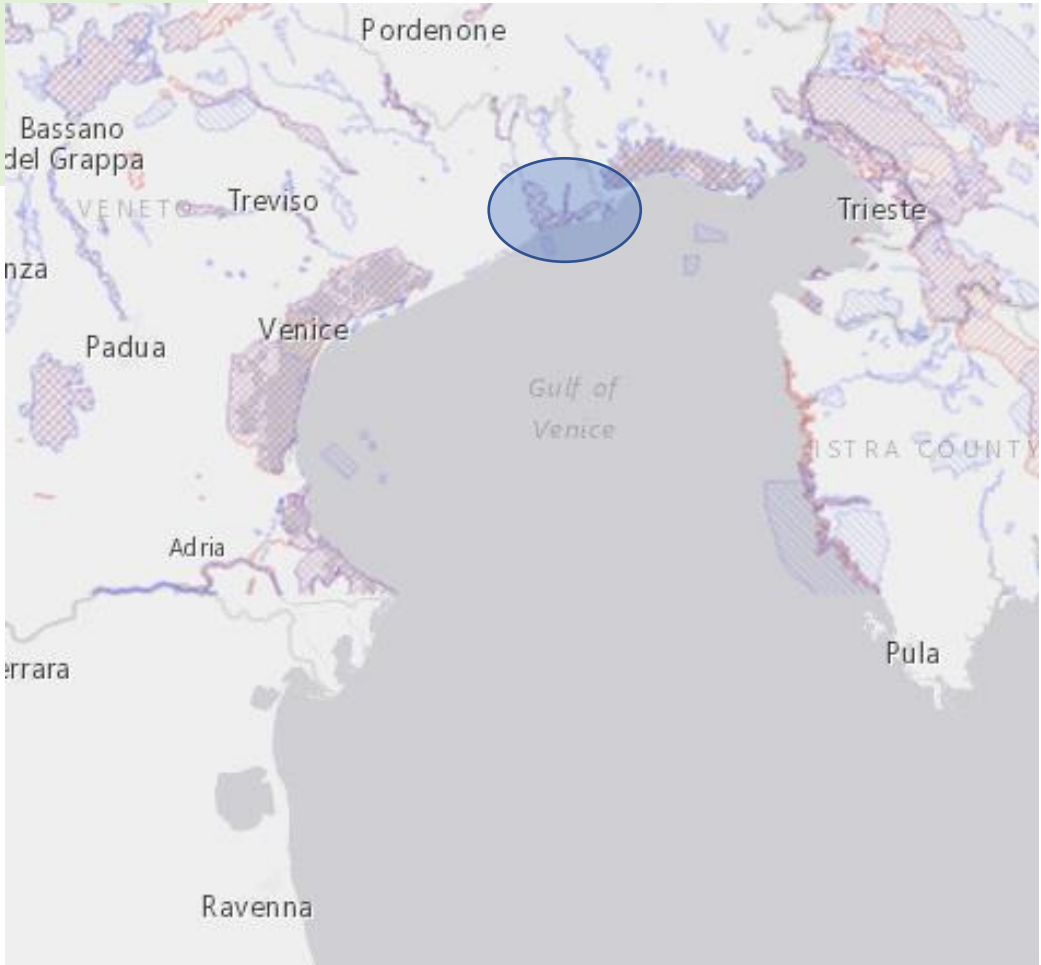
Caorle Lagoon - mouth of Tagliamento river (IT3250033)

Mouth of Tagliamento river (IT3250040)

Valle Vecchia – Zumelle - Valli di Bibione (IT3250041)

Rich biodiversity: dunes, wetlands and salt marshes, mudflats, hunting and fishing farms, estuary habitats, …

Nearby mainland: dense urban areas and highly developed agriculture on reclaimed land



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1) ecosystem services identification

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OBJECTIVE

Identify the ESS that characterized the pilot sites

EXPECTED RESULTS

1. Identify the ESS and related significance
2. Identify relevant stakeholders
3. Identify the Habitats relevant to the pilot sites

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MARKET FOR ECOSYSTEM SERVICES FOR AN ADVANCED PROTECTION POLICY OF NATURA 2000 AREAS

WP3.1	Development and implementation of the climate change monitoring system in the Natura2000 sites of the 3 regions.
Activity 5	Data collection for ESS identification.

STAKEHOLDERS INVOLVED IN THE PROCESS

NEED OF CAPACITY BUILDING

Filter	Section	Division	Group	Class	Code	Simple descriptor	Presence of the ESS: YES NO N.I. (= NO INFORMATION)	Description of service and connected habitat	Is this ESS important/relevant for the Area?	Who is the stakeholder of this ESS?	Example Service
CICES	***Provisioning (Biotic)***	*Biomass*	*Wild animals (terrestrial and aquatic) for nutrition, materials or energy*	*Wild animals (terrestrial and aquatic) used for nutritional purposes*	*1.1.6.1*	*Food from wild animals*	*e.g.: YES*	*e.g.: The lagoon provides nursery habitats for small fishes which can be fished. Small fishes are found in open waters (which are in part habitat Natura 2000 n° 1150) but they also benefit from the presence of shallow waters around salt marshes (mud flats habitat Natura 2000 n° 1140)*	*e.g.: Yes, small fishes are very abundant in the lagoon*	*e.g.: There are very few local fishers who benefit of this service*	
CICES	Provisioning (Biotic)	Biomass	Cultivated terrestrial plants for nutrition, materials or energy	Cultivated terrestrial plants (including fungi, algae) grown for nutritional purposes	1.1.1.1	*Any crops and fruits grown by humans for food; food crops*					*Standing wheat crop before harvest (Proxy for: ecosystem contribution to growth of harvestable wheat)*
CICES	Provisioning (Biotic)	Biomass	Cultivated terrestrial plants for nutrition, materials or energy	Fibres and other materials from cultivated plants, fungi, algae and bacteria for direct use or processing (excluding genetic materials)	1.1.1.2	*Material from plants, fungi, algae or bacterial that we can use*					*Harvestable surplus of annual tree growth*
CICES	Regulation & Maintenance (Biotic)	Transformation of biochemical or physical inputs to ecosystems	Mediation of nuisances of anthropogenic origin	Noise attenuation	2.1.2.2	*Reducing noise*					*Shelter belts along motorways*
CICES	Regulation & Maintenance (Biotic)	Transformation of biochemical or physical inputs to ecosystems	Mediation of nuisances of anthropogenic origin	Visual screening	2.1.2.3	*Screening unsightly things*					*Shelter belts around industrial structures*
CICES	Cultural (Biotic)	Direct, in-situ and outdoor interactions with	Physical and experiential interactions with natural	Characteristics of living systems that that enable activities promoting health, recuperation or enjoyment through active or immersive interactions	3.1.1.1	*Using the environment for sport and recreation; using nature to help stay fit*					*Ecological qualities of woodland that make it attractive to hiker; private gardens Or Opportunities for diving, swimming*
			d experiential s with natural nt	Characteristics of living systems that enable activities promoting health, recuperation or enjoyment through passive or observational interactions	3.1.1.2	*Watching plants and animals where they live; using nature to destress*					*Mix of species in a woodland of interest to birdwatchers Or Whales, birds, seals and reptiles can be enjoyed by wildlife watchers*
			of baseline flows and vents	Mass flows	5.2.1.1	*Physical barriers to landslides*					*Sand bar providing coastal protection*
			of baseline flows and extreme events	Liquid flows	5.2.1.2	*Physical barriers to flows*					*Natural levees providing flood protection*
CICES Extended	Regulation & Maintenance (Abiotic)	Regulation of physical, chemical, biological conditions	Regulation of baseline flows and extreme events	Gaseous flows	5.2.1.3	*Physical barriers to air movements*					*Topographic control of wind velocity*

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2) Vulnerability assessment

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OBJECTIVE

Analysis of the Habitats and exposure to hazards

EXPECTED RESULTS

1. Habitat/ESS vulnerability
2. Impact chain

CESQA CENTRO STUDI QUALITÀ AMBIENTE

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MARKET FOR ECOSYSTEM SERVICES FOR AN ADVANCED PROTECTION POLICY OF NATURA 2000 AREAS

WP3.1 Development and implementation of the climate

Activity 5 2nd Data collection for vulnerability assessment

STAKEHOLDERS INVOLVED IN THE PROCESS

NEED OF CAPACITY BUILDING

Sito NATURA2K				Hazard List																		ESS erogati (Q#1)	SH di riferimento (che beneficiano del servizio)	SH fornitori/gestori del servizio
Name	SITE CODE	HABITAT CODE	HABITAT DESCRIPTION	Average temperature rise (of water, soil and air)	Increased entity of heat peaks	Increased frequency of heat peaks	Increased duration of each heat spike	Water acidification	Hypoxia and anoxia	Increase in the average water level	Increase in tidal range? / Increase in high tide level	Saline wedge	Increase in the frequency of extreme weather events	Increased intensity of extreme weather events	Increase in the frequency of fires	Changing currents	Changes in the river water regime	Variations in the frequency of precipitation	Variation in rainfall abundance	Subsidence				
Laguna di Caorle - foce del Tagliamento	IT3250033	7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae																					
		2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")																					
		1210	Annual vegetation of drift lines																					
		2250	Coastal dunes with Juniperus spp.																					
		1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)																					
		9340	Quercus ilex and Quercus rotundifolia forests																					
		1150	Coastal lagoons																					
		2270	Wooded dunes with Pinus pinea and/or Pinus pinaster																					
		1310	Salicornia and other annuals colonizing mud and sand																					
		2110	Embryonic shifting dunes																					
		2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")																					
		2230	Malcolmietalia dune grasslands																					
		6420	Mediterranean tall humid grasslands of the Molinio-Holoschoenion																					
		6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)																					
Foce del Tagliamento.	IT3250040	2250	Coastal dunes with Juniperus spp.																					
		9340	Quercus ilex and Quercus rotundifolia forests																					
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			s, peaty or clayey-silt-laden soils																					
			p.																					
			idifolia forests																					
			antic halophilous scrubs																					
			lands of the Molinio-																					
			a and/or Pinus pinaster																					
			lonizing mud and sand																					
Valli di Bibione		1210	Annual vegetation of drift lines																					
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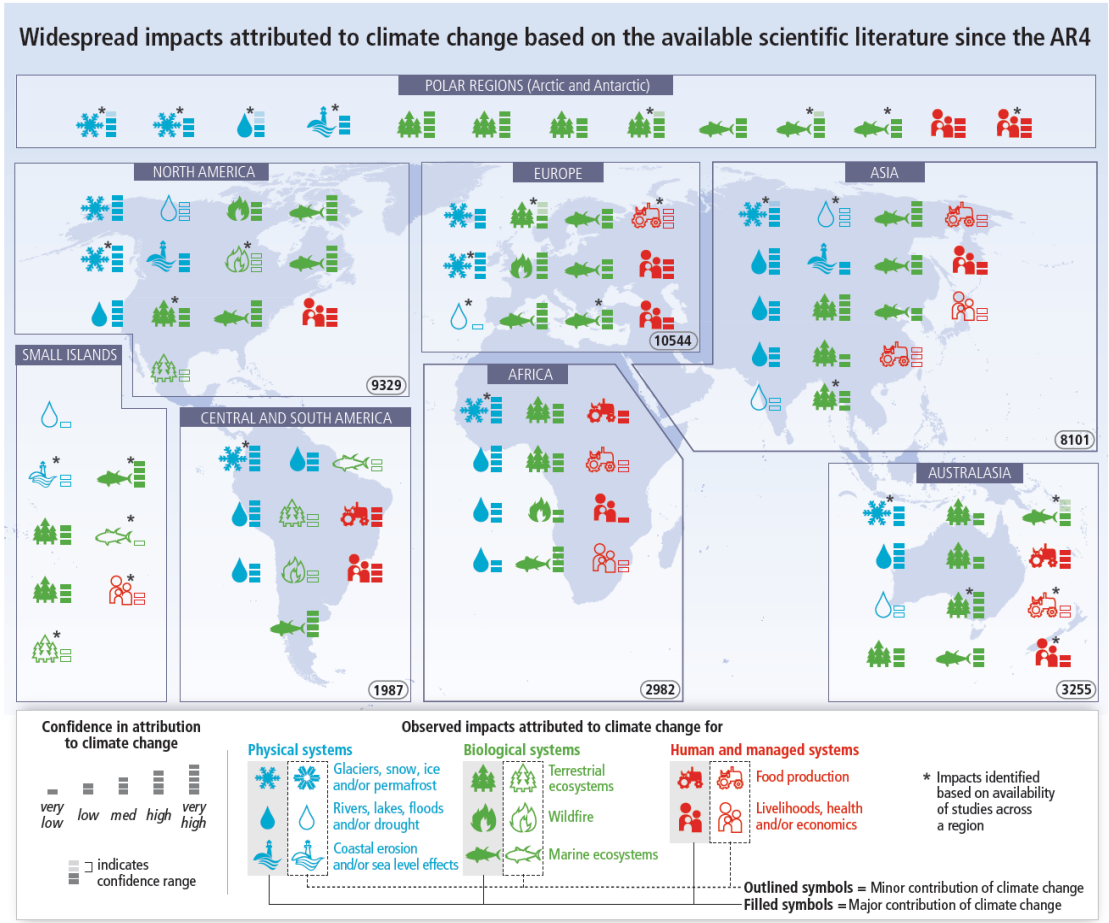
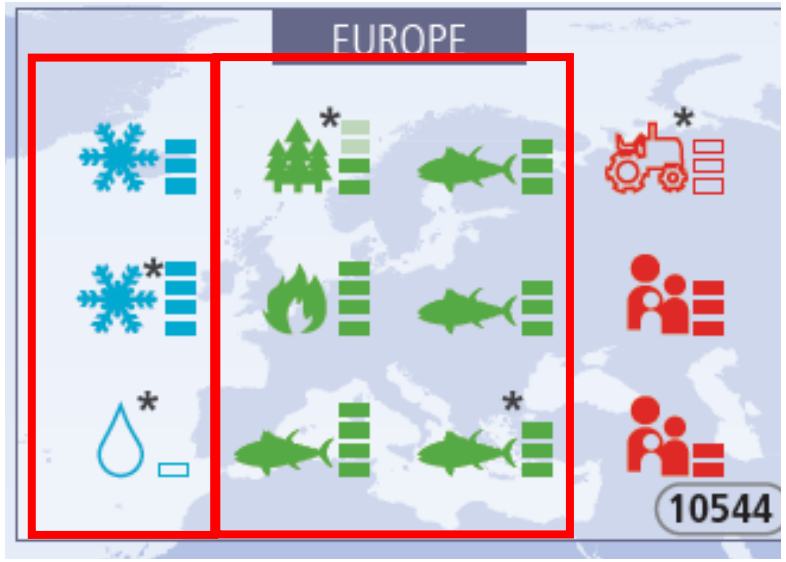
		6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)																					
		2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")																					

2) Vulnerability assessment

Hazard Identification

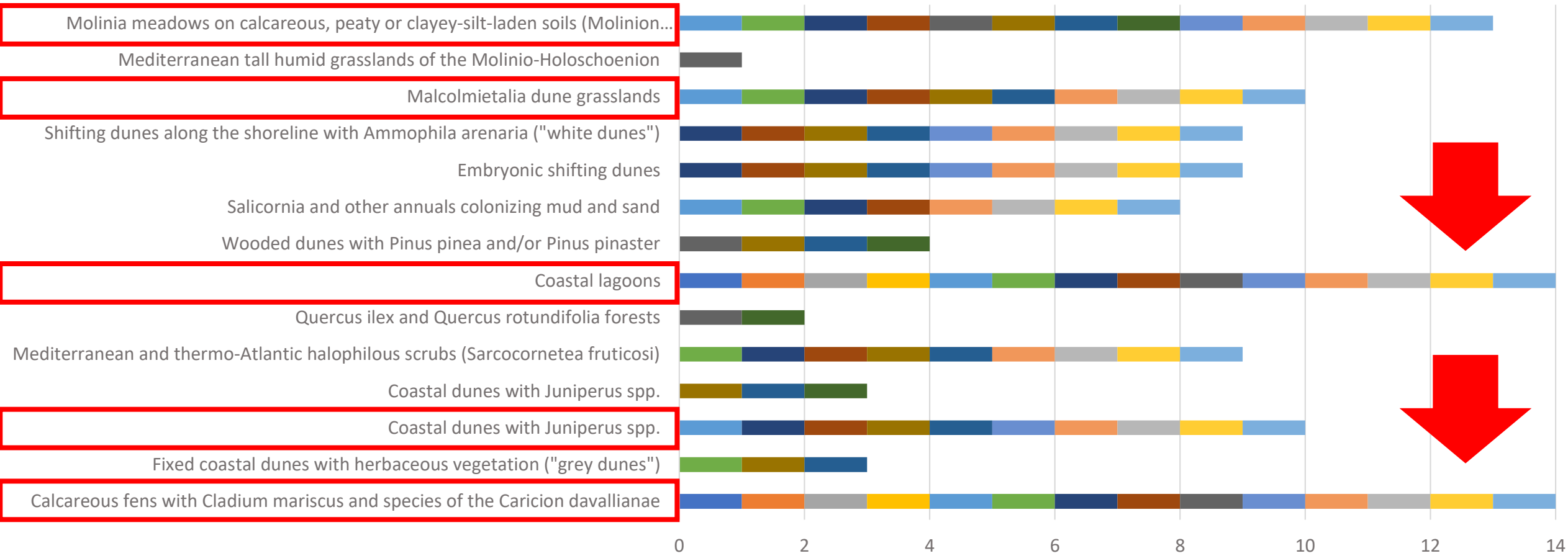


IPCC
(AR4 Report; AR5 Report)
+
Expert Judgement



Caorle Lagoon – mouth of Tagliamento river

Vulnerability Assessment: Habitats



Caorle Lagoon – mouth of Tagliamento river

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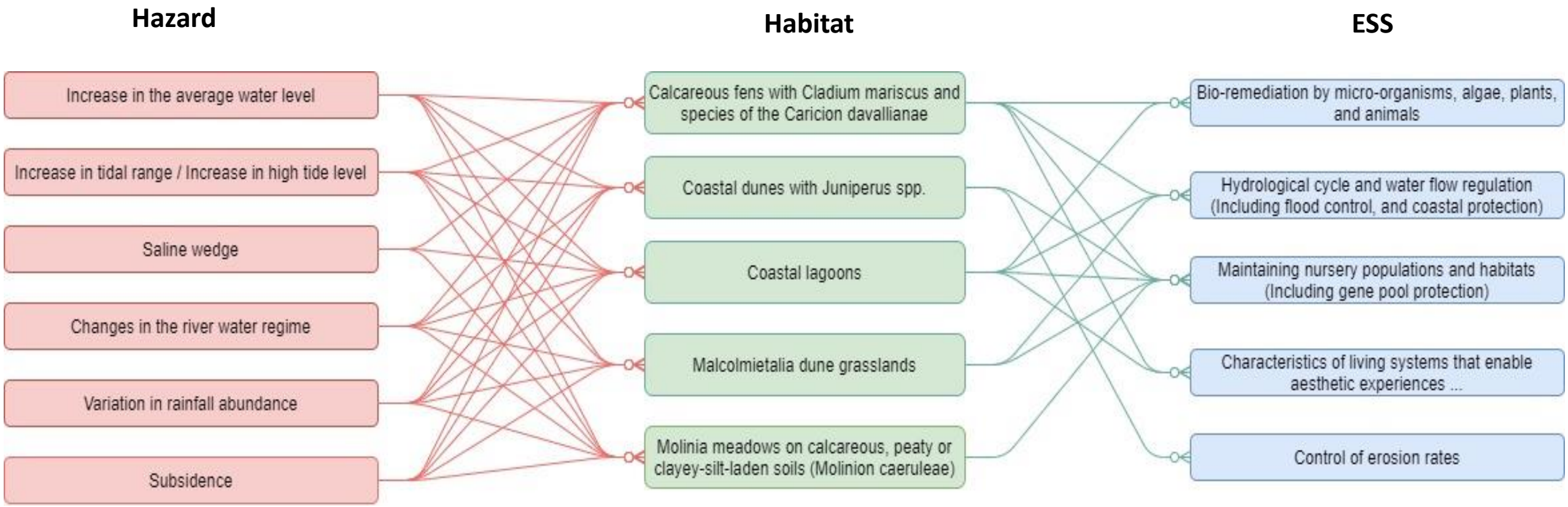

Caorle Lagoon – mouth of Tagliamento river

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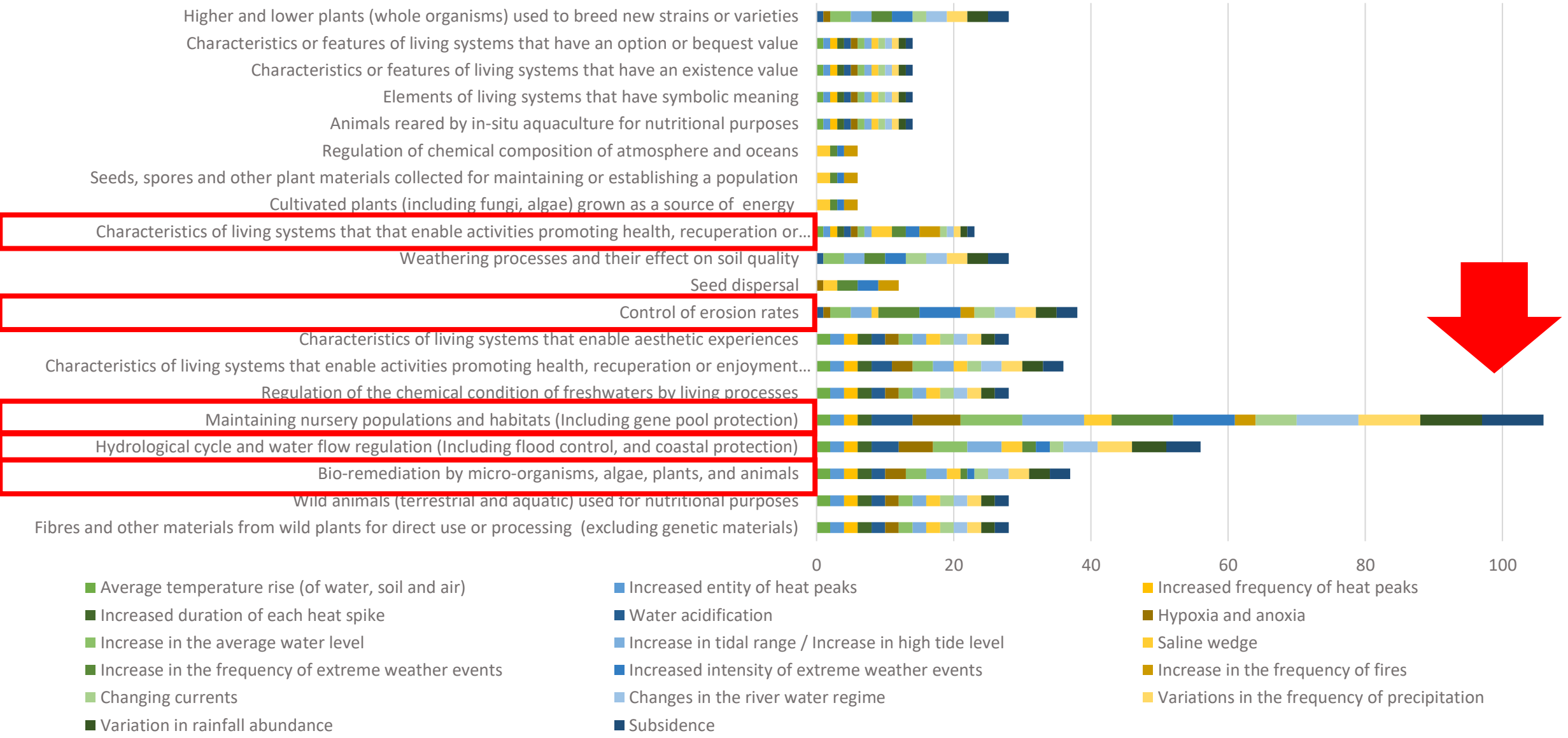
Vulnerability Assessment: Relevant Ecosystem Services



Caorle Lagoon – mouth of Tagliamento river

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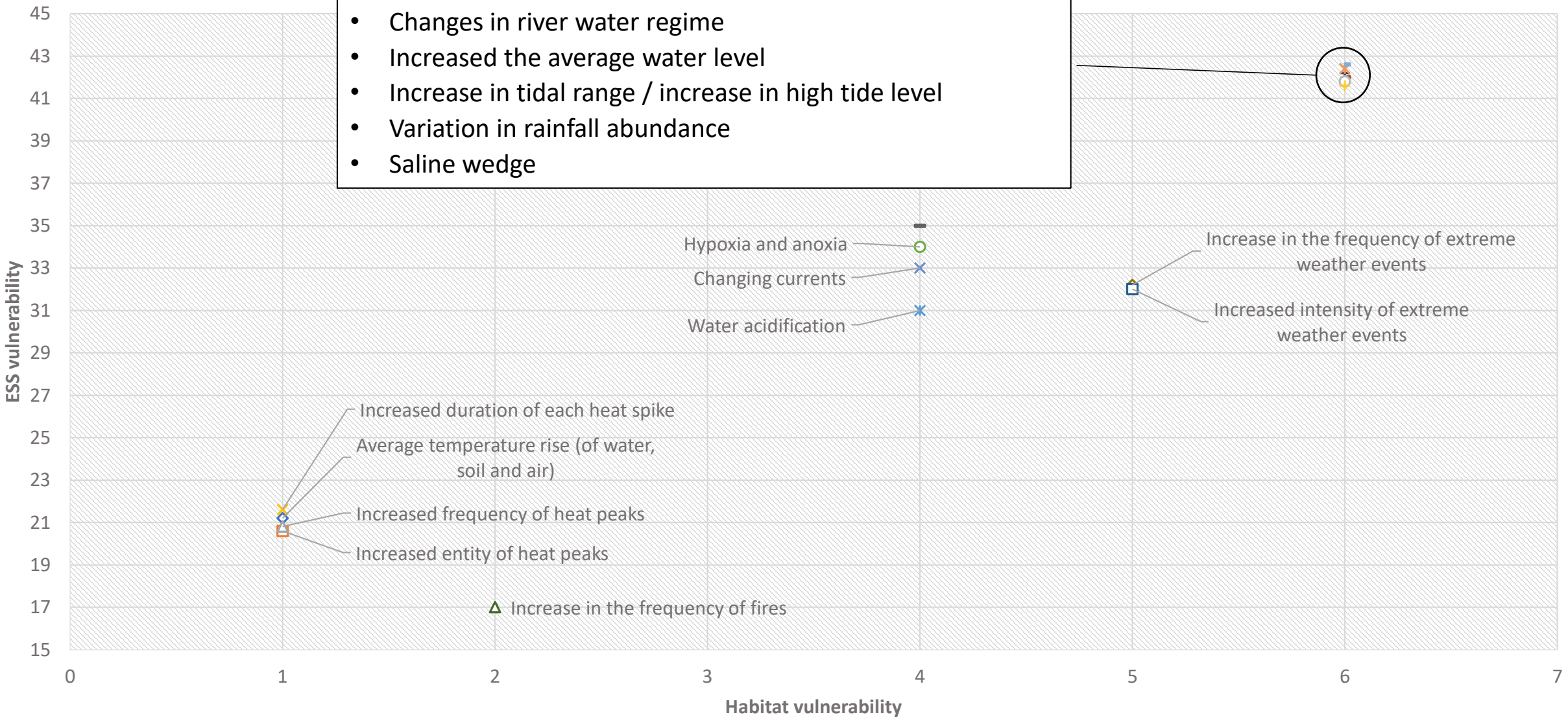
Vulnerability Assessment: Results

- Subsidence
- Changes in river water regime
- Increased the average water level
- Increase in tidal range / increase in high tide level
- Variation in rainfall abundance
- Saline wedge



The Slovenian pilot case study of project ECO-SMART: Natura 2000 area of Škocjanski zatok

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Figure 2: Škocjanski zatok Nature Reserve

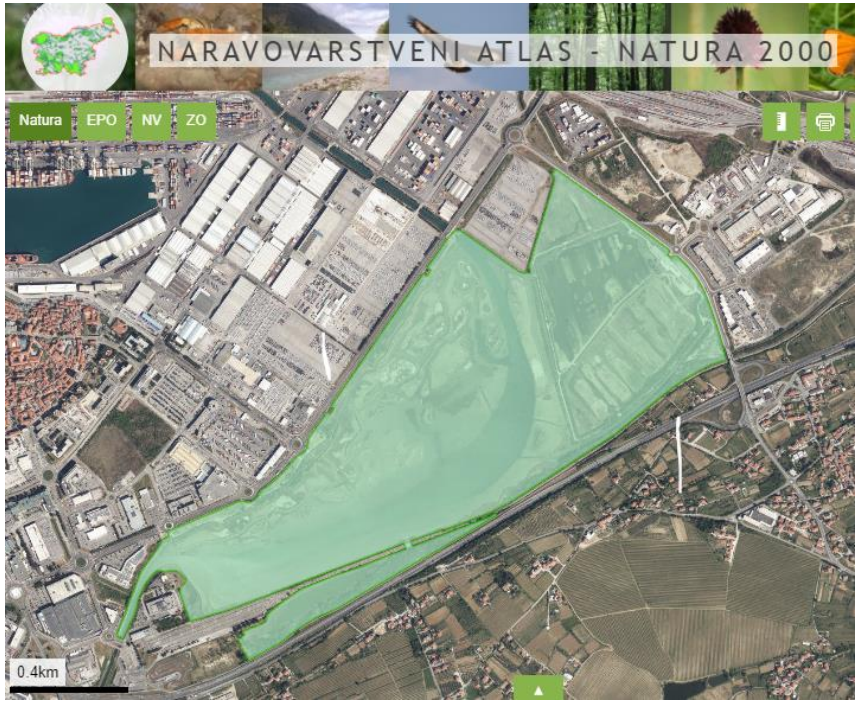

Figure 3: Škocjanski zatok – Natura 2000 area

Škocjanski zatok Nature Reserve is a coastal Mediterranean wetland located near the city of Koper on the Slovenian coast. It is protected under the Natura 2000 network and also as a Nature reserve from 1998 (Act on Škocjanski zatok Nature Reserve).

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Ecosystem Services, climate risks and vulnerability

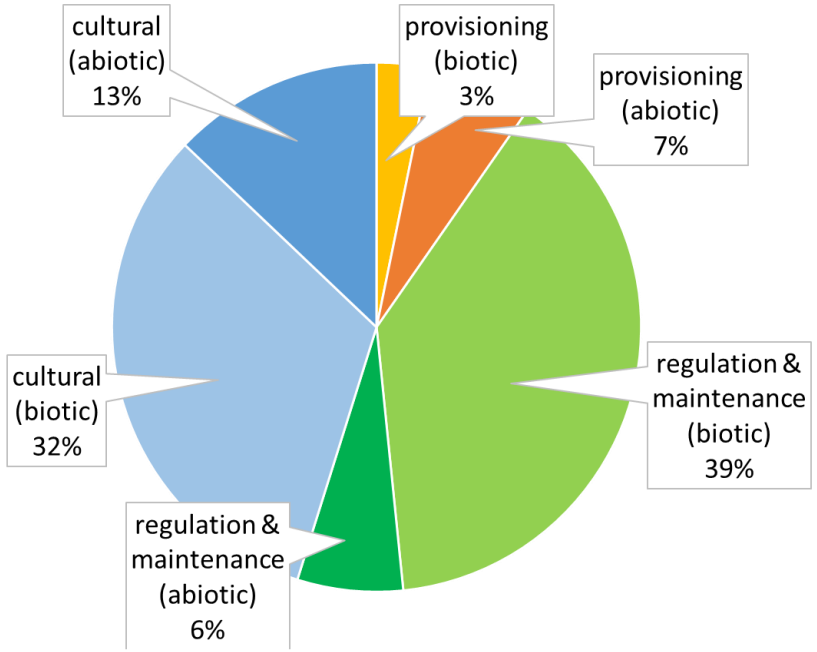

Figure 4: Škocjanski zatok ESS

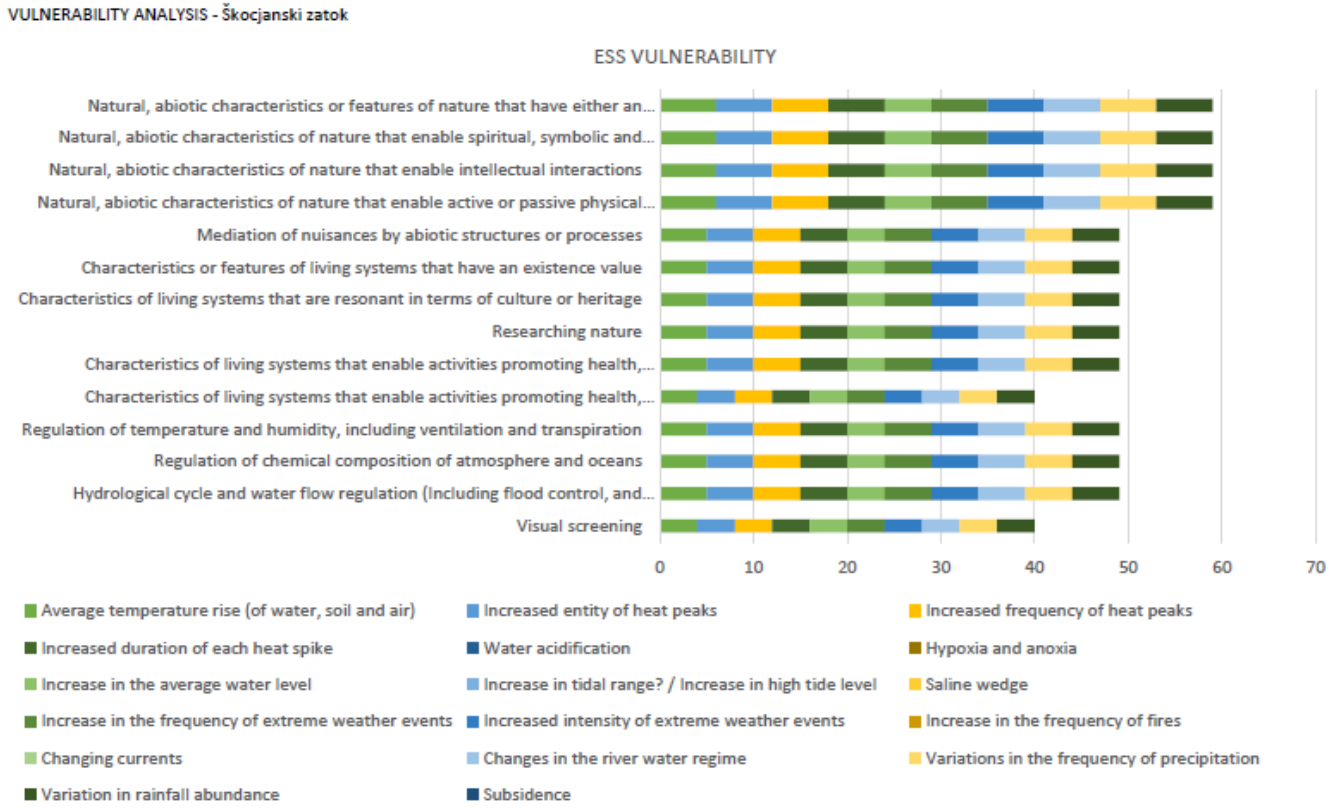

Figure 5: Škocjanski zatok Nature Reserve ESS vulnerability assessment

According to CICES classification Škocjanski zatok offers 31 ecosystem services that were considered within the analyses of climate risks and ESS vulnerability during the first phase of the project ECO-SMART.

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Where are we now? Definition of Payment for Ecosystem Services schemes

Possible PES schemes have been identified. E.g. for the Veneto area:

1. **Protection from storm surges with natural dune defense systems**
   - Coastal nourishment;
   - Dune conservation/restoration, e.g., with plantations.

2. **Recovery of a minimum vital and ecological functionality of the lagoon system**
   - Tidal opening of some lands

3. **Implementation and maintenance of slow use and environmental education actions**
   - Exploit variable revenues, such as tourist taxes, an increase in beach parking, etc., to define annually a targeted programme of conservation actions

Common methodology of Adaptation plans, accompanying action plans and feasibility assessments

Figure 6: Common methodology for adaptation plans

The expected results of the proposed methodology are:

- Adaptation plans with action plans and feasibility assessments for Natura 2000 pilot sites in Italy and Slovenia
- Signed agreements with local actors for the support and implementation of the selected relevant local adaptation measures
- Designed protocols of public tenders for the implementation of the adaptation plans using PES models

Conclusions

1) A novel approach to identify climate-vulnerable habitats, related ESS and the impact chain of hazards on them has been successfully demonstrated
2) Stakeholder engagement was (and will be) be fundamental for the implementation of such approach
3) Uncertainty in climate scenarios affect our analysis, especially given the lack of fine scale predictions for the northern Adriatic coasts
4) ESS can support nature conservation and a sustainable management of territories (need to educate developers and decision makers)
5) To exploit the potential of ESS there is a need to adopt an ecosystem approach in planning and management of coastal and marine resources

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Thank you for your attention.

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