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Comparative evaluation of the effectiveness of the ECO-SMART project pilot cases

WP3.3 - Capitalization of results to increase coastal and marine resilience capacity ai climate changes

English version n. 11

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WP 3.3 - Capitalization of results to increase coastal and marine resilience capacity ai climate changes

Deliverable: ATT 14.1 - Comparative evaluation of the effectiveness of the ECO-SMART project pilot cases

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For data collection referring to NATURA 2000 sites:
- Lagoon of Caorle - Mouth of the Tagliamento (IT3250033) - Mouth of the Tagliamento (IT3250040) - Valle Vecchia Zumelle - Valleys of Bibione (IT3250041): Marco Abordi (Terra srl)
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The overall objective of the ECO-SMART project is to evaluate, test and promote payment systems for ecosystem services (PES) as a tool to improve climate change monitoring capacity.

The project envisages the development of suitable climate change adaptation measures that can simultaneously strengthen the resilience of the territory and improve the conservation of habitats in Natura 2000 sites.

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Project Partners:
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PP2: Municipality of Monfalcone (Italy)
PP3: University of Padua - Department of Industrial Engineering (Italy)
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PP5: Scientific Research Centre Koper - Mediterranean Institute of Environmental Studies (Slovenia)

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Acronyms

EBA = Ecosystem-Based Adaptation

ESS = Ecosystem Service

EUSAIR = EU Strategy for the Adriatic-Ionian Region

EUSALP = EU-Strategy for the Alpine Region

PES = Payment for Ecosystem Service

PP = Project Partner

SH = Stakeholder

1 INTODUCTION

Activity 14 of the ECO-SMART Project aimed at drafting the comparative evaluation of the effectiveness of the ECO-SMART project pilot cases (Deliverable 14.1) and at drafting the cross border harmonised procedure for ESS and PES in order to deal adaptation plans for NATURA 2000 sites (Deliverable 14.2).

The Deliverable 14.1 analysed and assessed to what extent the activities carried out in the pilot cases contributed to the achievement of the project's objectives thanks to the methodological approach developed and applied by ECO-SMART.

External experts were involved in the evaluation.

2 COMPARATIVE EVALUATION OF THE EFFECTIVENESS OF THE ECO-SMART PROJECT PILOT CASES

The activity was developed as follows:

- PPs drew up the benchmarking document in order to facilitate the external experts' evaluation. The document is composed of 3 sections: introduction to the ECO-SMART project (Section 2-Chapter 5); methodological approach (Section 2-Chapter 6); pilot cases result self-evaluation (Section 2-Chapter 7).
  The pilot cases are:
    - Pilot cases of the Veneto region: Upper lagoon of Venice (IT3250031), Caorle Lagoon-Mouth of the Tagliamento (IT3250033), Mouth of the Tagliamento River (IT3250040), Old valley-Zumelle-Bibione valleys (IT3250041);
    - Pilot case of the Friuli Venezia Giulia Region: Cavana of Monfalcone (IT3330007);
    - Pilot case of Slovenia: Škocjanski zatok (SI3000252).
- PPs invited selected external experts to carry out the assessment. Experts belong to the following organizations: the Italian Ministry of the Ecological Transition, Italian and Slovenian members of the EUSAIR Pillar 3 – Environmental quality and EUSALP Action Group 6-Resources, the Institute for Water of the Republic of Slovenia, the UN Environment Programme / Mediterranean Action Plan Priority Actions Programme Regional Activity Centre.
  External experts were provided with the introduction of the ECO-SMART project, the self-evaluation carried out by each PP with reference to its own pilot case, the evaluation form.

- PP2 integrated the comparative evaluation with regard to the methodological approach (Section 1-Chapter 3) and the effectiveness on the pilot cases (Section 1-Chapter 0).

FIRST SECTION

3 EVALUATION OF THE METHODOLOGICAL APPROACH

The methodology is based on an integrative approach created by the ECO-SMART PPs to combine all project activities and aims. The approach embedded the communities' capacity building activities in all steps to facilitate the community engagement and participation in the co-creation of climate change adaptation measures using an EBA approach, strengthening of climate resilience of local Natura 2000 sites and local communities.

Multiple benefits for local ecosystems and communities have been identified during the formulation of the adaptation plans and PES simulations feasibility studies. Furthermore, a common transnational approach supports the ecosystems connectivity, a more coordinated ecosystem management and a joint action to protect biodiversity. Therefore, ECO-SMART cross-border approach to protect biodiversity and mitigate climate change impacts lays the bases for implementing measures at local level using a participatory bottom-up approach that involves communities in actions.

Definition and simulation of innovative financial mechanism as PES were the key aspect ensuring the economic feasibility of the proposed adaptation measures, particularly tailored to each Natura 2000 site involved.

External experts were invited to evaluate the methodology by answering to the following question:

- Which are added values of the methodology that go beyond the existing climate change adaptation approaches?
- Which are the limits, weaknesses, opportunities of this methodology?

3.1 Methodology added value

Seven external experts participated in the evaluation.

Regards the methodology added value, external experts could provide four levels of evaluation: very robust, robust, weak and very week. The experts assigned a high rate. Six out of seven stated that the methodology is robust and one that it is very robust.

In particular, they said that the methodology is well structured and the workflow has a very clear logic. It covers all relevant aspects from the identification of the ESS to the PES scheme and provides a very concrete proposal for managing habitats applying the payment for ecosystem services schemes.

The methodology enhances the stakeholders' involvement in managing Natura 2000 sites, which is essential to achieve the conservation objectives. The method provides a transparent and integrated assessment. It is clear that stakeholder involvement is

crucial at all stages. This is very important for the long-term success of PES. They suggested that special regard has to be given to the stakeholder with a major legal interest in using the area and direct users should be involved and charged with greater responsibility. Therefore, the application of the method should foster for a clear identification of those stakeholder who have a legal interest in the area (such as owners).

The assessment of the costs of implementing and financing measures is very important. The PES financing the adaptation plan measures should therefore be sustainable in order to provide long-term benefits.

3.2 Limits, weaknesses, opportunities of the methodology

Six external experts participated in the evaluation.

3.2.1 Limits

By "limit" we mean that the methodology is comprehensive and well developed but has some limitations in the application phase.

External experts stated that the method requires a lot of preparatory work such as the identification of the habitats and ESS that are most sensitive to climate change and the interests of the SH that may conflict if they are not balanced and understood by the users. Therefore, the feasibility of the selected measure should be well analysed.

3.2.2 Weaknesses

By "weaknesses" we mean that the methodology is not complete and not well developed, and we identify the points of failure. The methodology can be improved by adding the following suggestions.

The methodology provides for PES monitoring, but can be improved by planning monitoring more regularly. The status of selected (most vulnerable) habitats should be monitored regularly. This would allow adaptation of the PES to ensure its long-term effectiveness and rational use of resources.

The adoption of the Common International Classification of Ecosystem Services taxonomy can be a weak point, because while it is sufficiently comprehensive in terms of provisioning ESS, for operational purposes the definitions of regulatory and cultural ESS are not adequate.

The involvement of SH if not well prepared can lead to failure. There are SH that should be interested (e.g., landowners) but they may be unaware of the issue under discussion and subjectively not interested. The SH identification should be based non only on the interest to be involved but also on other criteria (e.g. direct and indirect or internal vs. external with reference to the impacts and/or to the contractual agreements between managers and beneficiaries).

3.2.3 Opportunities

One of the six external experts stated that consideration could be given to complementing PES schemes with other tools for stakeholder involvement, such as the implementation of buffer zones and green infrastructure to mitigate the impact of grey infrastructure.

4 EVALUATION OF THE EFFECTIVENESS ON THE PILOT CASES

The effectiveness is assessed in terms of (GIZ, UNEP-WCMC and FEBA, 2020)[1]:

- Effectiveness for human society. Does the project allow local communities to maintain or improve their involvement in Natura 2000 site management, reduce their vulnerability in the face of climate change, while enhancing co-benefits that promote long-term well-being?
- Effectiveness for the ecosystem. Does the project conserve biodiversity, restore, maintain or enhance the capacity of ecosystems to produce adaptation services for local communities and allow ecosystems to withstand climate change impacts and other pressures?
- Financial and economic effectiveness. Is the measure cost-effective and economically viable over the long term?
- Policy and institutional issues. Does the measure and activity developed in the framework of the ECO-SMART project influence the identified regulatory instruments?

Several criteria were analysed in order to evaluate the effectiveness. The coherence of the criteria to the effectiveness is shown in *Table 1*.

Table 1: Criteria

Criteria	Effectiveness
Stakeholders analysis	Effectiveness for human society
PES schemes	Effectiveness for human society
ESS relevance in the Natura 2000 site	Effectiveness for the ecosystem
ESS vulnerability to climate change	Effectiveness for the ecosystem
Achievement of project objectives	Effectiveness for the ecosystem
ESS selection	Effectiveness for the ecosystem
Adaptation measures for the pilot case	Effectiveness for the ecosystem
Economic feasibility of the selected measures	Financial and economic effectiveness
Regional and local plans and programs in which adaptation measures can be included	Policy and institutional issues

Each pilot case was analysed in a comparative way using the listed criteria.

[1] GIZ, UNEP-WCMC and FEBA (2020). *Guidebook for Monitoring and Evaluating Ecosystem-based Adaptation Interventions.* Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bonn, Germany.

The comparative analyses have been quite challenging, since even the methodological framework has been the same, the Slovenian and Italian PPs adapted it to the specific needs and development phase of each pilot case.

The aim of this comparative analyses is to highlight the most relevant aspects that should be transferred into policies and to assess the effectiveness of the approach for the larger implementation.

External experts were invited to evaluate the pilot cases results with respect to the nine criteria (Table 1) by reporting on whether:

- are the cases comparable?
- are there common contents of the three pilot cases?

And evaluate:

- the effectiveness and added values of the analyse of each criteria;
- the transferability of each criterion.

Six external experts participated in the evaluation. The external esperts' suggestions are reported in the next Sections.

4.1 Criteria analysis

"Stakeholders analysis" criterion

In general terms, the analysis of SH is characterised by comparable elements and common content among the three pilot cases.

The effectiveness of the criterion is quite good. Considering the objective of the analysis, i.e. the construction of PES schemes, institutional SH and private (landowners) SH have to be considered as crucial actors for the success of the project.

"PES schemes" criterion

In general terms, the PES scheme can be easily transferred in different context (not only in Natura 2000 sites) and is characterised by comparable elements among the three pilot cases.

The criterion is quite effective and has a medium to high added value. The implementation of the approach should be understood as a first exercise in building a PES scheme and requires further fine-tuning.

"ESS relevance in the Natura 2000 site" criterion

In general terms, the analysis of the ESS relevance in the Natura 2000 sites is characterised by comparable elements even if contents may differ among pilot cases.

The criterion is quite effective and has a medium to high added value. In order to ensure transferability, the methodology should provide a more structured approach. Pilot areas are characterised by the same ecosystem, so transferability to other ecosystems cannot be assessed.

"ESS vulnerability to climate change" criterion

In general terms, the ESS vulnerability to climate change analysis is characterised by comparable elements and common content among the three pilot cases.

The effectiveness of the criterion has a medium to high added value. The approach used for vulnerability analysis can be easily transferred to others context/site.

"Achievement of project objectives" criterion

In general terms, the achievement of project objectives is characterised by comparable elements and common content among the three pilot cases.

The effectiveness of the criterion has a medium added value. In order to ensure transferability, the methodology should provide a more structured approach.

"ESS selection" criterion

In general terms, the ESS selection is characterised by a lower level of comparison among the three pilot cases.

The effectiveness of the criterion has a medium to high added value.

"Adaptation measures for the pilot case" criterion

In general terms, the adaptation measures criterion is characterised by comparable elements and common content among the three pilot cases.

The effectiveness of the criterion has a medium to high added value. Although the measures are tailored for the case studies, the approach composed by the vulnerability analysis and analysis of existing measures in management plans can easily be transferred to different contexts.

"Economic feasibility of the selected measures" criterion

In general terms, the economic feasibility of the selected measures criterion is characterised by comparable elements and common contents among the three pilot cases.

The criterion is quite effective and has a medium added value. The implementation of the approach should be understood as a first exercise in building a PES scheme and requires further fine-tuning, including the economic feasibility.

"Regional and local plans and programs in which adaptation measures can be included" criterion

In general terms, the criterion is characterised by comparable elements and common content among the three pilot cases.

The effectiveness of the criterion has a medium added value. The criterion has an high level of transferability.

4.2 Capitalization

External experts were invited to specify which are in general the most relevant issues/aspects of this comparative analyses (if any) that should be capitalized (disseminate and transfer to policies) at national and transnational levels.

The methodology itself deserves being capitalized.

The most relevant aspects in general are:

- the ESS relevance and vulnerability analysis to climate change,
- the SHs' analysis and identification of actors with most direct link to ESS (those with legal interest in particular),
- the PES schemes, that could be supplemented by other information related to other tools for financing adaptation measures,
- the identification of local policies and local spatial planning to which adaptation measures should be included,
- the monitoring of achievements in long-term.

SECOND SECTION

5 INTRODUCTION TO THE ECO-SMART PROJECT

5.1 Project summary[2]

The EU affirmed the strategic role of protecting ecosystems in mitigating the climate change effects, while supporting the resilience of territories. The ECO-SMART project addressed the challenge of improved capacity of monitoring climate change and planning appropriate adaptation measures to avoid negative effects undermining the quality of biodiversity in the Natura 2000 sites.

The general objective of the ECO-SMART project was to evaluate and to test the crossborder economic feasibility of biodiversity-safeguard actions in Natura 2000 areas through the pilot application of PES.

ECO-SMART provided:

- A general framework to assess the vulnerability to climate change applied to the involved Natura 2000 areas;
- Sustainable adaptation plans through PES models in 3 pilot application at Natura 2000 network sites (2 in ITA and 1 in SLO);
- A wide dissemination of harmonized procedures for the application of ESSs approaches, and PES methods for the design of conservation of biodiversity in Natura 2000 areas.

5.2 Project objective

The objective was to contribute to the conservation of the biodiversity in Natura 2000 ITA-SLO sites through the development and pilot application of ESS/PES methods in order to draft adaptation plans mitigating climate change.

The project contributed to the CO23 objective[3] by establishing a common, scalable and replicable ESS/PES system, planning and implementing biodiversity protection measures through pilot actions, courses and workshops on ESS and PES and capitalization actions in the regulatory framework of the regions.

As stated in the application form, the objective of the project is:

- to evaluate and test at interregional level the economic feasibility to finance actions to safeguard the biodiversity of the Natura 2000 areas through the pilot application of PES.

[2] https://www.ita-slo.eu/en/eco-smart

[3] Common indicator (CO) is an indicator with agreed definition and measurement unit to be used when relevant in Operational Programmes, permitting aggregation to the national and EU level. 2014-2020 CF and ERDF regulations define common output indicator, and CO23 is defined as 'Surface area of habitats supported to attain a better conservation status'.

6 METHODOLOGICAL APPROACH

Actions to tackle climate change and establish adaptation measures require significant financial and technical resources. The public authorities involved in the project, for their institutional role are called to guide these processes even with limited resources. ECO-SMART aimed to facilitate this process by establishing PES scheme to finance the selected adaptation measures.

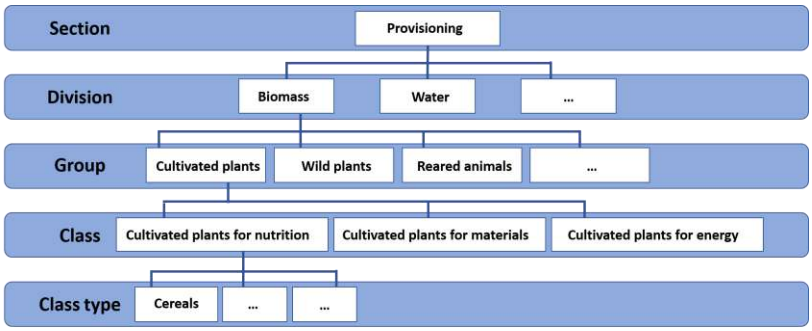
The methodology is divided into three steps (ESSs Identification, Vulnerability Analysis, and Adaptation Plan) distinct in terms of theoretical framework, tools, results.

- **Step 1: ESSs identification:**

Theoretical framework.

The theoretical framework adopted for the ESS identification is the Common International Classification of Ecosystem Services (CICES) developed by the European Environment Agency and external partners[4]. More generally, it has been used as the basis of mapping and ecosystem assessment, and has been adopted in the framework of the EU on Mapping and Assessment of Ecosystems and their Services (MAES)[5].

Figure 1. Diagram of the CICES taxonomy



CICES defines ESSs as the contributions that ecosystems make to human well-being. CICES describes them using a five-level hierarchical structure. Each level is progressively more detailed and specific. The way the system works can be illustrated for the contributions that ecosystems make to cultivated crops such as cereals (Figure 1)[6]:

- Section (e.g. Provisioning),
- Division (e.g. Biomass),
- Group (e.g. Cultivated terrestrial plants for nutrition, materials or energy),

[4] Haines-Young, R. and M.B. Potschin (2018). *Common International Classification of Ecosystem Services (CICES) V5.1 and Guidance on the Application of the Revised Structure*. Available from www.cices.eu
[5] https://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/index_en.htm.
[6] https://cices.eu/.

- Class (e.g. Cultivated terrestrial plants (including fungi, algae) grown for nutritional purposes),
- Class type (e.g. Cereals, defined as »The ecological contribution to the growth of cultivated, land-based crops that can be harvested and used as raw material for the production of food«).

Tool.

Each PP compiled the »*Tool 1. ESS data collection*« for its Natura 2000 site (Figure 2). The sheet contains 90 types of ESSs. From this list, each PP selected the ESSs present in the Natura 2000 site and provided a brief description of the service and connected habitat(s), the ESS relevance for the area and the benefitting SHs.

Results.

- Mapping habitats and ESSs in the Natura 2000 site.
- Identifying the most relevant ESSs in Natura 2000 sites through the involvement of experts and SHs and mapping SHs both beneficiaries and providers of ESSs.

Figure 2: Tool 1. ESS data collection

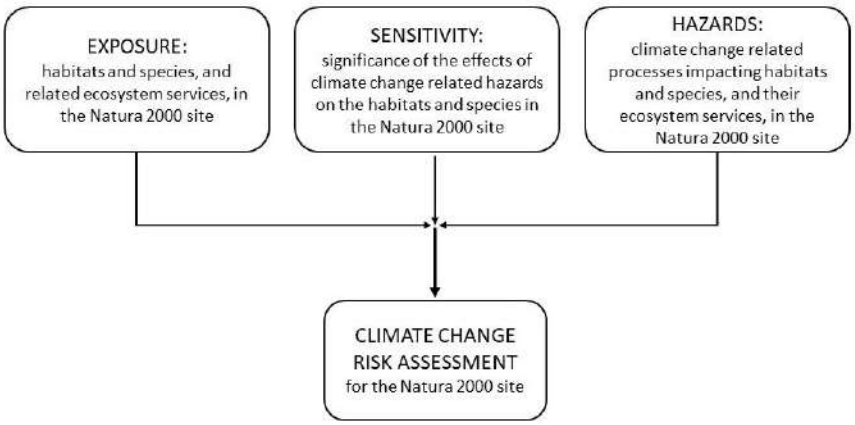
CICES taxonomy					ESS data collection			
Section	**Division**	**Group**	**Class**	**Class type**	**Presence of the ESS in your site: YES / NO / N.I. (NO INFORMATION)**	**Description of service and connected habitat(s)**	**Is this ESS important/relevant for the Area?**	**Who is the stakeholder of this ESS?**
Provisioning (Biotic)	Biomass	Cultivated terrestrial plants for nutrition, materials or energy	Cultivated terrestrial plants (including fungi, algae) grown for nutritional purposes	Any crops and fruits grown by humans for food; food crops				
	(…)	(…)	(…)	(…)				
Regulation & Maintenance (Biotic)	Transformation of biochemical or physical inputs to ecosystems	Mediation of wastes or toxic substances of anthropogenic origin by living processes	Bio-remediation by micro-organisms, algae, plants, and animals	Decomposing wastes				
	(…)	(…)	(…)	(…)				
Cultural (Biotic)	Direct, in-situ and outdoor interactions with living systems that depend on presence in the environmental setting	Physical and experiential interactions with natural environment	Characteristics of living systems that enable activities promoting health, recuperation or enjoyment through active or immersive interactions	Using the environment for sport and recreation; using nature to help stay fit				
	(…)	(…)	(…)	(…)				
Provisioning (Abiotic)	Water	Surface water used for nutrition, materials or energy	Surface water for drinking	Drinking water from sources at the ground surface				
	(…)	(…)	(…)	(…)				
Regulation & Maintenance (Abiotic)	Transformation of biochemical or physical inputs to ecosystems	Mediation of waste, toxics and other nuisances by non-living processes	Dilution by freshwater and marine ecosystems	Diluting wastes				
	(…)	(…)	(…)	(…)				
Cultural (Abiotic)	Direct, in-situ and outdoor interactions with natural physical systems that depend on presence in the environmental setting	Physical and experiential interactions with natural abiotic components of the environment	Natural, abiotic characteristics of nature that enable active or passive physical and experiential interactions	Things in the physical environment that we can experience actively or passively				
	(…)	(…)	(…)	(…)				

- **Step 2. Vulnerability Analysis:**

Theoretical framework.

The framework adopted for the vulnerability analysis is the ISO 14091 International standard on adaptation to climate change[7]. Climate change risk assessment, also referred as vulnerability, can be addressed as the result of the evaluation of hazards (potential source of harm), exposure (people, ecosystems, resources, infrastructure, economic, social or cultural assets that could be affected by the hazards), sensitivity (degree to which the system is affected) and the adaption capacity (ability of the system to adjust to potential damages or advantages and to respond to climate change consequences) of the system under assessment[8].

Figure 3. Conceptual framework of climate risk assessment adapted from ISO 14091



In the project ECO-SMART, the framework presented by ISO 14091 was adapted and developed for the vulnerability assessment of coastal Natura 2000 sites, as follows (Figure 3):

- Quantification of the exposure of the Natura 2000 site. It is expressed in terms of habitats and species and related provision of ESSs to climate change effects.
- Identification of hazards[9]. It is expressed in terms of climate change driven processes which can affect the habitats and species of the Natura 2000 site.
- Assessment of the sensitivity. It is expressed in terms of significance, or relevance, of the effects of the climate change-related hazards on the habitats and species of the Natura 2000 site. Local sensitivity was determined by adopting

[7] BS EN ISO 14091:2021. *Adaptation to climate change - Guidelines on vulnerability, impacts and risk assessment.*
[8] Manzardo et al. (2022). *A methodological proposal for the climate change vulnerability assessment of coastal habitats based on the evaluation of ecosystem services: lessons learnt from the INTERREG project ECO-SMART.* Manuscript in preparation,
[9] Considering the coastal and transitional ecosystems, the most relevant climate-driven hazard were detected based on the most recent climate change scenarios of IPCC: increase in average sea level, average temperature rise, global mean surface temperature, heat peaks, increase in tidal range/increase in the high tide level, ocean acidification, hypoxia and anoxia, extreme weather events, increase of wildfires, salt-wedge , subsidence, changing currents, hanging in the river water regime, variation in the frequency of precipitations and in rainfall abundance (IPCC. In: Climate Change 2014: Impacts, adaptation, and vulnerability. Part B: Regional aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change / IPCC. In: Climate Change 2014: Impacts, adaptation, and vulnerability. Part A: Global and sectoral aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change).

qualitative methodology and using the expertise and local ecological knowledge of SHs.

- Assessment of the potential climate change risk, or vulnerability, determined by considering how many habitats, species and ESSs are at risk.

Tool.

Each PP compiled the »*Tool 2. Hazard data collection*«. The sheet contains the most relevant ESSs (as selected in the Step 1). Each PP identified the effects of the 17 hazards on the ESSs and the associated habitats. SHs related to each habitat are listed distinguishing between stakeholders who are beneficiaries and those who provide the ESS (Figure 4).

- Ecosystem service analysis

The analysis aimed to identify the ESSs which are most vulnerable to climate change. ESS vulnerability was quantified summing up the hazards affecting the selected service. Results were represented in histogram (see Appendix 1).

$$ESS_{j-th}\ vulnerability = \sum_{1}^{n} Hazards\ influencing\ ESS_{j-th}$$

- Habitat vulnerability analysis

The analysis aimed to identify the habitats which are most vulnerable to climate change. Habitat vulnerability was quantified summing up the hazards affecting the selected habitats. 17 hazards have been taken into account. Therefore the habitat vulnerability may range form 0 up to 17. Results were represented in histogram (see Appendix 1).

$$Habitat_{i-th}\ vulnerability = \sum_{1}^{n} Hazards\ influencing\ Habitat_{i-th}$$

- Joint vulnerability analysis

Combining the results of the ESSs and habitat analysis, the joint analysis identified the most impacting hazard in the Natura 2000 site.

$$Hazard_{n-th}\ relevance = \begin{bmatrix} \sum_{1}^{i} Habitat\ influenced\ by\ Hazard_{n-th}\ ; \\ \sum_{1}^{j} ESS\ influenced\ by\ Hazard_{n-th} \end{bmatrix}$$

Result.

- Assessing the vulnerability of Natura 2000 sites to climate change with a focus on both the vulnerability of habitats and the vulnerability of ESSs.

- Developing the impact chain: a schematic representation of the exposure of habitats and ESSs to climate change-related hazards. It helps to better understand, visualize, systemize and prioritize those hazards that drive risk in the habitat and related ESSs (refer to Note 7, see Appendix 2).

Figure 4: Tool 2. Hazard data collection

NATURA2000 area				Hazard List																				
Name	**SITE CODE**	**HABITAT CODE**	**HABITAT DESCRIPTION**	Average temperature rise	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	provided ESS (Q#1)	SH - ESS beneficiary)	SH - ESS provider
Caorle Lagoon--Mouth of the Tagliamento	**IT 3250033**	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.																					
		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)																					
		...	...																					

- **Step 3. Adaptation plan:**

Theoretical framework.

The framework adopted for planning climate change adaptation refers to the European framework on climate change adaptation, the Mediterranean and Adriatic framework on Climate change, the Natura 2000 and green infrastructure framework of Climate change.

Tool.

Each PP compiled the »*Tool 3. Adaptation plan template*«. The template approaches the following issues:

1. Get started:
   - Define a vision, objectives and guiding principles (in particular consider EU key principles to adaptation, interdisciplinary, ecosystem-based adaptation as key principles),
   - Establish an interdisciplinary team,
   - Identify the key SHs and set up collaboration with them. Actors are classified referring to two main parameters: influence (i.e. to what extent is the actor in a position to influence crucial decisions) and interest (i.e. how interested is the actor in the subject of climate change adaptation in general and in the planned adaptation measure in particular?) (Figure 5).

Figure 5: Analytical framework to classify SHs and determine their involvement in the adaptation process[10]

Map of SHs	Interest	
Influence	Uninterested Key Actors SHs find themselves in the position of making crucial decisions regarding the adaptation process and cannot be ignored or overlooked in the implementation of certain measures. However, they bring nothing to discussions of possible adaptation. Some may even take a stand against potential adaptation measures ('blockers').	Interested Key Actors SHs are central actors whose position, (decision-making) authority, potential influence, and/or contacts are of decisive relevance for the adaptation process. Without them, certain adaptation measures cannot be realized. They demonstrate consistent interest in adaptation measures and expect concrete effects for themselves or for the organizations they represent.
	Marginal Actors SHs have no opportunity to influence the adaptation process in any way, primarily because they have little or no authority, relevant resources, or influence. Moreover, they have scant interest in the subject of climate change adaptation, even though they might be affected by the consequences of	Interested Actors SHs do not possess the means to influence the adaptation process to any significant extent and are also not (necessarily) essential for the implementation of adaptation measures. Nevertheless, they are very engaged and demonstrate great interest in the consequences of climate change and possibilities for adaptation.

[10] Adapted from Prutsche, A., Felderer, A., Balas, M., Konig, M., Clar, C., Steurer, R. (2014). Methods and Tools for Adaptation to Climate Change. A Handbook for Provinces, Regions and Cities. Environment Agency Austria, Wien.

	climate change or by potential adaptation measures.	

2. Review the available knowledge and establish a baseline:
   - Consider policies, plans, programs (at different levels of governance),
   - Consider results of the previous steps (descriptions of Natura 2000 pilot sites, ESSs analyses, vulnerability analyses),
   - Consider sustainable aspects of conservation of natural resources, threats, climate scenarios and non-climatic future threats,
   - Identify ongoing activities with relevance for adaptation,
   - Explore good practices within or outside the country.
3. Develop the adaptation plan:
   - Explore a wide spectrum of adaptation options (Figure 6),
   - Select the main categories, types and specific measures that are relevant for the pilot area Natura 2000 and propose concrete measures,
   - Assess relevance and implementation status of proposed concrete measures (initial implementation indicates a clear need for action) (Figure 7).

Figure 6: Adaptation measures analyses[11]

Category	Type of measure*	Examples of concrete measures[12]	Is the measure relevant for the pilot Natura 2000 area?	What is the current status of implementation?[13]
Reduce of existing pressures	Restoration activities			
	Buffer zone development			
	Increase reserve size			
Increase ecosystem heterogeneity	Enhance structural gradients			
	Allow natural processes			
Ensure abiotic conditions	Water quality			
	Water quantity			
	Nutrients balance			
Management impact of extreme events	Fire management			
	Flood management			
	Storm management			
Increase connectivity	Develop corridors/stepping stones			
	Wider landscape management			
	Create new nature areas			
	Spatial planning			
Other measures	Relocation of species			
	Control of invasive alien species			

[11] Adapted from EC, (2013) Guidelines on Climate Change and Natura 2000. Dealing with the impact of climate change On the management of the Natura 2000 Network of areas of high biodiversity value, Technical Report - 2013 – 068.
[12] List potential examples of concrete measures that could be implemented in the pilot Natura 2000 area.
[13] No entry = no implementation; 1 = initial implementation; 2 = advanced implementation; 3 = complete implementation.

Figure 7: Measured to be implemented in the pilot Natura 2000 area

Category	Type of measure	Concrete measure	Aim, short description and expected results

4. Design the implementation of adaptation measures:
   - Design the action and operative plan for all selected adaptation measures (Figure 8),
   - Perform a feasibility assessment using multi-criteria analyses (economic, environmental and social costs and benefits of adaptation). The measures should be evaluated on a scale from 1 (low) to 5 (high) involving the affected/affiliated SHs (Figure 9).

Figure 8: Comprehensive description of the adaptation measure and its operative and activity plan[14]

TITLE OF THE MEASURE *n.(1, 2, 3…)*	
Adaptation objective	*What will be achieved with this measure?*
Detailed description of the measure	*What is this measure about?*
Primary responsibility for implementation	*Which department/organization/actors are responsible for this measure?*
Significance of the measure	*What climate change-related impacts are addressed by the measure?*
Link to existing instruments	*Are there any existing instruments (laws, strategies, networks) that support the measure's objectives?* *What instruments (laws, regulations, strategies, funding programs) are well suited to integrating the measure's objectives?* *What instruments conflict with the measure's objectives?*
Status of implementation	*What steps have been/are being carried out in the implementation of the measure?*
Necessary further steps	*What additional steps are necessary in the short, medium, and long term for implementation?*
Required resources, (including financial resources)	*What financial resources will be required for the planning and implementation of the measure (to the extent an estimation is possible)?*
Potential environmental, social benefits	*What potential environmental and social benefits are expected and connected with the implementation of the measures?*
Potential obstacles	*What obstacles could impede the success of adaptation? How can these barriers be removed?*
Interdisciplinary aspects and effects on other sectors	*Which areas/disciplines/sectors interact with the measure or will be affected by it?* *Are positive impacts on other sectors/disciplines/areas expected? If yes, how can these be utilized or evaluated in the larger context?*
Schedule for planning and implementation	*How much time should be allowed for the planning and implementation of the measure?* *How much lead time will there be until the measure is fully effective?*
Additional affected actors/sectors within the organization	*Which areas within the organization/additional stakeholders can support the measure's implementation or will be affected by the measure?* *Which type of agreements do you need with key actors/stakeholders?*
Mechanisms to monitor and evaluate the implementation success	*Which type of indicators (Process-based adaptation indicators in Outcome-based indicators) should be considered?* *Set up a Monitoring & Evaluation system- please describe the main aspects* *How you would ensure effective adaptation by supporting the long-term process of learning and providing a tool for practitioners to manage their work in the context of the uncertainty surrounding?*

[14] See Note 10.

Figure 9: Multi-criteria analyses[15]

Criteria	Measure 1	Measure 2	Measure 3
IMPORTANCE/SIGNIFICANCE. Can the measure prevent significant damage? Will irreversible damage be avoided by means of the measure? Does the measure have a broad (protective) impact on the population?			
URGENCY. Are extensive damages already occurring that could be prevented or reduced through the measure? Can the measure be considered an early preparatory action to avoid future damage costs?			
ROBUSTNESS AND FLEXIBILITY. Can the measure contribute to adaptation even if climate change takes place more rapidly and more radically, or if there are unforeseeable changes? Can the measure be adjusted or be reversible to meet greater or different protective needs or in case of diverging developments?			
SYNERGIES WITH OTHER POLICY OBJECTIVES AND RANGE OF EFFECT. Will greenhouse-gas emissions be sustainably reduced through the implementation of the measure? Can the measure also have positive effects on other targeted sectors? Can the measure cover multiple risks?			
ENVIRONMENTAL CONSEQUENCES. Does the measure help to strengthen the functions/services of the natural ecosystem? Does the measure help to preserve biodiversity and ecological processes?			
SOCIAL CONSEQUENCES. Does the measure contribute to a fair distribution of climate risks or create protective advantages for as many people as possible, fostering the welfare and health of the entire population? Does the measure entail benefits for particularly vulnerable segments of the population (elderly, chronically ill, poor)?			
ECONOMIC EFFICIENCY. Does the investment in the measure pay off in terms of the potentially prevented damage? Does the measure achieve a certain protective objective in the most cost-effective manner (in comparison to other measures with the same protective/adaptation objective)? INSIDE THIS CRITERIA PLEASE CONSIDER IN PARTICULAR THE SELECTED AND SIMULATED PES SCHEMES AS A POSSIBILE FINANCIAL TOOL TO SUPPORT THE IMPLEMENTATION OF THE PROPOSED ADAPTATION MEASURE.*			
TIME-EFFECTIVENESS. How much time will pass from the planning stage through implementation until the measure becomes effective? Does the measure have a long lead time or development phase before coming into effect?			
POLITICAL AND CULTURAL ACCEPTABILITY. Is the measure politically opportune – that is, does it correspond with the political objectives of decision-makers? Is the measure socially accepted, or should considerable resistance from the population be anticipated? Is the measure easy to implement, in that it involves a manageable number of decision-makers? Can the measure be integrated into other policy areas?			
ENHANCEMENT OF LEARNING AND AUTONOMOUS ADAPTIVE CAPACITY. Can the measure achieve an effective adaptation by supporting the long-term process of learning and providing a tool for practitioners to manage their work in the context of the uncertainty surrounding? Does the measure contribute to higher the resilience or autonomous adaptive capacity of the local environment or communities?			

5. Evaluate the adaptation plan:
   - Verify the adaptation plan, action plan and feasibility assessment with experts and SHs,
   - Sign agreements with local actors for the support or implementation of the selected relevant measures,
   - Design the public procurement/tender to implement selected relevant adaptation measures.

[15] See Note 10.

Results.

- Climate change adaptation plan for 3 Natura 2000 sites (2 in Italy and 1 in Slovenia).
- Operative/action plan and feasibility assessment for 3 Natura 2000 sites (2 in Italy and 1 in Slovenia).
- Signed agreements with local actors for the support/implementation of the selected measures.

- **Step 4. PES scheme:**

Theoretical framework.

The framework adopted for the construction of the PES scheme refers to the literature[16][17]. The PES is defined as an economic transition in which a specific ESS is sold to at least one buyer by at least one supplier. The payment implies a positive incentive for the supplier to maintain the ESS.

Tool.

Each PP compiled the »*Tool 3.* Common procedure for ESSs selection and PES simulation«.

The ESSs were selected according to three evaluation criteria:

- Relevance of the ESSs within the Natura 2000 site. The relevant ESSs were already selected in the step 1.
- The state of vulnerability of the ESSs to climate change. Then, the vulnerability analysis carried out a further selection by identifying the most vulnerable to ongoing climate change.
- The presence / absence of actors (buyers and suppliers) for the ESSs. Finally, a shortlist of ESSs was identified for which there was at least one buyer and one supplier committed to an explicit agreement, as required by the literature.

Result.

- One or more PES schemes for each Natura 2000 site. The schemes were exposed during meetings with SHs in order to weigh up the feasibility and explore their potential.
  The scheme provides information on: ESSs and safeguarded habitats, categories of SHs involved (Figure 10), value of ESSs and costs of adaptation measures (Figure 11).

Figure 10: PES scheme

PES scheme *n.* - *Name*	Description
Affected ESS	
Affected habitats	
Maintenance, preservation and restoration of the service	
SHs which provide the ESS	
SHs which benefit of the ESS	
SHs which pay for benefitting of the ESS	

[16] Arriagada R., Perrings C. (2009). *Making Payments for Ecosystem Services Work*. USA: UNEP/ecoSERVICES Group, School of Life Sciences, Arizona State University.
[17] Wunder S. (2005).*Payments for environmental services: Some nuts and bolts*. CIFOR Occasional Paper No. 42, Center for International Forestry Research, Bogor.

Figure 11: Economic feasibility of the selected measures

Economic feasibility of the selected measure *n. - Name*	Description
Brief description of the measure	
Costs of measure implementation (Name of the method, Amount of the costs (€/ha; €))	
Benefits of measure implementation (Name of the method, Amount of the benefits (€/ha;€))	
Ratio between benefits and costs	
Timeframe of implementation	
Timeframe for achieving effectiveness	
Status of implementation	

- **Step 5. Stakeholders engagement:**

Theoretical framework.

The framework adopted for the community capacity building is based on guidelines, identified gaps and actions proposed by "UNFCCC capacity building framework and Action for Climate Empowerment"[18].

Tool.

Activities with SHs are embedded in the entire process and included in the different steps that lead finally to the design of the adaptation plan for the selected Natura 2000 sites in Italy and Slovenia.
Each PP applies the »*Tool 4. Common training formats on ESSs, PES, adaptation plans*«.
The tool was developed at several levels.
At the first level, the tool aimed to improve the capacity-building of the SHs by identifying their main needs and lack of knowledge, and then at the second level engaging them in targeted training on project topics.
The training needs were collected following events presenting the project and its issues through the administration of questionnaires. The addressed issues were:

- Knowledge of climate change, Natura 2000 areas, ESSs and PES,
- Perception of the value of natural capital and the ESSs derived from it,
- Perception of the vulnerability of natural capital to climate change.

At the second level, three training events were organised by each PP on:

- Environmental protection and climate change: how to finance adaptation measures? New models and approaches for the valorization of ecosystems.
- Ecosystem services of Natura 2000 sites in the ECO-SMART project: threats, opportunities and perspectives.
- The valorization of NATURA 2000 sites of the ECO-SMART project: Payments for Ecosystem Services schemes.

At the third level, three training events were organised by each PP. SHs were trained in order to raise awareness, enhance acceptance and motivation to be an actor of the adaptation plans; share good practice examples that might foster the adaptation process; promote mainstreaming of adaptation (in general) and adaptation concept proposed by project ECO-SMART (in particular) into local plans.

Results.

- 1st level training: 3 online workshops were organised.
- 2nd level training: 3 online workshops were organised.
- 3rd level training: 3 online workshops were organised.

[18] UNFCCC (2002). *Conference of the Parties Report of the conference of the parties on its Seventh session*, held at Marrakesh from 29 october to 10 november 2001, FCCC/CP/2001/13/Add.1, 21 January 2002.

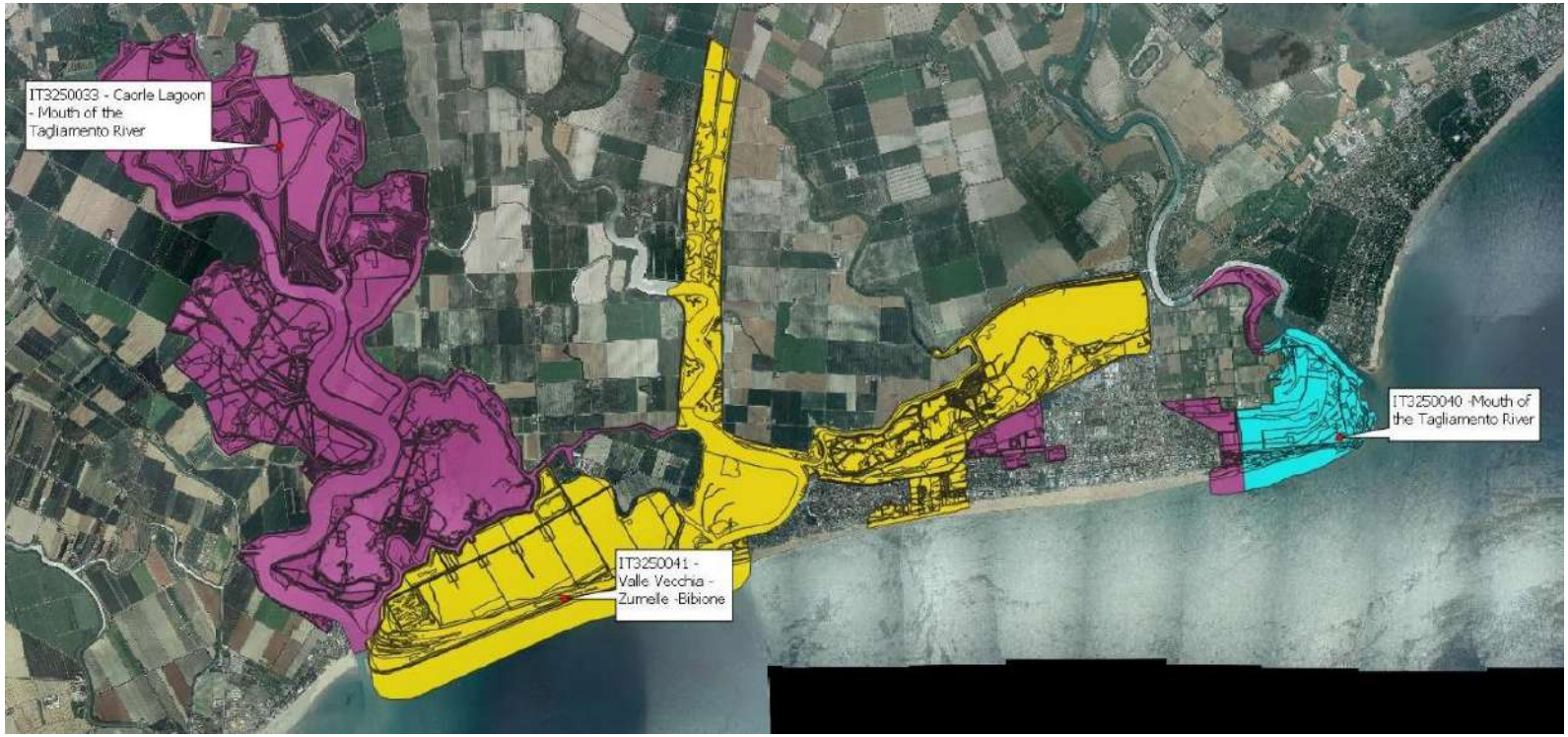
7 PILOT CASES RESULTS SELF-EVALUATION

7.1 Natura 2000 sites introduction

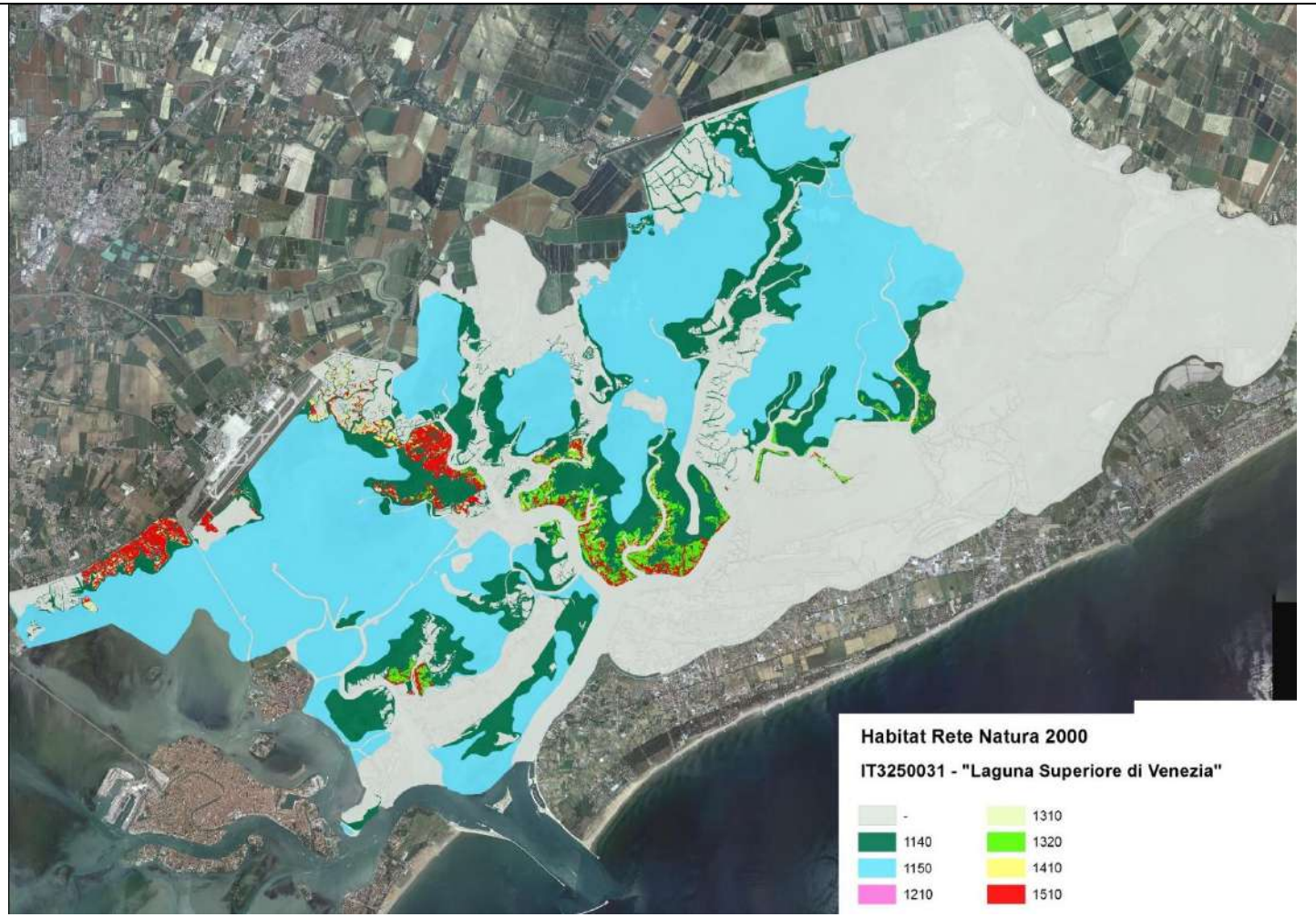
7.1.1 Veneto region: Upper lagoon of Venice (IT3250031), Caorle Lagoon-Mouth of the Tagliamento (IT3250033), Mouth of the Tagliamento River (IT3250040), Old valley-Zumelle-Bibione valleys (IT3250041)

Natura 2000 sites: Caorle Lagoon-Mouth of the Tagliamento (IT3250033), Mouth of the Tagliamento River (IT3250040), Old valley-Zumelle-Bibione valleys (IT3250041)	
Natura 2000 site description	The Veneto Region PP studied 4 sites: Upper lagoon of Venice (IT3250031); Caorle Lagoon-Mouth of the Tagliamento (IT3250033); Mouth of the Tagliamento River (IT3250040); Old valley-Zumelle-Bibione valleys (IT3250041). The sites were analyzed according to a common approach that led to solutions across all sites. **Upper lagoon of Venice (IT3250031).** Northern site of the Venetian lagoon system, characterized by the presence of a complex system of tidal flats, canals, salt marshes and river mouths with large portions used mainly for fish farming. The natural landscape is characterized by open water spaces sometimes covered with submerged seagrasses or seaweeds and by large salt marsh surfaces that host halophyte species, some of which are endemic to the North Adriatic area. It is an important area for the wintering and migration of water birds, in particular waders. Nesting area for some charadriiformes including Black winged stilt and Redshank. Floristic presences of considerable interest at national and / or regional level. The vulnerability of the site is represented by sea level rise, by the evident erosion of the salt marshes in relation to the excessive presence of boats, by the considerable loss of sediments to the sea not compensated by an equal rate of river and marine imports and by the pollution of the waters due to the presence of the petrochemical pole of Marghera as well as due to agriculture and aquaculture. **Caorle Lagoon-Mouth of the Tagliamento (IT3250033).** The site is a varied environmental mosaic, consisting of ancient and recent dune systems, with numerous wetlands and marshes, embanked valleys and estuary environments. The consolidated dunes host populations of *Pinus nigra* and *P. pinea* with a high presence of Mediterranean elements, which in certain areas are organized in forest coenosis (*Orno-Quercetum ilicis*); in the clearings there are discrete formations with *Juniperus communis* and xeric meadows. The interdunal lowlands are colonized by hygrophilous cenosis (*Eriantho-Schoenetum nigricantis*). The site is of particular naturalistic interest due to the multiplicity of vegetation types and the presence of floristic elements of undoubted value, used as a nesting site, refuge and pass; based on zoocoenosis and phytocenosis with exclusive characteristics. The vulnerability of the site is determined by the alteration of the dune vegetation and trampling due to tourist-recreational frequentation, expansion of residential and tourist settlements, and water pollution. **Mouth of the Tagliamento River (IT3250040).** The site is a varied environmental mosaic, consisting of ancient and recent dune systems, with numerous wetlands and marshes, embanked valleys and estuary environments. The consolidated dunes host populations of *Pinus nigra* and *P. pinea* with a high presence

	of Mediterranean elements, which in certain areas are organized in forest coenosis (*Orno-Quercetum ilicis*); in the clearings there are discrete formations with *Juniperus communis* and xeric meadows. The interdunal lowlands are colonized by hygrophilous cenosis (*Eriantho-Schoenetum nigricantis*). The site is of particular naturalistic interest due to the vegetation types and the presence of floral elements of undoubted value; biogeographic, geomorphological, ecological, vegetational and faunal interest; nesting site, refuge and step; site of zoocenosis and phytocenosis with exclusive characteristics (coastal pine forest with black pine, the only site in the region for *Testudo hermanni*, probably indigenous). **Old valley-Zumelle-Bibione valleys (IT3250041).** The site is of particular interest due to the biogeographic, geomorphological, ecological, vegetational and faunal characteristics: nesting site, refuge and step; site of zoocenosis and phytocenosis with exclusive characteristics, including coastal pine forest with black pine. The area is of considerable relevance for wintering and migration of wetlands-related fauna (in particular Anatidae), nesting of colonial herds, presence of endemic types and syntypes, as well as rare and threatened species and associations.

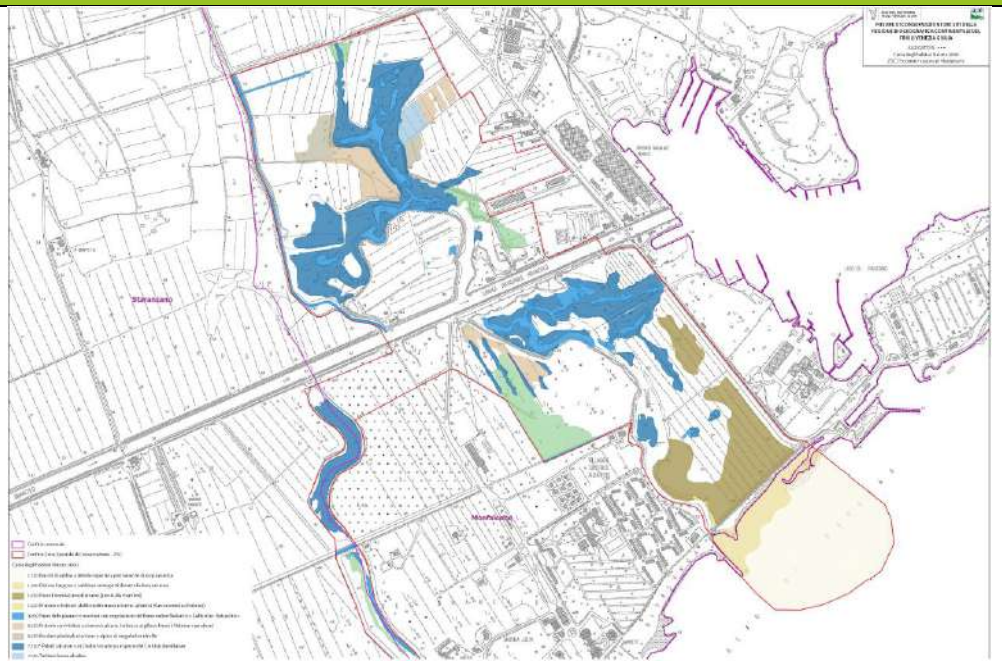


Natura 2000 sites map: lagoon system of Caorle



Natura 2 000 sites map: Upper lagoon of Venice

7.1.2 Friuli Venezia Giulia Region: Cavana of Monfalcone (IT3330007)

Natura 2000 site: Cavana of Monfalcone (IT3330007)
 IT3330007 - Habitat Natura 2000 (source: Regione Autonoma Friuli Venezia Giulia)
The Cavana of Monfalcone Special Area of Conservation (SAC) is a transition area located between the lower Isonzo plain and the Adriatic Sea. The site has a total extension of 133.42 hectares. A large part (84.8 %) includes the municipality of Monfalcone, a small part the municipality of Staranzano (3.3 %) and a significant part at sea (11.9 %). A part of the site is affected by the land reclamation works of the last century that transformed the transition areas into extensive monoculture cultivations. The naturalistic value of the site is determined by the presence of resurgence areas close to the sea that have resisted the land reclamation and the intense industrialization present near the site. In the SAC, 56.9% of the surface is characterized by habitats that are not of Community interest, while in the remaining fraction 10 types of habitats included in Annex I of the Habitats Directive have been identified, of which 2 are considered priority: 7210* "Alkaline fens", 91E0* "Alluvial forests of *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)".

7.1.3 Slovenia: Škocjanski zatok (SI3000252)

Natura 2000 site : Škocjanski zatok (SI3000252)	
 Photo from Škocjanski zatok nature reserve management plan written by DOPPS. For more information visit the site web page: https://www.skocjanski-zatok.org/en/	Škocjanski zatok is the largest brackish wetland in Slovenia. Together with its surrounding areas, the wetland is an ecosystem of great value to Slovenia, its uniqueness deriving from proximity to the sea, Mediterranean climate and submediterranean vegetation, as well as its organisation and size. The various depths of the brackish lagoon and the high diversity of habitats ranging from wet meadows, shallows and mudflats, tidal areas, shores and a brackish marsh to reedbeds in combination with a freshwater marsh sustain a high diversity of plant and animal species. The area of Škocjanski zatok is designated a nature reserve from 1998 upon the Act on Škocjanski zatok Nature Reserve, adopted by the Slovenian Parliament (Official Journal of RS, no. 20/98). The level of protection corresponds to the IUCN category IV. Upon the Decree on Natura 2000 sites, Škocjanski zatok became declared a Special Protected Area in 2004 and became a Special Area of Conservation (SAC) upon the up-date of the same Decree in the beginning of 2012: a) **Identification number for SPA Škocjanski zatok: SI5000008.** Qualifying bird species are: Kentish plover (*Charadrius alexandrinus*), Little bittern (*Ixobrychus minutus*), Great reed warbler (*Acrocephalus arundinaceus*), Reed warbler (*Acrocephalus scirpaceus*) and other species added in 2013. b) **Identification number for SAC Škocjanski zatok: SI3000252.** Qualifying animal species: Mediterranean killifish (*Aphanius fasciatus*), *Vertigo angustior* (a species of narrow-mouthed whorl snail). Qualifying habitat types: **Mediterranean and thermo-Atlantic halophilous scrubs *Sarcocornetea fruticosi* (Natura 2000 code 1420):** Perennial vegetation of marine saline muds mainly composed of scrub, essentially with a Mediterranean-Atlantic distribution Salicornia, *Limonium vulgare*, Suaeda and Atriplex communities. This habitat is very important as a breeding site for terns, plovers and black-winged stilts. **Mudflats and sandflats not covered by seawater at low tide (Natura 2000 code 1140):** Intertidal mudflats and sandflats are submerged at high tide and exposed at low tide, usually without vascular plants, sometimes coated by blue algae and diatoms. This kind of habitat is very rich with biodiversity and particularly important as feeding grounds for waders. **Salicornia and other annuals colonizing mud and sand (Natura 2000 code 1310):** Formations composed mostly or predominantly of halophyte annuals which are periodically flooded. Plants are mostly grasses and Chenopodiaceae of the genus Salicornia, prevailed by glasswort *Salicornia europaea*, accompanied by sea blite *Suaeda maritima*. Glasswort, as well as sea blite, is well adapted to extreme ecological conditions of the habitat, like high salinity, and might be the only species in the community. **Mediterranean salt meadows *Juncetalia maritimi* (Natura 2000 code 1410):** Permanent and shallow marine marshes with sea rush (*Juncus maritimus*), and other plants as follows: Cornuti plantain (*Plantago cornutii*), sea aster (*Aster tripolium*) and sea sow-thistle (*Sonchus maritimus*).

	Coastal lagoons (Natura 2000 code 1150): Lagoons are areas of shallow coastal salt water, of varying salinity and water volume, wholly or partially separated from the sea by sand banks or, less frequently, by rocks.

7.2 Criteria - ESS relevance in the Natura 2000 site (STEP 1 of the methodological approach)

7.2.1 Veneto Region: Upper lagoon of Venice (IT3250031), Caorle Lagoon-Mouth of the Tagliamento (IT3250033), Mouth of the Tagliamento River (IT3250040), Old valley-Zumelle-Bibione valleys (IT3250041)

Criteria - ESS relevance in the Natura 2000 site		
Indicator	**Qualitative assessment**	**Quantitative assessment**

Habitat affected Upper lagoon of Venice (IT3250031)	The most affected habitats are:
	1. Natura 2000 code 1150: Coastal lagoons
	2. Natura 2000 code 1420: Mediterranean and thermo Atlantic halophilous meadows and fruit groves (Sarconcorneta fruticosa)
	3. Natura 2000 1140: Muddy or sandy expanses emerging at low tide
	4. Natura 2000 1510 *: Mediterranean salt steppes (Limonietalia)
	5. Natura 2000 1310: Annual pioneer vegetation from Salicornia to other muddy and sandy areas
	6. Natura 2000 1320: Spartine meadows (Spartinion maritimae)
	7. Natura 2000 1410: Mediterranean flooded pastures (Juncetalia maritimi)
		• Extension of affected habitats (hectares),
		  • Natura 2000 code 1150= 3665.7 ha, Natura 2000 code 1420= 2036.5 ha, Natura 2000 code 1140= 1629.2 ha, Natura 2000 code 1510*= 1018.25 ha, Natura 2000 code 1310= 610.95 ha, Natura 2000 code 1320= 407.3 ha, Natura 2000 code 1410= 14.10 ha,
		  Total affected area: 9382.00 ha
		• Percentage of affected habitats in respect to the total Natura 2000 site area:
		  • Natura 2000 code 1150= 18%, Natura 2000 code 1420= 10%, Natura 2000 code 1140= 8%, Natura 2000 code 1510*= 5%, Natura 2000 code 1310= 3%, Natura 2000 code 1320= 2%, Natura 2000 code 1410= 1%,
		  Total=47%
		Site= 20365.00 ha

Most influenced ESS Upper lagoon of Venice (IT3250031)	The most influenced ESSs are: 1. Maintenance of nursery areas and population (including gene pool protection); 2. Control of erosion rates; 3. Seed dispersal; 4. Characteristics of living systems that allow activities that promote health, recovery or enjoyment through active or immersive interactions; 5. Characteristics of the housing systems that allow aesthetic experiences. 6. Characteristics of living systems that enable activities that promote health, recovery, or enjoyment through passive or observational interactions.	(do not fill in)

Criteria - ESS relevance in the Natura 2000 site		
Indicator	**Qualitative assessment**	**Quantitative assessment**

Habitat affected
Lagoon system of Caorle (IT3250033, IT3250040, IT3250041)
	The most affected habitats are:
	1. Natura 2000 code 1150: Coastal lagoons
	2. Natura 2000 code 7210: Calcareous swamps with *Cladium mariscus* and species of the *Caricion davallianae*
	3. Natura 2000 code 6410: Meadows with Molinia on calcareous, peaty or clayey-loamy soils (*Molinion caeruleae*)
	4. Natura 2000 code 2230: Dunes with meadows of the Malcolmietalia
	Natura 2000 code 2250: Coastal dunes with *Juniperus spp.*
		• Extension of affected habitats (hectares),
		  • Natura 2000 code 1150= 657.9 ha, Natura 2000 code 7210= 43.86 ha, Natura 2000 code 6410= 43.86 ha, Natura 2000 code 2230= 43.86 ha, Natura 2000 code de 2250= 87.72 ha,
		  Total affected area: 877.2 ha
		• Percentage of affected habitats in respect to the total Natura 2000 site area:
		  • Natura 2000 code 1150= 15%, Natura 2000 code 7210=1%, Natura 2000 code 6410=1%, Natura 2000 code 2230=1%, Natura 2000 code 2250=2%
		  Total=20%
		Site=4386.00 ha

Most influenced ESS Lagoon system of Caorle (IT3250033, IT3250040, IT3250041)	The most influenced ESSs are: 1. Maintenance of nursery areas and population (including gene pool protection) 2. Regulation of the hydrogeological cycle and water flow (including flow regulation and coastal protection) 3. Control of erosion rates 4. Bioremediation by microorganisms, algae, plants and animals 5. Characteristics of living systems capable of promoting activities useful for health, recovery or recreational activities through active or immersive interactions	(do not fill in)

7.2.2 Friuli Venezia Giulia Region: Cavana of Monfalcone (IT3330007)

Criteria - ESS relevance in the Natura 2000 site		
Indicator	**Qualitative assessment**	**Quantitative assessment**

Habitat affected	The most affected habitats are:
	1. Natura 2000 code 3260: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion*
	2. Natura 2000 code 7210*: Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*
	3. Natura 2000 code 6430: Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
	4. Natura 2000 code 7230: Alkaline fens
	5. Natura 2000 code 6410: Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)
		• Extension of the most affected habitats:
		  • Natura 2000 code 3260: 5.04 ha
		  • Natura 2000 code 7210*: 18.16 ha
		  • Natura 2000 code 6430: 1.52 ha
		  • Natura 2000 code 7230: 0.72 ha
		  • Natura 2000 code 6410: 3.29 ha
		  • Total: 28,73 ha,
		• Percentage of affected habitats respect to the total Natura 2000 site area: 21.5%

Most influenced ESS	The most influenced ESS are: 1.Regulation of the chemical condition of freshwaters by living processes 2.Pollination (or 'gamete' dispersal in a marine context) 3.Filtration/sequestration/storage/accumulation by micro-organisms, algae, plants, and animals 4.Bio-remediation by micro-organisms, algae, plants, and animals 5.Visual screening	(do not fill in)

7.2.3 Slovenia: Škocjanski zatok (SI3000252)

Criteria - ESS relevance in the Natura 2000 site			
Indicator	**Qualitative assessment**	**Quantitative assessment**	**Notes**

Habitat affected	More affected Natura 2000 habitats:
	1. Natura 2000 code 1420: Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)
	2. Natura 2000 code 1140: Mudflats and sandflats not covered by seawater at low tide
	3. Natura 2000 code 1310: Salicornia and other annuals colonizing mud and sand
	4. Natura 2000 code 1410: Mediterranean salt meadows (*Juncetalia maritimi*)
	Resulted as less affected than other Natura 2000 habitats: Coastal lagoon Code 1150.
	Only Natura 2000 habitat was considered in the vulnerability analysis.
		• Extension of more affected Natura 2000 habitats (hectares)- brackish part of the reserve:
		  • Natura 2000 code 1140: 0.9 ha
		  • Natura 2000 code 1310: 8.6 ha
		  • Natura 2000 code 1410: 0.03 ha
		  • Natura 2000 code 1420: 6.4 ha
		  • Total: 15,93 ha
		Extension of less affected Natura 2000 habitat (coastal lagoon, code 1150): 53.3 ha
		Habitats of the freshwater part or the reserve (not classified as Natura 2000 habitats but as well protected inside the Natura 2000 site as habitats of Natura 2000 species): 16.2 ha
		Total Natura 2000 site area: 122.7 ha
		• Percentage in respect to the total Natura 2000 site area (122.7 ha):
		  • % all Natura 2000 habitats: 56.4 %
		  • % more affected Natura 2000 habitats: 12.9 %
		  • % less affected Natura 2000 habitat: 43.4 %
			The vulnerability analyses considered only the Natura 2000 habitat types localized in the brackish part of the reserve since this part is considered more vulnerable that the habitats of the freshwater part of the reserve. Previous researches (Kaligarič and Ivajnšič, 2014[1]) assessed that sea level rise is a major threat to these Natura 2000 habitats. Depending of different scenarios of climate changes and sea level rise in particular, the mentioned Natura 2000 coastal habitats could shift to each other and decrease their surfaces in total. These habitats represent a relatively small part of the reserve, only approx. 13 % of the total area, but are very important as bird's nesting and feeding grounds.
			
			1 Kaligarič M., Ivajnšič D. (2014) Habitat Changes Caused by Sea Level Rise, Driven by Climate Change in the Northern Adriatic Coastal Wetlands, Slovenia. In: Rannow S., Neubert M. (eds) Managing Protected Areas in Central and Eastern Europe Under Climate Change. Advances in Global Change Research, vol 58. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-7960-0_15

Criteria - ESS relevance in the Natura 2000 site			
Indicator	**Qualitative assessment**	**Quantitative assessment**	**Notes**
Most influenced ESS	The most influenced ESS are: 1. Natural, abiotic characteristics of nature that enable active or passive physical and experiential interactions 2. Natural, abiotic characteristics of nature that enable intellectual interactions 3. Natural, abiotic characteristics of nature that enable spiritual, symbolic and other interactions 4. Natural, abiotic characteristics or features of nature that have either an existence, option or bequest value	(do not fill in)	For this Natura 2000 site the most relevant ESS are classified as regulating and maintenance and cultural. Provisioning services are very limited because of the protection of the area as natural reserve. Cultural services are quite important for the educational mission of the reserve, as a visit to Škocjanski zatok Nature Reserve is predominantly aimed at learning about and experiencing nature. However, to make sure every visitor has a pleasant experience and that there are no negative visitation impacts on nature at the same time, everyone has to adjust his or her behaviour to the well-being of the protected species. Therefore, some harmful activities of visitors are not allowed. Most of the regulating ESS are linked to the existing pressures, such as bioremediation of polluted waters, dust filtering, lowering of noise. Indeed relevant regulating ESS are connected to climate regulation and carbon sequestration that are important to mitigation of climate change.

7.3 Criteria - ESS vulnerability to climate change (STEP 2 of the methodological approach)

7.3.1 Veneto Region: Upper lagoon of Venice (IT3250031), Caorle Lagoon-Mouth of the Tagliamento (IT3250033), Mouth of the Tagliamento River (IT3250040), Old valley-Zumelle-Bibione valleys (IT3250041)

Criteria - ESS vulnerability to climate change		
Indicator	**Qualitative assessment**	**Quantitative assessment**
Hazards of greatest significance Upper lagoon of Venice (IT3250031)	The hazards with greatest significance are: 1. Increase in the average water level 2. Increase in tide range / Increase in high tide level 3. Increase in the frequency and intensity of extreme meteorological phenomena 4. Subsidence 5. Average temperature rise (of water, soil and air) 6. Variation in the frequency and abundance of precipitation 7. Change of currents 8. Variations in the water regime of rivers 9. Saline wedge	Analyses have been done during WP 3.1 and reported in the report of Activity 5 that connected potential hazards to the habitats and their ecosystem services as a means to assess the potential vulnerability. The assessments are reported in the Appendix 1. The level of vulnerability on the habitats and ESS was assessed as follows: • Habitat (17 hazards have been taken into account therefore vulnerability assessment ranges from 0 up to 17): Natura 2000 code 1150= 10; Natura 2000 code 1420= 2; Natura 2000 code 1140= 2; Natura 2000 code 1510*=3; Natura 2000 code 1310= 3; Natura 2000 code 1320= 2; Natura 2000 code 1410= 3 • ESS 1. Maintenance of nursery areas and population (including gene pool protection)=13 2. Control of erosion rates=7 3. Seed dispersal=7 4. Characteristics of living systems that allow activities that promote health, recovery or enjoyment through active or immersive interactions=15 5. Characteristics of the housing systems that allow aesthetic experiences=7

Criteria - ESS vulnerability to climate change		
Indicator	**Qualitative assessment**	**Quantitative assessment**
		6. Characteristics of living systems that enable activities that promote health, recovery, or enjoyment through passive or observational interactions=20
Hazards of greatest significance Lagoon system of Caorle (IT3250033, IT3250040, IT3250041)	The hazards with greatest significance are: 1. Subsidence 2. Variations in the river water regime 3. Average sea level rise 4. Increase in the amplitude of the tides 5. Variations in the abundance of rainfall 6. Saline wedge	Analyses have been done during WP 3.1 and reported in the report of Activity 5 that connected potential hazards to the habitats and their ecosystem services as a means to assess the potential vulnerability. The assessments are reported in the Appendix 1. The level of vulnerability on the habitats and ESS was assessed as follows: • Habitat (17 hazards have been taken into account therefore vulnerability assessment ranges from 0 up to 17) 1. Natura 2000 code 1150= 14 2. Natura 2000 code 7210=14 3. Natura 2000 code 6410= 13 4. Natura 2000 code 2230=10 5. Natura 2000 code 2250=10 • ESS 1.Maintenance of nursery areas and population (including gene pool protection) = >100 2.Regulation of the hydrogeological cycle and water flow (including flow regulation and coastal protection)= 58 3.Control of erosion rate=39 4. Bioremediation by microorganisms, algae, plants and animals = 38 5. Characteristics of living systems capable of promoting activities useful for health, recovery or recreational activities through active or immersive interactions= 36

7.3.2 Friuli Venezia Giulia Region: Cavana of Monfalcone (IT3330007)

Criteria - ESS vulnerability to climate change		
Indicator	**Qualitative assessment**	**Quantitative assessment**
Hazards of greatest significance	The hazards with greatest significance are: 1.Increase in tidal range / Increase in high tide level 2.Increase in the average water level 3.Increased entity of heat peaks 4.Average temperature rise (of water, soil and air) 5.Increased frequency of heat peaks 6.Saline wedge	Analyses have been done in WP 3.1 and reported in the report of Action 5, which connected potential hazards to the habitats and their ecosystem services as a mean to assess the potential vulnerability. The assessments are reported in the Appendix 1. The level of vulnerability on the habitats and ESS was assessed as follows: • Habitat (17 hazards have been taken into account therefore vulnerability assessment ranges from 0 up to 17) Natura 2000 code 3260: 15 Natura 2000 code 7210*: 12 Natura 2000 code 6430: 10 Natura 2000 code 7230: 9 Natura 2000 code 6410: 9 • ESS 1.Regulation of the chemical condition of freshwaters by living processes: 38 2.Pollination (or 'gamete' dispersal in a marine context): 28 3.Filtration/sequestration/storage/accumulation by micro-organisms, algae, plants, and animals: 27 4.Bio-remediation by micro-organisms, algae, plants, and animals: 27 5.Visual screening: 25

7.3.3 Slovenia: Škocjanski zatok (SI3000252)

Criteria - ESS vulnerability to climate change			
Indicator	**Qualitative assessment**	**Quantitative assessment**	**Notes**
Hazards of greatest significance	The hazards with greatest significance are: 1. Average temperature rise (of water, soil and air) 2. Increased entity of heat peaks 3. Increased frequency of heat peaks 4. Increased duration of each heat spike 5. Increase in the frequency of extreme weather events 6. Increased intensity of extreme weather events 7. Increase in the average water level 8. Changes in the river water regime 9. Variations in the frequency of precipitation 10. Variation and in the abundance of rainfall	Analyses have been done during WP 3.1 and reported in report act 5. that connected potential hazards to the habitats and their ecosystem services as a means to assess the potential vulnerability. This vulnerability analyses are included in report 5, whose figures area included as attachments. However previous studies argue that the vulnerability of habitats of the brackish part of Škocjanski zatok reserve was more elevated than ones in the freshwater part. The major hazards are connected with sea level rise and will affect predominantly the brackish part, in particular the loss of surface of its nesting islands, saltmarshes and mudflats that are a home to a range of rare animal and plant species, but it will not affect the deep water habitats of the coastal lagoon. The assessments are reported in the Appendix 1. The level of vulnerability on the habitats and ESS was assessed as follows: • Habitat (17 hazards have been taken into account therefore vulnerability assessment ranges from 0 up to 17): Code 1140: 10; Code 1310: 10; Code 1410: 10; Code 1420: 10; Less affected Natura 2000 habitats; Costal lagoon Code 1150: 9 • ESS: 1. Natural, abiotic characteristics of nature that enable active or passive physical and experiential interactions: 59 2. Natural, abiotic characteristics of nature that enable intellectual interactions: 59 3. Natural, abiotic characteristics of nature that enable spiritual, symbolic and other interactions: 59 4. Natural, abiotic characteristics or features of nature that have either an existence, option or bequest value: 59 In the vulnerability analysis only ESS defined as more relevant for stakeholders was included. The level of vulnerability of above listed ESS was assessed as <60. The level of vulnerability of other relevant ESS was assessed between 40 - 50.	Within the framework of the project "Assessments of Climate Change Impacts in Slovenia in the 21st Century", The Slovenian Environmental Agency examined climate change assessments for the future. Climate change impact assessments are being prepared for some extraordinary events, such as heat waves, droughts, extraordinary precipitation phenomena, high water conditions. The model calculations are used in assessing the future climate. Calculations of climate models are based on the various possible projections of the greenhouse gas concentration in the atmosphere by the end of the 21st century. Therefore the list of potential hazards for the Slovenia pilot site has been done based on the document "Assessments of Climate Change Impacts in Slovenia in the 21st Century"

7.4 Criteria – Stakeholders (SHs) analysis (STEP 3 of the methodological approach)

7.4.1 Veneto Region: Upper lagoon of Venice (IT3250031), Caorle Lagoon-Mouth of the Tagliamento (IT3250033), Mouth of the Tagliamento River (IT3250040), Old valley-Zumelle-Bibione valleys (IT3250041)

Criteria – Stakeholders analysis		
Map of stakeholders	**Interest**	
Influence Upper lagoon of Venice (IT3250031)	Uninterested Key Actors Veneto Region, Metropolitan City of Venice, Municipality of Jesolo, Municipality of Cavallino tre Porti, Municipality of San Donà di Piave, Municipality of Musile di Piave, Municipality of Quarto d'Altino, Eastern Alps Basin Authority, ARPAV - Veneto regional agency for environmental prevention and protection, Venice Port System Authority	Interested Key Actors CORILA Consortium for the coordination of research relating to the Venice lagoon system, Ispra - SNPA - National environmental protection system (Venice Lagoon), University of Padua, IUAV - University of Venice, CNR Institute of Marine Sciences, Venetian Society of Natural Sciences, Legambiente Venice, Eastern Veneto Reclamation Consortium, Veneto Agriculture - Veneto Agency for the Primary Sector. Agency, Lipu of Venice, WWF Veneto
	Marginal Actors HYLA Cooperative Society	Interested Actors Val Dogà fishing farm, Grassabò fishing farm, Dragojesolo fishing farm, Cavallino fishing farm, Lio Maggiore fishing farm, Liona fishing farm, Perini fishing farmy, Porto Canale dock, Tourists, Farmers' association, Venice hoteliers association, Laguna Photografica Cultural Association, Provincial Association of Beekeepers of Venice – APAV, VeGal - Local Action Group of Eastern Veneto, AGRI Agricultural and Agri-food Confederation, IVSLA, Veneto Science and Letters Institute, Citizens residing in Venice, Nautical Associations Marco Polo North Lagoon, FIPSAS Venice

<table>
<tr><th colspan="3">Criteria - Stakeholders analysis</th></tr>
<tr><th>Map of stakeholders</th><th colspan="2">Interest</th></tr>
<tr><td rowspan="2">Influence
Lagoon system of Caorle (IT3250033, IT3250040, IT3250041)</td><td>Uninterested Key Actors
• Veneto Region
• Municipality of Caorle
• Municipality of Concordia Sagittaria
• Municipality of San Michele al Tagliamento
• Eastern Veneto Reclamation Consortium
• Veneto Agriculture - Veneto Agency for innovation in the Primary Sector
• VeGal - Local Action Group of Eastern Veneto
• University of Padua</td><td>Interested Key Actors
• Bibione Mare spa
• Federvalli</td></tr>
<tr><td>Marginal Actors
• Il Pendolino Association
• Association for the Caorle Lagoon
• AGRI Agricultural and Agri-food Confederation
• Legambiente Circle of Eastern Veneto "Geretto Pascutto"
• Caorle Territory Defense Committee
• Confagricoltura - Portogruaro
• National Confederation of Direct Farmers - Coldiretti
• Coop Fishing Artisan Consortium CO VE P A
• Eko club
• Game Producers Authority - EPS - Veneto Regional Section
• La Brussa Oasis
• Martin Pescatore Sports Fishing Society</td><td>Interested Actors
• Optimal Territorial Area of Hunting 1 Portogruaro - ATC 1
• Venetian Hunters Association
• National Free Hunting Association - ANLC
• Paese Vivo Association of Trade Unions
• Porto Santa Margherita Owners Association
• Italian Hunting Federation - F.I.d. C.
• FIPSAS - Italian Federation of Sports and Underwater Activities
• Delta Tagliamento Auxiliary Coast Guard
• Pro Loco Caorle</td></tr>
</table>

7.4.2 Friuli Venezia Giulia Region: Cavana of Monfalcone (IT3330007)

Criteria - Stakeholders analysis		
Map of stakeholders	**Interest**	
Influence	Uninterested Key Actors • None	Interested Key Actors • Friuli Venezia Giulia Autonomous Region – Directorate for Agriculture, Forestry and Fisheries – Biodiversity service • Municipality of Monfalcone • Consortium for the Reclamation of the Isontina Plain (medium level of influence)
	Marginal Actors • Marina Julia Family Camping Village • Yacht club Hannibal • KiteLife Grado • Kayak company of Monfalcone • Higher-educational institut M. Buonarroti of Monfalcone	Interested Actors • Marine Protected Area of Miramare • Managing authority of the Isonzo river Mouth Natural Reserve - Municipality of Staranzano • Fishermen cooperartive of Monfalcone • Confcooperative-FEAMP (federation of cooperatives) • Hunting reserve of Staranzano • Hunting reserve of Monfalcone • Legambiente of Monfalcone (environmental association) • Associazione Ambientalista Eugenio Rossman (environmental association) • Isonzo river Mouth Natural Reserve – Technical and scioentific committee (Stazione Biologica Isola della Cona) • Associazione Co.Na. (environmental association) • Freelance ornithologists • Freelance botanists

7.4.3 Slovenia: Škocjanski zatok (SI3000252)

<table>
<tr><th colspan="3">Criteria - Stakeholders analysis</th></tr>
<tr><th>Map of stakeholders</th><th colspan="2">Interest</th></tr>
<tr><td rowspan="2">Influence</td><td><u>Uninterested Key Actors</u>
Ministry of Education, Science and Sport of RS
Municipality of Koper
Municipality of Ankaran
Port of Koper
Slovenian Water Agency (IzVRS)
Ministry of Agriculture, Forestry and Food of RS
Ministry of Health of RS</td><td><u>Interested Key Actors</u>
DOPPS – BirdLife Slovenia
Institute of the Republic of Slovenia for Nature Conservation
Ministry of the Environment and Spatial Planning</td></tr>
<tr><td><u>Marginal Actors</u>
Tourists from Slovenia and abroad
Tourist information centres
Photography association Koper
Travel agents (Atlas, Istraterra, Nomago, Autentica, Istranka), hotels (Delfin, Terme Krka Žusterna), co-operative of small local tourism businesses
Nature art film studios
All real estate businesses active in Koper
Park Center, Planet Koper, Supernova I, GORC Sermin II, Commercial areas along Ankaranska road
adult education institutes
Italian minority organizations
Co-operative of ecological producers of Istria</td><td><u>Interested Actors</u>
Local inhabitants
EUSAIR facility point Slovenia
Local community organizations
Individual farmers, bee-keepers
Individual private vegetable producers/small gardens on the reserve borders
VinaKoper, Agraria Koper, Vinol
all educational groups of visitors (preschool & all levels of schools)
Researchers from science and research centres (ZRS, SAZU, NIB), developmental centres staff (RRC)
Local inhabitants as visitors: recreation enthusiasts, joggers, ornithologists (bird watchers), nature lovers
Students doing internship and projects
Higher vocational college and university students (in particular from pedagogic and psychology oriented faculties) other managers of protected areas in Slovenia and abroad
Tourism faculties, nature and environmental Programs/faculties, universities staff – researchers, lecturers (in general)
Informal experts' groups</td></tr>
</table>

7.5 Criteria – ESS selection (STEP 3 of the methodological approach)

7.5.1 Veneto Region: Upper lagoon of Venice (IT3250031), Caorle Lagoon-Mouth of the Tagliamento (IT3250033), Mouth of the Tagliamento River (IT3250040), Old valley-Zumelle-Bibione valleys (IT3250041)

Criteria - ESS selection	
Indicator	**Qualitative assessment**
Selected ESS 1 Upper lagoon of Venice (IT3250031)	Support of biodiversity, spiritual value (e.g. landscape), support of the productivity of lagoon and marine fish resources that depend on salt marshes to feed or grow, support of sustainable local economic activities (e.g. ecotourism, nature conservation activities) and environmental education and dissemination activities, improvement of water quality through phytoremediation, mitigation of climate change through storage and sequestration of carbon, protection of coasts (and also other habitats of conservation interest) from storm surges and consequent erosion phenomena.
Selected ESS 1 Lagoon system of Caorle (IT3250033, IT3250040, IT3250041)	Coastal protection from storm surges through natural dune systems, achievable both in the Site of Community Importance areas affected by coastal pine forests and coastal lagoons, and in deep sandy shores, allocating a part of the beach to natural dunes.
Selected ESS 2 Lagoon system of Caorle (IT3250033, IT3250040, IT3250041)	Maintenance of the Caorle lagoon system understood as the dynamics of tide entry and exit, and management of sediments through the excavation of internal lagoon canals, the interconnection of canals, the construction of new wetlands that can be flooded by the tides and the opening of hunting valleys.
Selected ESS 3 Lagoon system of Caorle (IT3250033, IT3250040, IT3250041)	Construction and maintenance of slow-use infrastructures and environmental education (new cycle paths, maintenance and cleaning of the territory, education and awareness projects, etc.)

7.5.2 Friuli Venezia Giulia Region: Cavana of Monfalcone (IT3330007)

Criteria - ESS selection	
Indicator	**Qualitative assessment**
Selected ESS 1	The ESS defined as “Natural resources management” aims to maintain populations and preserve habitat against anthropic pressures.
Selected ESS 2	The ESS defined as “Fruition” aims to promote health, recovery or enjoyment through passive and active, didactic-educational interactions.
Selected ESS 3	The ESS defined as “Hydrological resource management” is particularly relevant considering that the site is a transition area.

7.5.3 Slovenia: Škocjanski zatok (SI3000252)

Criteria - ESS selection	
Indicator	**Qualitative assessment**
Selected ESS 1	The ESS defined as “Mitigation of climate extremes” included: regulation of chemical composition of atmosphere and oceans, regulation of temperature and humidity, including ventilation and transpiration, hydrological cycle and water flow regulation (including flood control, and coastal protection).
Selected ESS 2	The ESS defined as “Habitat mosaic for plant and animal species” included: disease control, maintaining nursery populations and habitats (including gene pool protection), seed dispersal, pollination (or 'gamete' dispersal in a marine context), visual screening, noise attenuation, bio-remediation by micro-organisms, algae, plants, and animals, mediation of nuisances by abiotic structures or processes. In indirect way it allows also final cultural ESS.

7.6 Criteria – Adaptation measures for the pilot case (STEP 3 of the methodological approach)

7.6.1 Veneto Region: Upper lagoon Venice (IT03250031) Caorle Lagoon-Mouth of the Tagliamento (IT3250033), Mouth of the Tagliamento River (IT3250040), Old valley-Zumelle-Bibione valleys (IT3250041)

Criteria – Adaptation measures for the pilot case			
Category	**Type of measure**	**Example of measure**	**Objective, brief description and expected results**
Reducing existing pressures	Conservation and restoration activities	Conservation and recovery of coastal dune habitats	Natural protection from storm surges through the development of natural dunes: from embryonic to consolidated
		Coastal nourishment	Addition of sand able to feed the natural dunes through the wind
	Conservation and restoration activities - Upper lagoon Venice (IT03250031)	Conservation interventions of the salt marshes	The intervention aims to conserve existing habitats, and therefore prevent their disappearance connected to erosion of human origin and sea level rise, with the resulting loss of biodiversity and ecosystem services, through the continuous application in the time of soil bio-engineering techniques with low environmental impact (fascines in biodegradable and natural materials such as wood, sediment nourishment taken from the mud flats in front of the salt marshes) based on the involvement of local workers such as professional lagoon fishermen.
	Restoration activities	Increase of the wandering area of the tide inside the lagoon	Restore the dynamics of the lagoon through the opening of the fishing valleys to the tide, the creation of new wetlands, the excavation of the lagoon canals
		Cleaning of beached material brought by storm surges and river mouths in extreme events.	Restore natural conditions and reclaim waste areas.
	Increase the size of the area	Re-enlarge some agricultural areas of difficult cultivation and hydraulic reclamation	Creation of new wetlands in connection with the sea capable of implementing ecological value, biodiversity and the lure of the tide within the lagoon
	Development of buffer zones	Create buffer zones around the SIC area	Implement transition areas between natural areas and agricultural areas with a tourist value
	Control of species and diseases	Interventions for the eradication or control of exotic species such as the American red shrimp, nutria, swans, allochthonous fish fauna, etc.	Avoid the emergence of some hydraulic problems and limit the competition produced by these species towards native ones
	Reduce or eliminate external sources of pollution or disturbance	Launch a clean-up project for the basin draining the lagoon	Increase the quality of the water and the capacity to host the widest potential biodiversity possible
		Controls and surveillance of nautical traffic and poaching	To avoid disturbing the fauna and erosion of the embankments

Criteria – Adaptation measures for the pilot case			
Category	**Type of measure**	**Example of measure**	**Objective, brief description and expected results**
Improve ecosystem heterogeneity	Improve structural gradients in and around Natura 2000 sites	Conservation, recovery of coastal dune habitats and back-coast lagoon habitats	Natural protection from storm surges through the development of natural dunes: from embryonic to consolidated dunes. Restoration of lagoon dynamics
	Facilitate ecosystem change by adapting the dynamic processes of natural landscape formation	Creation of new wetlands, excavation of lagoon channels and interconnection of the hydraulic network	Recreating the dynamics of the lagoon and recirculation of sea water within the lagoon
Ensuring the required abiotic conditions	Water quality	Purification and phytoremediation	Improve water quality
	Quantity of water	Management of water exchanges from upstream and downstream	Strengthen the call of the internal areas of the lagoon at the inlet of the tide, solve the problem of the Cavrato canal
	Balancing nutrients	Start a clean-up project of the basin draining the lagoon	Increase the quality of the water and the capacity to host the widest possible possibility
Managing disturbances and extreme events	Fire management	Fire fighting organization Interventions to mitigate the risk	Strengthen the fire extinguishing system in the woods and in the marsh reed areas Forest management interventions in the coastal pine forest
Managing disturbances and extreme events	Flooding management	Redefinition of the activation ranges of the Cavrato canal in the event of a flood of the Tagliamento river	Avoid irreparable damage to the naturalness of the places and to the anthropic infrastructures present
	Storm management	Conservation and recovery of coastal dune habitats	Natural protection from storm surges through the development of embryonic to consolidated dunes
Increasing connectivity	Create new natural areas	SIC site management plan	Overall management of sites of community interest
	Wild landscape management	SIC site management plan	Overall management of sites of community interest
	Increase corridors and stepping stones	SIC site management plan	Overall management of sites of community interest
Other	Self-financing actions given for tourist, landscape and cultural ecosystem services	Monetary payment for tourist services - use and parking / access	Enhance from a monetary point of view some ESSs linked to tourist, cultural and landscape aspects in order to reinvest

Criteria - Adaptation measures for the pilot case			
Category	**Type of measure**	**Example of measure**	**Objective, brief description and expected results**
			these resources in conservation measures of the ecosystems themselves.

7.6.2 Friuli Venezia Giulia Region: Cavana of Monfalcone (IT3330007)

Criteria – Adaptation measures for the pilot case			
Category	**Type of measure**	**Example of measure**	**Objective, brief description and expected results**
Reducing existing pressures	Restoration activities	Construction of protection/restoration of salt marshes in erosion areas compatible with the surrounding environment.	In general, habitats in relation to the sea have characteristics that allow them to tolerate periods of flooding and high salinity levels. This is the case of the so-called halophilic habitats, characterized by a type of vegetation that tolerates periodic submersion by salt water, which in the pilot area are recognized as the Natura 2000 habitats 1410 and 1420. In this case we are dealing with barenicolous environments i.e. areas that present some of the coastal lagoon characteristics, such as the development of wetlands, brackish environment, flooded soils and halophilous vegetation. The functions of salt marshes also include phyto-purification (water purification) through natural processes and reduction of the force of waves and currents, indirectly protecting the environments and structures behind them from erosion. Protection/restoration actions towards this type of habitat ensure not only the maintenance of the habitat itself and of the aspects linked to it in terms of plant and animal biodiversity, but also fulfil the indirect functions of protection and phyto-purification. In addition, in the event of storm surges due to extreme weather conditions, the barenicolous habitats would be able to withstand the presence of salt water, acting as a protective barrier for the shellfish habitats in the areas behind them.
Reducing existing pressures	Buffer zone development	Establishment of buffer strips along the course of streams and rivers and along the perimeter of habitats of community interest.	The site is located in a highly anthropised area, characterized by intensive monocultures and an industrial and shipbuilding area. In this context, restoration works aim at including natural and semi-natural elements, on the one hand contribute to increasing biodiversity and the complexity and heterogeneity of the area, while on the other hand buffer zones created close to the industrial area have the function of both habitat protection and visual barrier, increasing the overall landscape value. In addition, the so-called buffer strips act as attractors for wildlife, but also contribute to the increase of the overall plant biomass, functional to the carbon sequestration due to CO_2 emissions from human activities.
Improving ecosystem hetero-geneity	Improving structural gradients in and around Natura 2000 sites	Woodland improvement measures, compatibility with the stationary characteristics (flora and fauna).	
	Facilitating ecosystem	Maintenance, restoration and creation of natural and semi-natural elements of the agro-ecosystem of high ecological	

Criteria - Adaptation measures for the pilot case			
Category	**Type of measure**	**Example of measure**	**Objective, brief description and expected results**
	change by adapting the dynamic processes of natural landscape formation	interest (permanent meadows, single and multi-stranded buffer strips, single and multi-stranded hedges and tree and shrub rows, windbreaks, shrubs, copses, residues of agricultural systems, old orchards and vineyards, maceration areas, ponds and wetlands (both temporary and permanent) and for the construction of structures for the maintenance and dissemination of wildlife.	
Reducing existing pressures	Infrastructure defragmentation	In hydraulic infrastructures, removal or adaptation of structures that cause interruptions in the continuum of watercourses and limit the natural movement of fish.	Given the presence of resurgence environments at the site and its proximity to important river systems, ensuring hydraulic continuity contributes to maintaining an adequate water supply to the area and, in general, to ensuring the preservation of species and habitats dependent on the presence of water. In addition, the functionality and integrity of the river ecosystem and related ESSs are maintained, particularly those concerning the presence of microorganisms, algae, plants and animals and their bioremediation capacity. Finally, in anticipation of droughts due to rising temperatures, the presence of dams would block the distribution of available water, exacerbating the phenomenon even further.
Ensuring the required abiotic conditions	Amount of water	Use of hydropower facilities that do not cause the interruption of hydraulic continuity and that ensure the ecological and habitat continuum (e.g. hydraulic screw) (see Note 1).	
Reducing existing pressures	Reducing or eliminating external sources of pollution or nuisance	Reducing the impact of road traffic on species and habitats through mitigation measures such as bollards for larger fauna (bollards, acoustic/olfactory systems, barriers, etc.) and noise barriers, with visual mitigation system, for birdlife.	The Cavana of Monfalcone SAC is located in an area that is strongly influenced by human presence, both in terms of tourism (Marina Julia and Marina Hannibal) and industry (shipyards and industrial area). Nevertheless, the proximity to the town of Monfalcone and the local agricultural tradition make the site exposed to numerous disturbing elements. The measures aim at implementing systems to safeguard wildlife when moving, attempt to reduce the possible impact of wildlife against cars, motor vehicles and work vehicles that frequent the area. Furthermore, the creation of safe and dedicated wildlife passages increases the connection of the SAC, seen as a node of the local marine-coastal ecological network, with the other neighbouring natural areas, implementing connectivity at regional level.
Increasing connectivity	Increasing corridors and stepping stones	Under- and overpass tunnels to facilitate the movement of minor and major fauna.	
		Construction of suitable structures to allow fish to ascend and ensure the restoration of river ecological continuity.	
	Wilderness management	Identification by the site-manager of ecological corridors and maintenance of their functionality within the Site.	

Criteria – Adaptation measures for the pilot case			
Category	**Type of measure**	**Example of measure**	**Objective, brief description and expected results**
Ensuring the required abiotic conditions	Water quality	Prohibition of the use of sewage sludge on habitats of community interest and the construction of new landfills or waste treatment plants (see Note 1).	With regard to the possible pollution to which the area is exposed, the presence of landfills and the use of sewage sludge, not only in the SAC but also in the surrounding area, affects the integrity of the river system, both surface and resurgence, altering the capacity for bioremediation and filtration/sequestering/storage/accumulation by microorganisms, algae, plants and animals hosted in the different habitats. Furthermore, given the strong agricultural vocation of the area, the introduction of practices aimed at greater eco-sustainability improves the impact of agriculture on the site, decreasing the load of synthetic compounds released into the environment. Furthermore, the adoption of extensive farming practices contributes to maintaining the areas of pasture and permanent grassland, enriching the overall biodiversity of the area in terms of flora. In this perspective, it is worth mentioning that habitats provide numerous ESSs. The most relevant among those analyzed are those of Regulation, Pollination, Filtration/Storage/Accumulation and Bioremediation. This means that maintaining the integrity of habitats allows them to fully enjoy their functionality, i.e. the functionality that enables them to satisfy the numerous ESSs linked to them. Fragmented and degraded habitats lose functionality and thus the ESS they provide, in both quality and quantity.
	Nutrient balance	Adoption of traditional extensive farming and breeding techniques; adoption of organic farming and integrated farming systems, especially when adjacent to wetlands.	
Increasing connectivity	Creating new natural areas	Recovery of degraded or fragmented habitats aimed at upgrading and extending existing habitat portions and reducing fragmentation, favoring the use of ecological restoration techniques using native species and local flowers.	
Managing disturbances and extreme events	Storm management	Maintenance of the system of draining channels at a shallow depth, compared to the ground level (20-30 cm), along agricultural crops.	In view of extreme weather events, some measures that include structural elements can support the resilience of habitats. These are, for example, the presence of a drainage system composed of a network of draining channels to facilitate the flow of rainwater and prevent flooding of the area and, as far as possible, the strengthening of the system of embankments and barriers to protect the coast from possible ingress of sea water. In fact, the area where the site is located is below sea level and therefore particularly exposed to rising sea levels.
	Flood management	Reinforcement of embankments to protect the banks and the coastline, paying attention to maintaining the transitional character between the coast and the sea.	
Other measures	Control of invasive alien species	Banning the reintroduction, introduction and repopulation of non-native species and populations in the wild.	It is well known that climate change favours the arrival and/or establishment of alien, sometimes invasive, species. In this case, allochthonous species of decapod crustaceans have had a strong impact on the regional population of the crayfish *Astropotamobius pallipes fulcisianus*. Consequently, by means of actions to eradicate allochthonous crustaceans, the aim is to encourage the recovery of the autochthonous population. The LIFE RARITY project (LIFE/10/NAT/IT/000239) has already worked in this area, whose experts could share useful information and knowledge on the measures to be taken with the Site Management Authority.
		Eradication of allochthonous decapods of the genera *Procambarus*, *Orconectes*, *Pacifastacus* and *Cherax*.	
NOTE 1. Adaptation measures are aimed at identifying solutions for the adaptation of ecosystems in the long term. As pointed out, the site is located in a high industrial development area characterized by a rapidly expanding shipbuilding and naval-mechanical sector and growing economic and demographic pressures (energy demand, disposal of urban and industrial waste and effluents). With regard to the construction of hydroelectric plants along the watercourses present in the site area, reference is given to small plants for the production of energy from renewable sources that could use the hydraulic screw. However, it should be stressed that the energy exploitation of watercourses is not consistent with the principles of ecological continuity illustrated in the table.			

7.6.3 Slovenia: Škocjanski zatok (SI3000252)

Criteria - Adaptation measures for the pilot case			
Category	**Type of measure**	**Example of measure**	**Objective, brief description and expected results**
Reducing existing pressures	Restoration activities	Ensuring wetland growth, protection against erosion, pollution, invasive species	The location of the Nature Reserve (NR) in the urban setting, in the adjacency of the city of Koper and the port, and the fact that the reserve doesn't have a buffer zone, where the urban pressures would be neutralized, contribute many negative impacts. Those pressures mainly relate to pollution of water inflows to the NR, noise, impacts of different business activities nearby as well as invasive species. Therefore, it is very important to have a good Management Plan (MP) that ensures wetland growth and protection of its habitats against these main pressures. The MP already includes the measures to deal with those pressures, but is important to update the MP with new measures to ensure wetland growth and protection, also in case of potential pressures connected to climate change. In this way, the NR can maintain the important regulating ESS by increasing the flood protection from adjacent urban areas and transport infrastructures on one hand, and at the same time eliminating the flood hazard to the reserve infrastructures.
Improve ecosystem heterogeneity	Allow natural processes	Monitoring the quality of water in brackish and freshwater parts of the reserve, control of both meteoric and waste waters	Škocjanski zatok nature reserve is located in the centre of an urban environment. Activities in the surrounding urban zones, including industrial, craft, business and trade, affect the nature reserve by polluting the waters flowing into the bay, with light pollution and noise generated. Impacts from the on-going construction of such zones along the border with the nature reserve are not negligible. This is followed by water pollution due to unregulated sewerage in the near settlements. Other sources of threats are the lack in the adequate amount and the quality of water mainly on the inflow from river Rižana, while the water quality in the Badaševica is not yet suitable for using this tributary to supply the nature reserve, and identified on the inflow through the sea canal were additional potential threats such as oil spills or petroleum products, ballast water from ships and the construction of traffic bridges across the sea canal. The proposed measure includes a sophisticated and innovative monitoring system of water quality that can detect and prevent major threats because of already detected potential water pollution sources (for example in the immediate vicinity of the nature reserve there are still discharges from which polluted waters flow and enter the protected area at least occasionally, e.g. from the meteor water system from the area between Škocjanski zatok, the Port of Koper and the city, and from Vinakoper. Furthermore, along the northern border of the area is an old landfill for organic waste from the Port of Koper that could be monitored. Consequently the monitoring plan should be prepared and activated accordingly to the hazards assessment connected to the water quality in the freshwater and brackish parts of the reserve.
Ensuring the required abiotic conditions	Water quantity	Appropriate and strategic regulation of sea level, appropriate and strategic	The sea level regulation is already partially implemented in the pilot area. In particular, the tide is regulated during the nesting season of riparian birds. In the future, careful planning of the use of the water regulation system for the benefit of both flora and fauna will be required. The water mass will be much higher in the second half of the 21st century, which may affect the erosion of the existing nesting islands. The freshwater regulation is already partially implemented in the pilot area, through a flood protection system. According to global climate models, the inflow of fresh water will be reduced on an annual basis, but the distribution and amount of

Criteria – Adaptation measures for the pilot case			
Category	**Type of measure**	**Example of measure**	**Objective, brief description and expected results**
		regulation of fresh water inflow	precipitation will be less constant throughout the year. In this way, it is necessary to combat these processes, especially when the lagoon ecosystems become much more saline.
Managing disturbances and extreme events	Flood management	Appropriate and strategic regulation of the freshwater inflow	The freshwater regulation system is already partially implemented in the pilot area, through a flood protection system. According to global climate models, the inflow of fresh water will be reduced on an annual basis, but the distribution and amount of precipitation will be less constant throughout the year. The proposed measure includes a more innovative monitoring system for the regulation of freshwater inflow, and a management and monitoring plan that includes hazard risk assessment of new patterns of distribution and amounts of precipitations during the year, including measures to prevent drought and heat peaks potential impacts.
Increasing connectivity	Spatial planning	Maintenance of existing and enlargement of the surface of Natura 2000 habitats at the appropriate micro-height	The restoration of Škocjanski zatok NR during the period 2000-2007 was an important project for Slovenia at that stage, and required substantial financial and other resources to cover the damage done by previous spatial planning which was excluding natural capital from its evaluations. The principal objective of the project was to restore, enhance and conserve habitats of endangered animal and plant species in the Škocjanski zatok Nature Reserve after the industrial degradation in the 1980s: in the brackish part of the reserve 200,000 cubic meters of mud was removed from the lagoon, accompanied by the restoration of habitats along the lagoon borders (shallow areas, mudflats of different heights, and the creation of islets within the lagoon). These adaptations were aimed at eliminating all the major threats in the brackish part of the reserve. After more than 10 years from that first major restoration of the reserve, new restoration measures need to be implemented to restore the degraded ecosystems of the brackish lagoon and in particular the restoration of habitats along the lagoon borders. The purpose of this measure is: to increase the area for the growth of target halophytic vegetation (annuals and perennials) and thus preserve Natura 2000 habitat types, increase the potential nesting area for 5 riparian birds, implement better water flow by the deepening of secondary channels, and the protection against erosion due to movement of water masses.
Other	Control of invasive alien species	Removal of invasive species	The purpose of the measure is to preserve biodiversity in the Natura 2000 area of Škocjanski zatok, and thus create more dynamic ecosystem processes, which would also ensure the preservation of ecosystem services in this area. Biodiversity conservation makes an important contribution to climate change mitigation and adaptation, since some invasive species are even more successful because of global warming. The specific objective of the measure is to eliminate and limit the spread of invasive alien animal and plant species. Upgrading this measure, which is already in the advanced implementation phase, would therefore include: continuing to remove terrestrial invasive plant species, continuing to monitor invasive species in both the freshwater and brackish parts (lagoon), identifying other potentially problematic alien species, preparation of an integrated strategy for the management of invasive and potentially problematic alien species in the perspective of climate change and its expected impacts (rising air and water temperatures, accelerated phenological development, increased primary production, etc.)

7.7 Criteria - Regional and local plans and programs in which adaptation measures can be included (STEP 3 of the methodological approach)

7.7.1 Veneto Region: Caorle Lagoon-Mouth of the Tagliamento (IT3250033), Mouth of the Tagliamento River (IT3250040), Old valley-Zumelle-Bibione valleys (IT3250041)

Criteria - Regional and local plans and programs in which adaptation measures can be included	
Indicator	**Qualitative assessment**
Regional and local plans and programs	Plans and programs are listed as follows: • National Recovery and Resilience Plan, European programming, • Regional fire prevention plan, • SCI / SPA site management plan.

7.7.2 Friuli Venezia Giulia Region: Cavana of Monfalcone (IT3330007)

Criteria - Regional and local plans and programs in which adaptation measures can be included	
Indicator	**Qualitative assessment**
Regional and local plans and programs	Plans and programs are listed as follows: • Regional plans: Regional landscape Plan, Regional territorial management Plan, Regional energy Plan, Regional urban waste management Plan, Regional Strategy for invasive alien species, • Natura 2000 site (IT3330007 Cavana of Monfalcone) management Plan, • General Municipal Regulator Plan of the Municipality of Monfalcone.

7.7.3 Slovenia: Škocjanski zatok (SI3000252)

Criteria – Regional and local plans and programmes in which adaptation measures can be included	
Indicator	**Qualitative assessment**
Regional and local plans and programs	Plans and programs are listed as follows: • Škocjanski zatok management plan (at local level), • Natura 2000 management program at national level, • Regional Development Program, • Strategic bases of spatial planning of Municipality of Koper, Spatial strategy/plan Municipality of Koper, Sustainable urban strategy of the city of Koper 2030 – TUS.

7.8 Criteria -PES schemes (STEP 4 of the methodological approach)

7.8.1 Veneto Region: Upper lagoon of Venice (IT3250031), Caorle Lagoon-Mouth of the Tagliamento (IT3250033), Mouth of the Tagliamento River (IT3250040), Old valley-Zumelle-Bibione valleys (IT3250041)

Criteria -PES schemes						
PES scheme	**Affected ESS**	**Affected habitats**	**Maintenance, preservation and restoration of the service**	**SHs which provide the ESS**	**SHs which benefit of the ESS**	**SHs which pay for benefitting of the ESS**
PES schemes 1- Upper lagoon of Venice (IT3250031)	The affected ESS is: conservation of salt marsh habitats to counter the widespread erosion of the lagoon environment	The affected habitats are: Natura 2000 code: 1150, 1420, 1140, 1510*, 1310, 1320, 1410	Selected measures are: conservation interventions of the salt marshes	The SHs, which can potentially provide the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: **Professional lagoon fishers.**	The SHs, which can potentially benefit of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: **Superintendency of Public Works for Veneto, Trentino-Alto Adige and Friuli-Venezia Giulia,** the Veneto Region and the municipality of Venice,fishermen, associations and nature guides, subjects related to the world of education and research (eg. Universities), economic operators in the field of ecotourism, citizenship in general	The SHs, which can potentially pay for benefitting of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: **Superintendency of Public Works for Veneto, Trentino-Alto Adige and Friuli-Venezia Giulia (main responsible for the protection of the lagoon morphology),** the Veneto Region and the municipality of Venice.

Criteria -PES schemes						
PES scheme	**Affected ESS**	**Affected habitats**	**Maintenance, preservation and restoration of the service**	**SHs which provide the ESS**	**SHs which benefit of the ESS**	**SHs which pay for benefitting of the ESS**
PES schemes 1 - Lagoon system of Caorle (IT3250033, IT3250040, IT3250041): Protection from storm surges with natural dune defence systems	The affected ESS is: Coastal protection from storm surges through natural dune systems, achievable both in the SIC areas affected by coastal pine forests and coastal lagoons, and in deep sandy shores, allocating a part of the beach to natural dunes.	The affected habitats are: •Natura 2000 code 7210[19], 1150, 1210, 1310, 1420, 2110, 2120, 2130*, 2230, 2250*, 2270*, 6410, 6420, 7210*, 9340	Selected measures are: • Restoration activities • Development of buffer zones • Improve structural gradients in and around Natura 2K sites • Fire management • Storm management • Increase corridors and stepping stones • Wild landscape management Create new natural areas	The SHs, which can potentially provide the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • Regional Civil Engineering, • **Eastern Veneto Reclamation Consortium**, Municipalities and beach consortia	The SHs, which can potentially benefit of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • Municipalities, • farmers, • **Veneto Agriculture**, • Eastern Veneto Reclamation Consortium, • Tour operators, Citizenship in general	The SHs, which can potentially pay for benefitting of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: **Veneto Region**

[19] 7210 - Calcareous swamps with Cladium mariscus and species of the Caricion davallianae; 1150 - Coastal lagoons; 1210 - Annual vegetation of drift lines; 1310 - Salicornia and other annuals colonizing mud and sand; 1420 - Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetiea fruticosi*); 2110 - Embryonic shifting dunes; 2120 - Shifting dunes along the shoreline with Ammophila arenaria; 2130* - Fixed coastal dunes with herbaceous vegetation (grey dunes); 2230 - Malcolmietalia dune grasslands; 2250* - Coastal dunes with *Juniperus spp.*; 2270* - Wooded dunes with *Pinus pinea* and/or *Pinus pinaster*; 6410 - Coastal dunes colonised by Mediterranean and Atlantic thermophilous pines, corresponding to the substitution facies or in some stations climax formations of evergreen oak of artificial origin (*Quercetalia ilicis* or *Ceratonio-Rhamnetalia*); 6420 - Mediterranean tall humid herb grasslands of the *Molinio-Holoschoenion*; 7210* - Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*; 9340 - *Quercus ilex* and *Quercus rotundifolia* forests.

Criteria -PES schemes						
PES scheme	**Affected ESS**	**Affected habitats**	**Maintenance, preservation and restoration of the service**	**SHs which provide the ESS**	**SHs which benefit of the ESS**	**SHs which pay for benefitting of the ESS**
PES schemes 2- Lagoon system of Caorle (IT3250033, IT3250040, IT3250041): Recovery of a minimum vital and ecological functionality of the Caorle lagoon system	The affected ESS is: Maintenance of the Caorle lagoon system understood as the dynamics of tide entry and exit and management of sediments through the excavation of internal lagoon canals, the interconnection of canals, the construction of new wetlands that can be flooded by the tides and the opening of hunting valleys.	The affected habitats are: • Natura 2000 code 7210 - Calcareous swamps with *Cladium mariscus* and species of the *Caricion davallianae* • 1150 - Coastal lagoons • 1210 - Annual vegetation of marine deposit lines • 1310 - Annual pioneer vegetation in Salicornia and other species of muddy and sandy areas • 1420 - Mediterranean and thermo-Atlantic halophilous meadows and fruit groves (*Sarcocornietea fruticosi*) • 6410 - Meadows with Molinia on calcareous, peaty or clayey-loamy soils (*Molinion caeruleae*)	The selected measures are: • Restoration activities • Increase the size of the area Development of buffer zones; Control of species and diseases; Reduce or eliminate external sources of pollution or disturbance; Improve structural gradients in and around Natura 2K sites; Facilitate ecosystem change by adapting the dynamic processes of natural landscape formation; Water quality; Amount of water; Nutrient balance; Fire management; Flooding management; Storm management; Increase corridors and stepping stones; Wild landscape management; Create new natural areas	The SHs, which can potentially provide the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • Regional Civil Engineering, • **Eastern Veneto Reclamation Consortium**	The SHs, which can potentially benefit of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • Municipalities, • fishermen, • hunters, • **Eastern Veneto Reclamation Consortium**, • tour operators, • citizenship in general	The SHs, which can potentially pay for benefitting of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • **Public bodies interested in environmental protection**, • tour operators, • professional and recreational fishermen, • hunters, • sports and environmental associations.

Criteria -PES schemes						
PES scheme	**Affected ESS**	**Affected habitats**	**Maintenance, preservation and restoration of the service**	**SHs which provide the ESS**	**SHs which benefit of the ESS**	**SHs which pay for benefitting of the ESS**
PES schemes 3- Lagoon system of Caorle (IT3250033, IT3250040, IT3250041): Implementation and maintenance of slow fruition actions and environmental education	The affected ESS is: Realization and maintenance of infrastructures with slow use and environmental education (new cycle paths, maintenance and cleaning of the territory, education and awareness projects, etc.)	All habitats of the site are affected by the PES scheme.	The selected measures are: • Restoration activities • Increase the size of the area • Reduce or eliminate external sources of pollution or disturbance • Improve structural gradients in and around Natura 2K sites • Facilitate ecosystem change by adapting the dynamic processes of natural landscape formation • Water quality • Nutrient balance • Fire management • Increase corridors and stepping stones • Wild landscape management • Create new natural areas • Self-financing actions given for tourist, landscape and cultural ecosystem services	The SHs, which can potentially provide the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • Municipalities, tour operators, citizens in general, tourists	The SHs, which can potentially benefit of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • Public bodies, • tour operators, • managers of tourist services in the vicinity and linked to the protected areas (parking managers, tour operators, tourist consortia, etc.).	The SHs, which can potentially pay for benefitting of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • **Public bodies**, • tour operators, • managers of tourist services in the vicinity and linked to the protected areas (parking managers, tour operators, tourist consortia, etc.).

7.8.2 Friuli Venezia Giulia Region: Cavana of Monfalcone (IT3330007)

Criteria -PES schemes						
PES scheme	**Affected ESS**	**Affected habitats**	**Maintenance, preservation and restoration of the service**	**SHs which provide the ESS**	**SHs which benefit of the ESS**	**SHs which pay for benefitting of the ESS**
PES schemes 1: Natural resources management	The affected ESS is: Maintaining nursery populations and habitats including pollination, seeds dispersal	All the habitats of the site are affected because the transitional system of resurgence wetlands in connection with marine waters is a very important natural context for the conservation of habitats and species.	The type of intervention is habitat conservation and restoration in order to face external pressures. In particular, the area is at risk of becoming a narrow urban suburb between the tourist facilities to the west, the industrial facilities to the north and the shipyard to the east.	The SHs, which can potentially provide the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • **Autonomous Region Friuli Venezia Giulia - Directorate for Agriculture, Forestry and Fisheries - Biodiversity service** • **Municipality of Monfalcone**	The SHs, which can potentially benefit of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • **Environmental associations (Legambiente of Monfalcone, Associazione E. Rossman)** • Higher-educational institut M. Buonarroti of Monfalcone • University of research purposes • Nature tourism providers (**Marina Julia Family Camping Village**, Yacht club Hannibal, KiteLife Grado, Kayak company of Monfalcone) • Hunting reserve of Staranzano • **Hunting reserve of Monfalcone** • Fishermen cooperartive of Monfalcone	The SHs, which can potentially pay for benefitting of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • **Environmental associations (Legambiente of Monfalcone, Associazione Ambientalista Eugenio Rossman)** • **Hunting reserves**

Criteria -PES schemes						
PES scheme	**Affected ESS**	**Affected habitats**	**Maintenance, preservation and restoration of the service**	**SHs which provide the ESS**	**SHs which benefit of the ESS**	**SHs which pay for benefitting of the ESS**
PES schemes 2: Fruition	The affected ESS is: Characteristics of living systems that enable activities promoting health, recuperation or enjoyment through active and passive interactions, education and training	The affected habitats are: 1110, 1140, 1410, 1420, 3140, 3260, 62A0, 6410, 6430, 6510, 7210, 7230, 91E0, 91L0.	The required maintenance measures are: - restoration operations aiming to convert former agricultural areas into habitats of naturalistic importance; - maintenance of green areas in order to enhance the existing paths and observatory; - maintenance and creation of equipped paths for didactics and fruition providing information on the naturalistic emergencies of the site, climate change and the role of transition zones in the planning of adaptation measures.	The SHs, which can potentially provide the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • **Autonomous Region Friuli Venezia Giulia - Directorate for Agriculture, Forestry and Fisheries - Biodiversity service** • **Municipality of Monfalcone**	The SHs, which can potentially benefit of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • **Environmental associations (Legambiente of Monfalcone, Associazione Ambientalista Eugenio Rossman)** • Higher-educational institut M. Buonarroti of Monfalcone • University of research purposes • Nature tourism providers (**Marina Julia Family Camping Village**, Yacht club Hannibal, KiteLife Grado, Kayak company of Monfalcone) • Hunting reserve of Staranzano • **Hunting reserve of Monfalcone**	The SHs, which can potentially pay for benefitting of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • **Environmental associations (Legambiente of Monfalcone, Associazione Ambientalista Eugenio Rossman)** • **Hunting reserves**

Criteria -PES schemes						
PES scheme	**Affected ESS**	**Affected habitats**	**Maintenance, preservation and restoration of the service**	**SHs which provide the ESS**	**SHs which benefit of the ESS**	**SHs which pay for benefitting of the ESS**
PES schemes 3: Hydrological resource management	Hydrological cycle and water flow regulation (Including flood control)	Given the small size of the area, the ecosystem service is generated by the entire Natura 2000 site, at least as far as the terrestrial part is concerned. It is therefore 117.54 hectares. All the habitats of the site are affected as they are characterized by a transitional system of resurgence wetlands in connection with marine waters.	The required maintenance measures are: - Maintenance of the hydrological cycle through flow management. The intervention would be implemented and supervised by the Consortium for the Reclamation of the Isontina Plain to ensure, through the management of the Da Vinci's doors, the functionality of the internal levels of the Cavana area and the outflow of resurgence waters and rainwater towards the sea. However, it should be noted that from a naturalistic point of view, the current sweetening, due to the occlusion of the mouth of the Cavana, has brought positive effects to the avifauna. Due to this potential conflict in land use, we believe that this type of intervention requires more in-depth studies and analyses that cannot be carried out within the ECOSMART project.	For the reasons given, no service providers are reported.	For the reasons given, no service users are reported.	For the reasons given, no users willing to pay for the service are reported.

7.8.3 Slovenia: Škocjanski zatok (SI3000252)

Criteria -PES schemes						
PES scheme	**Affected ESS**	**Affected habitats**	**Maintenance, preservation and restoration of the service**	**SHs which provide the ESS**	**SHs which benefit of the ESS**	**SHs which pay for benefitting of the ESS**
PES schemes 1 Mitigation of climate extremes	The affected ESS is: Mitigation of climate extremes. The ESS of the CICES synthetized by the definition "mitigation of climate extremes" are listed as follows: Regulation of chemical composition of atmosphere and oceans; Regulation of temperature and humidity, including ventilation and transpiration; Hydrological cycle and water flow regulation (including flood control, and coastal protection);	All habitats of Skocjanski zatok are affected by the PES scheme.	The affected measures are described in the report of the Activity 13, and are listed as follows: • Removal of invasive species • Maintenance of existing and enlargement of the surface of Natura 2000 habitats at the appropriate micro-level • Appropriate and strategic regulation of sea level, appropriate and strategic regulation of fresh water inflow	The SHs, which can potentially provide the ESS, are listed as potential SHs. Those, which attended the worktables are considered as **actual SHs** and are highlight in bold: • **DOPPS - BirdLife Slovenia** • Institute of the Republic of Slovenia for Nature Conservation • RS - Ministry of the Environment and Spatial Planning)	The SHs, which can potentially benefit of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • All local inhabitants	The SHs, which can potentially pay for benefitting of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • Farmers • Companies • Beekeepers

Criteria -PES schemes						
PES scheme	**Affected ESS**	**Affected habitats**	**Maintenance, preservation and restoration of the service**	**SHs which provide the ESS**	**SHs which benefit of the ESS**	**SHs which pay for benefitting of the ESS**
PES schemes 2 Habitat mosaic for plant and animal species	The affected ESS is: Habitat mosaic for plant and animal species. The ESS of the CICES synthetized by the definition "Habitat mosaic for plant and animal species" are listed as follows: Disease control; Maintaining nursery populations and habitats (Including gene pool protection); Seed dispersal; Pollination (or 'gamete' dispersal in a marine context); Visual screening; Noise attenuation; Bio-remediation by micro-organisms, algae, plants, and animals; Mediation of nuisances by abiotic structures or processes; Cultural (Abiotic and Biotic)	All habitats of Skocjanski zatok are affected by the PES scheme.	The affected measures are described in the report of the Activity 13, and are listed as follows: • Removal of invasive species • Maintenance of existing and enlargement of the surface of Natura 2000 habitats at the appropriate micro-level • Appropriate and strategic regulation of sea level, appropriate and strategic regulation of fresh water inflow	The SHs which can potentially provide the ESS are listed. Those which attended the worktables and can be considered as actual SHs and highlight in bold: • **DOPPS - BirdLife Slovenia** • Institute of the Republic of Slovenia for Nature Conservation • RS - Ministry of the Environment and Spatial Planning)	The SHs, which can potentially benefit of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • All local inhabitants	The SHs, which can potentially pay for benefitting of the ESS, are listed as potential SHs. Those, which attended the worktables are considered as actual SHs and are highlight in bold: • Visitors • Photographers • Schools • Farmers • Port of Koper • Beekeepers

7.9 Criteria - Economic feasibility of the selected measures (STEP 4 of the methodological approach)

7.9.1 Veneto Region: Upper lagoon Venice (IT3250031),Caorle Lagoon-Mouth of the Tagliamento (IT3250033), Mouth of the Tagliamento River (IT3250040), Old valley-Zumelle-Bibione valleys (IT3250041)

Criteria - Economic feasibility of the selected measures									
Selected measures	Brief description of the measure	Costs of measure implementation		Benefits of measure implementation		Ratio between benefits and costs	Timeframe of implementation	Timeframe for achieving effectiveness	Status of implementation
		Name of the method	Amount of the costs (€/ha; €)	Name of the method	Amount of the benefits (€/ha;€)				
Upper lagoon Venice (IT3250031) Measure 1: Restoration activities	conservation interventions of the salt marshes	n.a	2.2 M €/year	n.a.	18.3	8.3	2 years	1 years	completed study
Lagoon system of Caorle									
Measure 1: Restoration activities	1.Conservation and recovery of coastal dune habitats 2. Coastal nourishment 3.Cleaning of beached material	n.a.	1,007,648 €/anno Vallevecchia 567,877 Bibione	n.a.	32,380,187 €/anno Vallevecchia 25,514,333 Bibione	32 (Vallevecchia) 44 (Bibione)	3 years	5 years	The agreement between the "SH-Wet area contract" and the Veneto Region is being approved
Measure 2: Development of buffer zones	Create buffer zones around the Natura 2000 site	n.a	1.000.000,00€/year	n.a	Environmental benefits not economically exploited on the ESS	n.a	3 years	5 years	Consultation with all the actors involved

Criteria - Economic feasibility of the selected measures									
Selected measures	Brief description of the measure	Costs of measure implementation		Benefits of measure implementation		Ratio between benefits and costs	Timeframe of implementation	Timeframe for achieving effectiveness	Status of implementation
		Name of the method	Amount of the costs (€/ha; €)	Name of the method	Amount of the benefits (€/ha;€)				
Measure 3: Improvement of the heterogeneity of the ecosystem	Conservation and recovery of coastal dune habitats and coastal lagoon habitats.	n.a	Measure 5 is directly included in measure 1. The costs and benefits are equal	n.a	Measure 5 is directly included in measure 1. The costs and benefits are equal	Measure 5 is directly included in measure 1. The costs and benefits are equal	3 years	5 years	Consultation with all the actors involved
Measure 4: Fire management	Fire prevention organization and interventions to mitigate the risk and forest management interventions in the coastal pine forest	n.a.	Vallevecchia 282'860 €/year Bibione 251'079 €/year	n.a.	environmental benefits not economically exploited on the ESS	n.a	3 years	5 years	Consultation with all the actors involved
Measure 5: Storm management	Conservation and recovery of coastal dune habitats, in particular natural protection from storm surges through the development of dunes from embryonic to consolidated	n.a	Measure 5 is directly included in measure 1. The costs and benefits are equal	n.a	Measure 5 is directly included in measure 1. The costs and benefits are equal	Measure 5 is directly included in measure 1. The costs and benefits are equal	3 years	5 years	Consultation with all the actors involved

Criteria - Economic feasibility of the selected measures									
Selected measures	Brief description of the measure	Costs of measure implementation		Benefits of measure implementation		Ratio between benefits and costs	Timeframe of implementation	Timeframe for achieving effectiveness	Status of implementation
		Name of the method	Amount of the costs (€/ha; €)	Name of the method	Amount of the benefits (€/ha;€)				
Measure 6: Increase in connectivity	Increase corridors and stepping stones. Wild landscape management. Create new natural areas	n.a	1.000.000,00€/year	n.a	Environmental benefits not economically exploited on the ESS	n.a	3 years	5 years	Consultation with all the actors involved

7.9.2 Friuli Venezia Giulia Region: Cavana of Monfalcone (IT3330007)

Criteria - Economic feasibility of the selected measures									
Selected measures	Brief description of the measure	Costs of measure implementation		Benefits of measure implementation		Ratio between benefits and costs	Timeframe of implementation	Timeframe for achieving effectiveness	Status of implementation
		Name of the method	Amount of the costs (€/ha; €)	Name of the method	Amount of the benefits (€/ha; €)				
Measure 1: Creating buffer zone	Creating grassland buffer zones between the wooded area where the resurgence pot is located and the industrial area close to it.	Market cost	In a total area of about 7 ha directly managed by the Region, the total expenditure is about 9,600 euro (without business margins and without VAT), which corresponds to a cost per ha of about 1,370 euro/year.	Benefit transfer[20].	The value of the ESS "Maintaining populations and habitats for restocking (including conservation of the gene pool)" is estimated with regards to (Visintin, 2008)[21]: • Habitat/refugia benefit: 184.20 €/ha/year • Recreation and cultural benefit: 1,200.65 €/ha/year • Total ESS benefit: 1,362.93 €/ha/year	0.99 = 1,362.93 €/ha/year / 1,370 euro/year	Ongoing by the Region. As regard to measures which require the involvement of new SHs (environmental association, hunting reserve), it may take 1 year	As regard to measures which require the involvement of new SHs, it may take 2 years	Consultation with SHs

[20] The ESS called "Maintenance of populations and habitats for restocking (including gene pool conservation)" cannot be estimated as such, because the service it provides is related to the provision of other ecosystem services that can be estimated using traditional techniques suggested in the literature. In fact, the same CICES classification, among the examples of benefits related to this ecosystem service, reports "Sustainable populations of useful or iconic species that contribute to a service in another ecosystem". The presence of iconic species and fauna can have a use value, for example in the context of cultural ecosystem services linked to forms of tourism, education and research, as well as a non-use value such as an existence value. No estimates are currently available for the pilot case. A benefit transfer approach was therefore adopted to estimate the economic values for ecosystem services of the pilot site by transferring available information from studies already completed in another location. In this case, estimates were transferred from the project S.A.R.A. (Sistema Aree Regionali Ambientali) of the Friuli Venezia Giulia Region with special regard to the Foce dell'Isonzo Regional Nature Reserve, a coastal wetland characterized by transitional environments similar to the Cavana di Monfalcone site (Visintin, 2008).

[21] Visintin F. (2008), *Modello di contabilità ambientale per il Sistema delle aree naturali tutelate del Friuli Venezia Giulia, Progetto S.A.R.A. Sistema Aree Regionali Ambientali - Costituzione sistema regionale delle aree naturali*, CETA-Centro di Ecologia Teorica e Applicata, gennaio 2008, Gorizia, Rapporto interno.

Criteria – Economic feasibility of the selected measures									
Selected measures	Brief description of the measure	Costs of measure implementation		Benefits of measure implementation		Ratio between benefits and costs	Timeframe of implementation	Timeframe for achieving effectiveness	Status of implementation
		Name of the method	Amount of the costs (€/ha; €)	Name of the method	Amount of the benefits (€/ha; €)				
Measure 2: Creating new natural areas	Currently one of the resurgence pots belonging to the hydrological system of the Natura 2000 site is located in an area that the Municipal Urban Plan classifies as industrial zone. This area is adjacent to but outside the Natura 2000 site. In order to preserve the ecosystem and the hydrological system of the Natura 2000 site, the measure proposes to initiate the procedure to modify the current delimitation by including the resurgence pot of the industrial area in the Natura 2000 site.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Proposal submitted by SHs, under assessment by the Municipality
Measure 3: Reducing external sources of pollution and nuisance	Managing the parking of lorry drivers who use spaces adjacent to the site for parking by creating a rest station equipped with toilets and waste management.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Proposal submitted by SHs, under assessment
Measure 4: Facilitating ecosystem change	Facilitating ecosystem change by adapting the dynamic processes of natural landscape formation, involving local farmers in the maintenance or creation of elements such as rows, hedges, drainage ditches, etc., useful for encouraging and differentiating the local fauna.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Proposal submitted by SHs, under assessment
Measure 5: Improving structural gradients in and around Natura 2000 sites	Improving structural gradients in and around Natura 2000 sites, by restoring the cutting of wet meadows west of the Cavana swamp, containing scrubland and encouraging local flora of wet meadows in the Schiavetti area. For these areas, the possibility of restoring the turf through fractioned controlled burning should be evaluated.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Proposal submitted by SHs, under assessment by the Municipality
Measure 6: Control of invasive alien species	Controlling invasive alien species in order to eradicate *Amorpha fructicosa* and *Procambarus clarkii*.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Proposal submitted by SHs, under assessment
Measure 7: Flood management	Flood management, strengthening the system of embankments surrounding the Cavana biotope, which is at risk of flooding.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Proposal submitted by SHs, under assessment

Criteria – Economic feasibility of the selected measures									
Measure 8: Management of water flows	Management of water flows, actively managing the Da Vinci doors within the site by favoring the presence of a freshwater environment.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Proposal submitted by SHs under assessment

7.9.3 Slovenia: Škocjanski zatok (SI3000252)

Criteria - Economic feasibility of the selected measures									
Selected measures	Brief description of the measure	Costs of measure implementation		Benefits of measure implementation		Ratio between benefits and costs	Timeframe of implementation	Timeframe for achieving effectiveness	Status of implementation
		Name of the method	Amount of the costs (€/ha; €)	Name of the method	Amount of the benefits (€/ha; €)				
Measure 1: Removal of invasive species	The specific objective of the measure is to eliminate and limit the spread of invasive alien animal and plant species.	direct cost	Cost of labour and implementation: 11.000 € per year Tot approx. when implemented over 3 years: 33.000 €	Benefit transfer	Economic assessment of benefits based on PES scheme 1 is 101,59 EUR/ha per year Economic assessment of benefits based on PES scheme 2 is 254,42 EUR/ha per year For the total area of the pilot site: 122.7 ha PES 1: 101,59 EUR x 122.7 ha=12.465,093 per year PES 2: 254,42 EUR x 122.7 ha=31.217,334 per year PES 1+2= 43.736,427 EUR per year Qualitative assessment of environmental and social benefits includes: - providing a mosaic of habitats (biodiversity), preventing the spread of invasive alien species, conserving Natura 2000 species and habitats, ensuring the growth and natural succession of wetlands, providing ecosystem services - provision of educational activities, provision of research activities, provision of tourist attractions and offers, mitigation of the urban microclimate in the event of heat waves, thereby improving the quality of life of local residents	It is an ecosystem based adaptation measure, that resulted as a win-win measure. Economic cost could be covered by implementation of PES scheme 1 Ratio Benefit/Cost (per year) = 12.465,093/11.000 =1,13	3 years	1 year	advanced implementation

Criteria – Economic feasibility of the selected measures									
Selected measures	Brief description of the measure	Costs of measure implementation		Benefits of measure implementation		Ratio between benefits and costs	Timeframe of implementation	Timeframe for achieving effectiveness	Status of implementation
		Name of the method	Amount of the costs (€/ha; €)	Name of the method	Amount of the benefits (€/ha; €)				
Measure 2: Maintenance of existing and enlargement of the surface of Natura 2000 habitats at the appropriate micro-level	The specific aim of the measure is to restore the degraded ecosystems of the brackish lagoon and in particular the objective is the restoration of habitats along the lagoon borders. The purpose of this measure is: to increase the area for the growth of target halophytic vegetation (annuals and perennials) and thus preserve Natura 2000 habitat types, increase the potential nesting area for 5 riparian birds, implement better water flow by the deepening of secondary channels, and the protection against erosion due to movement of water masses.	direct cost	Approximately 205.000,00 € for ecosystem restoration. For system maintenance, monitoring, 1000 - 3000 € per year Tot: approx. 215.000 € (if divided in 4 years' time of implementation then is 53.750€ per year)	Benefit transfer	Economic assessment of benefits based on PES scheme 1 is 101,59 EUR/ha per year Economic assessment of benefits based on PES scheme 2 is 254,42 EUR/ha per year For the total area of the pilot site: 122.7 ha PES 1: 101,59 EUR x 122.7 ha=12.465,093 per year PES 2: 254,42 EUR x 122.7 ha=31.217,334 per year PES 1+2= 43.736,427 EUR per year Qualitative assessment of environmental and social benefits including: - providing a mosaic of habitats (biodiversity), ensuring the growth and natural succession of wetlands, providing nesting areas, providing other regulatory and supporting ecosystem services; maintaining dynamic ecosystem processes; better carbon sequestration in the ecosystems - ensuring the existence of a coastal wetland that attracts many visitors and offers jobs, providing educational activities, providing tourist attractions and offers, mitigating the urban microclimate in the event of heat waves, thereby improving the quality of life and health of residents and visitors	It is an ecosystem based adaptation measure, that resulted as a win-win measure. Economic cost could be partially covered by a combination of PES scheme 1 and 2. Ratio Benefit/Cost(per year) =43.736,427/53.750 =0,81	4 years	1 year	initial implementation

Criteria – Economic feasibility of the selected measures									
Selected measures	**Brief description of the measure**	**Costs of measure implementation**		**Benefits of measure implementation**		**Ratio between benefits and costs**	**Timeframe of implementation**	**Timeframe for achieving effectiveness**	**Status of implementation**
		Name of the method	**Amount of the costs (€/ha; €)**	**Name of the method**	**Amount of the benefits (€/ha; €)**				
Measure 3: Appropriate and strategic regulation of sea level, appropriate and strategic regulation of fresh water inflow	The proposed measure includes a more innovative monitoring system for the regulation of sea level and freshwater inflow, and a management and monitoring plan that includes hazard risk assessment of new patterns of distribution and amounts of precipitations during the year, including measures to prevent drought and heat peaks potential impacts.	direct cost	System upgrade approximately: 50.000 – 80.000 € System maintenance, monitoring, 1000 – 3000 € per year Tot: approx. 90.000 € (if divided in 5 years' time of implementation, then is 18.000€ per year)	Benefit transfer	Economic assessment of benefits based on PES scheme 1 is 101,59 EUR/ha per year Economic assessment of benefits based on PES scheme 2 is 254,42 EUR/ha per year For the total area of the pilot site: 122.7 ha PES 1: 101,59 EUR x 122.7 ha=12.465,093 per year PES 2: 254,42 EUR x 122.7 ha=31.217,334 per year PES 1+2= 43.736,427 EUR per year Qualitative assessment of both the environmental and the social benefits including: - control of tides, control of fresh water and nutrient inflow, provision of mosaic of habitats (biodiversity), provision of growth and natural succession of wetlands, provision of nesting areas, provision of other ecosystem services of this part of the reserve. - provision of educational activities, provision of tourist attractiveness and offer, provision of recreational area, mitigation of the urban microclimate in the event of heat waves, provision of educational and research activities taking place in the reserve.	It is an ecosystem based adaptation measure, that resulted as a win-win measure. Economic cost could be covered by a combination of PES scheme 2. Ratio Benefit/Cost (per year) =31.217,334 €/ 18.000€=1,73	5 years	1 year	advanced implementation

7.10 Criteria - Achievement of project objectives (STEP 4 of the methodological approach)

7.10.1 Veneto Region: Upper lagoon of Venice (IT3250031), Caorle Lagoon-Mouth of the Tagliamento (IT3250033), Mouth of the Tagliamento River (IT3250040), Old valley-Zumelle-Bibione valleys (IT3250041)

Criteria - Achievement of project objectives		
Indicator	**Qualitative assessment**	**Quantitative assessment**
Monitoring of the conservation status of the saltmarshes, the status of habitats and the supply of ecosystem services (upper lagoon Venice)	Interviews with local stakeholders (fishermen, nature guides, local population in general).	field monitoring, satellite, aerial and drone photos
The mechanisms adopted for monitoring results are periodic phytosociological, botanical and fauna surveys (lagoon system of Caorle)	Qualitative assessment is not planned	The adopted monitoring system is the assessment of the state of conservation of the habitats

7.10.2 Friuli Venezia Giulia Region: Cavana of Monfalcone (IT3330007)

Criteria - Achievement of project objectives		
Indicator	**Qualitative assessment**	**Quantitative assessment**
Mechanisms for monitoring results are: botanical and faunal surveys to monitor any anthropic impact and analysis of the satisfaction and effectiveness of the didactic-educational activity	• Visual census of species (list of species) to assess the measures effectiveness • Satisfaction of the didactic-educational activity through the submission of a satisfaction questionnaire	• Visual census of species (quantity per species) to assess the measures effectiveness • Flows of the didactic-educational activity

7.10.3 Slovenia: Škocjanski zatok (SI3000252)

Criteria - Achievement of project objectives	
Indicator	**Qualitative and Quantitative assessment**
Mitigation of climate extremes (1) Soil organic matter content [%] for each habitat. (2) Amount of above ground plant biomass [kg / ha] for each habitat; (3) Habitat areas [ha].	An integrated qualitative and quantitative evaluation is foreseen thanks to the assessment of the amount of total sequestered CO_2 (annual sink for each habitat [ton / ha / year] * habitat area [ha]). In case the amount is declining, the effectiveness of PES is questionable. in case the amount of total sequestered CO_2 is constant or increasing, the PES is effective.
Habitat mosaic for plant and animal species 1) Shannon Diversity Index (H) 1 for each habitat separately (Shannon and Weaver, 1949); (2) Habitat surface ratio [% of each habitat]; (3) Patch richness (PR) throughout the area (FRAGSTAT metrics)	An integrated qualitative and quantitative evaluation is foreseen by determining the presence of the desired habitats, defining the ideal ratio of habitat areas and determining an acceptable minimum area. In case the number of desired habitats decreases, or if the area decreases below the critical limit, the effectiveness of PES is questionable. In case the number of desired habitats remains the same or is increasing, and the area of habitats remains within the permitted limit, PES is effective.

7.11 SWOT

7.11.1 Veneto Region: Upper lagoon Venice (IT3250031), Caorle Lagoon-Mouth of the Tagliamento (IT3250033), Mouth of the Tagliamento River (IT3250040), Old valley-Zumelle-Bibione valleys (IT3250041)

SWOT analysis of the project results respect to the project objective	
Upper lagoon Venice (IT3250031)	
Strengths	The maintenance of salt marsh habitats has positive effects on economic sectors other than just nature conservation (in which it creates a large amount of local green jobs), in particular lagoon fishing, lagoon tourism and education and substantial saving of public funds
Weaknesses	Dialogue between the parties involved in the PES scheme (beneficiaries, intermediaries, suppliers), involvement of local citizens and service providers, i.e. professional lagoon fishermen who play a key role in the realization of the project, finding a sufficient number of fishermen
Opportunities	An increase in the supply of jobsthat develops around these environments.
Threats	The regular maintenance of the undertaken restoration and conservation actions over time is critically important.
lagoon system of Caorle (IT3250033, IT3250040, IT3250041)	
Strengths	This measure is able to prevent significant damage to biodiversity and economic activities linked to or protected by dunes (for ex. agriculture, tourism), potentially irreversible in the case of agriculture, by implementing multifunctional and low-cost nature-based solutions. It also reduces the need for spending money into sediment nourishment in beaches. The costs of the measure are outweighed by far by its benefits in economic terms.
Weaknesses	Stakeholders were (inevitably) only partly engaged in the design of restoration and conservation actions as well as PES scheme, but their engagement is key to achieve sustainability.
Opportunities	By defending complex ecosystems such as dunes, it is expected to increase multiple ESSs, with positive effects both for the conservation of nature and for multiple socio-economic sectors, at the same time increasing the sequestration of CO_2 through the protection of vegetated ecosystems and the use of nature based solutions. The PES scheme can contribute to effective adaptation to climate change as it consists of nature-based measures, which are, by definition, based on the necessary adoption of an adaptive approach that generates resilience at the level of local communities. These strengths are expected to become more and more important in a context of climate change.
Threats	The regular maintenance of the undertaken restoration and conservation actions over time is critically important, so regular funding needs to be ensured. This should be ensured by the high benefit-cost ratio and stakeholder engagement.

7.11.2 Friuli Venezia Giulia Region: the Cavana of Monfalcone (IT3330007)

SWOT analysis of the project results respect to the project objective	
Strenghst	- The site has a high naturalistic value given by the presence of resurgence areas close to the sea that have resisted the land reclamation and the intense industrialization present near the site. - As such, 43.1% of the surface is characterized by 10 types of habitats that are included in Annex I of the Habitats Directive, of which 2 are considered priority.
Weaknesses	- Small extension of the site. Due to actual delimitation, some sources are located outside the area, no buffer zone protects the core area of the site from external pressure and internal pressure (in case of tourism valorization). The Climate adaptation plan developed in the framework of the ECO-SMART project selected some adaptation measures that in addition to adaptation to climate change helps the naturalistic conservation of the site.
Opportunities	- High commitment of the local environmental associations since the designation of the Natura 2000 site. The promotion of the designation was carried out by the environmental associations. - Willingness of the local environmental associations, hunting reserves and economic operators to conserve and valorize the site. - Involvement of the local stakeholders in integrated management agreements. The stakeholders' engagement has moved to the first steps within the ECO-SMART project. Stakeholders are not yet ready to pay for the ESS. Nevertheless, the involvement could set up an atypical PES scheme, by considering the payment not in monetary terms but in timing terms. The beneficiary of the ESS pays in terms of time donated to the management of the asset providing the ESS. In this way the agreements are based on the integrated management of the site.
Threats	- Lack on management plan. At the moment site-specific measures are available. In case of drawing up the management plan, the measures suggested in the Climate adaptation plan developed in the framework of the ECO-SMART project may be included. - External pressures and low engagement from some economic sectors may seriously impact the site.

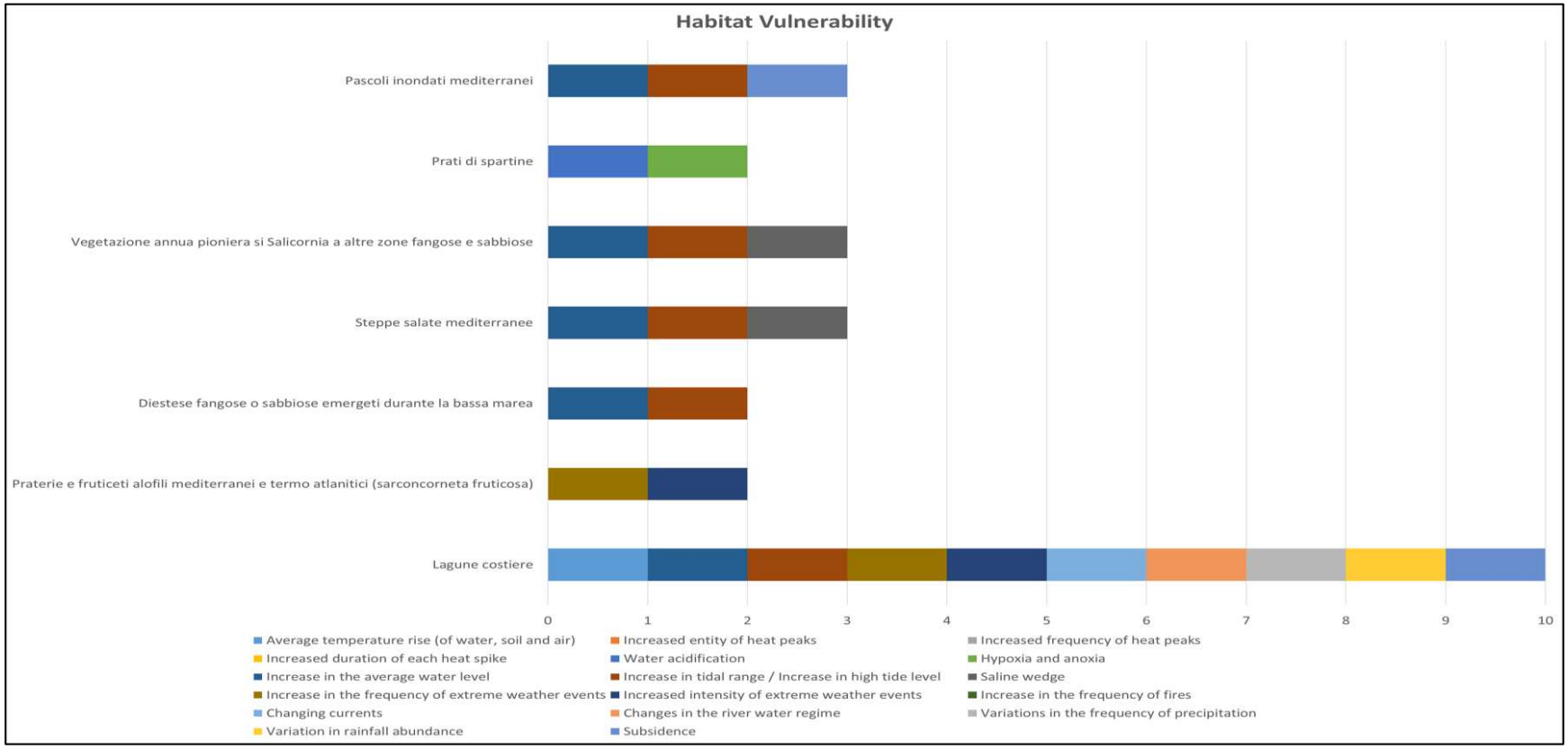
7.11.3 Slovenia: Škocjanski zatok (SI3000252)

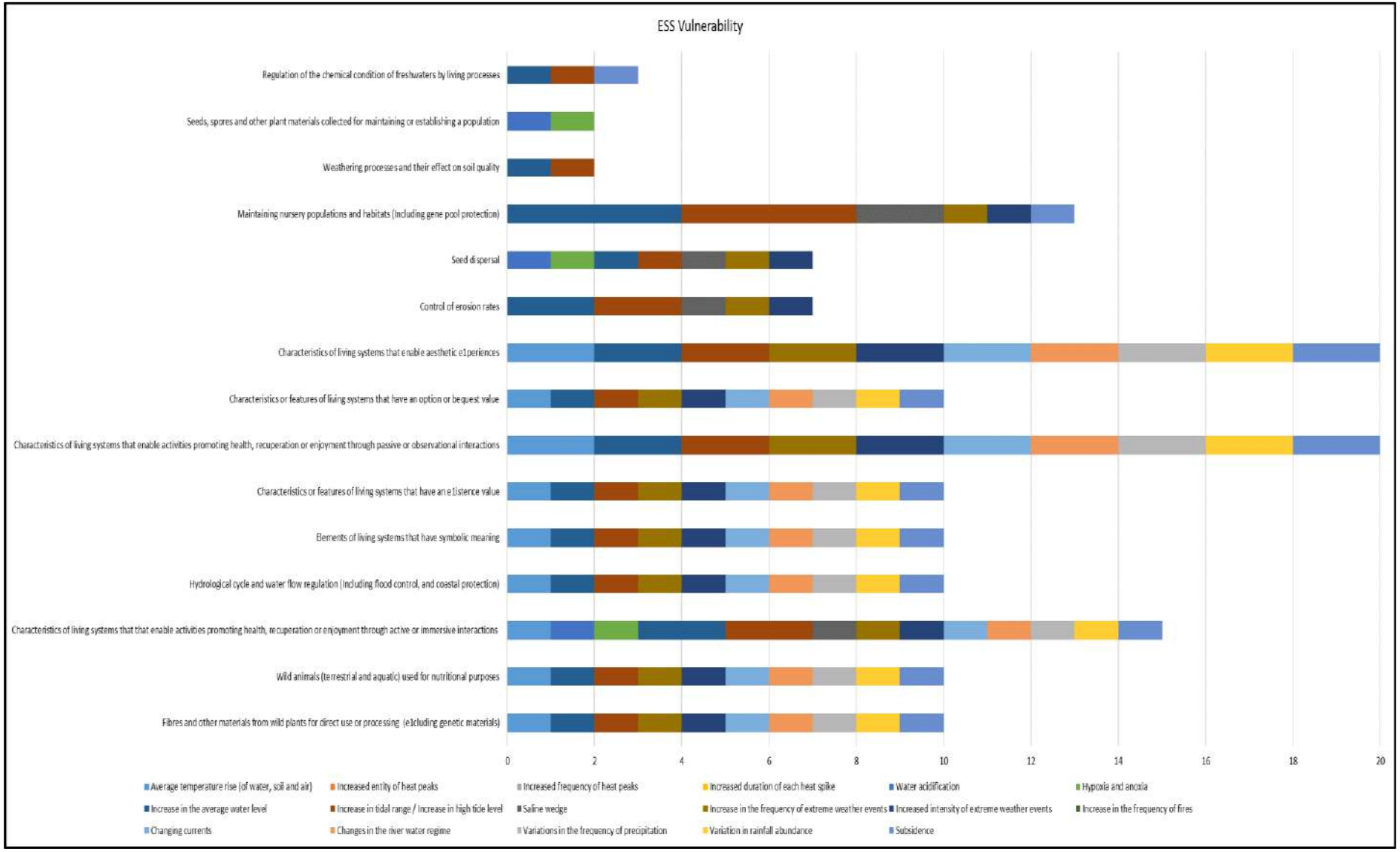
SWOT analysis of the overall project results respect to the project objective (integrative analyses)	
Strengths	- Pilot site excellence – the combination of both brackish and freshwater habitats makes the Natura 2000 pilot site Škocjanski zatok a very diverse environment – its nesting islands, saltmarshes and mudflats are home to a wide range of rare animal and plant species, thus enabling a rich biodiversity with a diversity of ESSs - Lots of available new data regarding pilot site biodiversity, threats, ecosystem services and impacts of climate change. Many data collected also on the established website, boards, publications. - The pilot site is a Slovenian model case of renaturation - a source of experience for others, an example of good practice. Without renaturation of the site after its degradation and pollution in the 1980s, many very relevant ecosystem services would be irremediable lost for this area. - Management experience and knowledge: friendly, flexible, dedicated, organized pilot site manager who provides personal contacts, lectures and relations with the media, stakeholders, visitors to the reserve. - Already developed cross-border and international cooperation, exchange of experiences between the pilot site and similar sites in Italy, Croatia and other Mediterranean regions. - Already well developed management plan and future development strategies, analyses of threats and strategies to reduce existing threats etc. - During the project new data regarding vulnerability of habitats and ESSs became available to managers and SHs, tailored climate change adaptation measures were proposed that could be added to the management plan and implemented also using new funds from the proposed PES schemes.
Weaknesses	- Not enough recognized value of ecosystem services of the pilot site to the general public – we tried to overcome this weakness with capacity building activities. - There are not enough contacts / relationships with local decision makers (municipality) and companies- we tried to overcome this weakness with workshops, media and other activities that are dedicated to spread stakeholder involvement in the project. - Managers are not enough active/interested in obtaining funds from local sources (companies, donations, etc.) and sources of local aid (voluntary work), or PES - we tried to overcome this weakness with major efforts to explain feasibility and benefits of PES to implement climate change adaptation measures. - During the project all capacity building events for stakeholders were organized virtually because of Covid-19 pandemic- we tried to overcome this weakness with activities to activate stakeholders using online surveys in real-time, facilitation of questions and suggestions of stakeholders.
Opportunities	- Ability to obtain funds from project sources. - The possibility of obtaining more funds from the activities of the reserve, marketing local products, expanding trips to the hinterland also through PES implementations. - Many opportunities to create stronger connections with local inhabitants and providers of products and services (multi-sector connectivity). - The pilot site is located within a highly touristic environment, which encourages opportunities to develop many forms of sustainable tourism. - Willingness of people to donate or pay an entrance fee- therefore opportunities to create PES schemes. - Opportunities to straighten collaboration with local research institutes. - More intensive involvement of key stakeholders from the beginning of the project. Active participation of relevant stakeholders with interest for ecosystem services provision and willingness for payment for ecosystem services preservation is crucial for PES implementation.

SWOT analysis of the overall project results respect to the project objective (integrative analyses)	
Threats	- Pilot site location – its proximity to urban surroundings with negative impacts, pollution, accessibility for domestic animals (turtles, cats, dogs), easy access for predators – it is impossible to set up measures to move the location or create buffer zones. However, it is possible to set up measures to better monitor threats and protect biodiversity of the pilot site- we tried to propose measures to more integrative approaches that prevent impacts of climate change and other anthropogenic sources. - Vandalism, disregard to code of conduct in the nature reserve – we tried to involve local inhabitants in capacity building activities to straighten their knowledge and awareness regarding this important nature protected area. - Potential lack of financial resources and interest of decision makers for maintenance and renovation of the pilot site and rising economic interest connected with the enlargement of industrial/commercial/business area of Koper (port of Koper, infrastructures, Sermin Business Park) in the future could lead to gradual degradation of the area and its ecosystem services because of the lack of policy support and financial assets and developed PES schemes – we try to involve local inhabitants and schools in activities to raise awareness and to explain the urgent need to collaborate to protect the natural heritage.

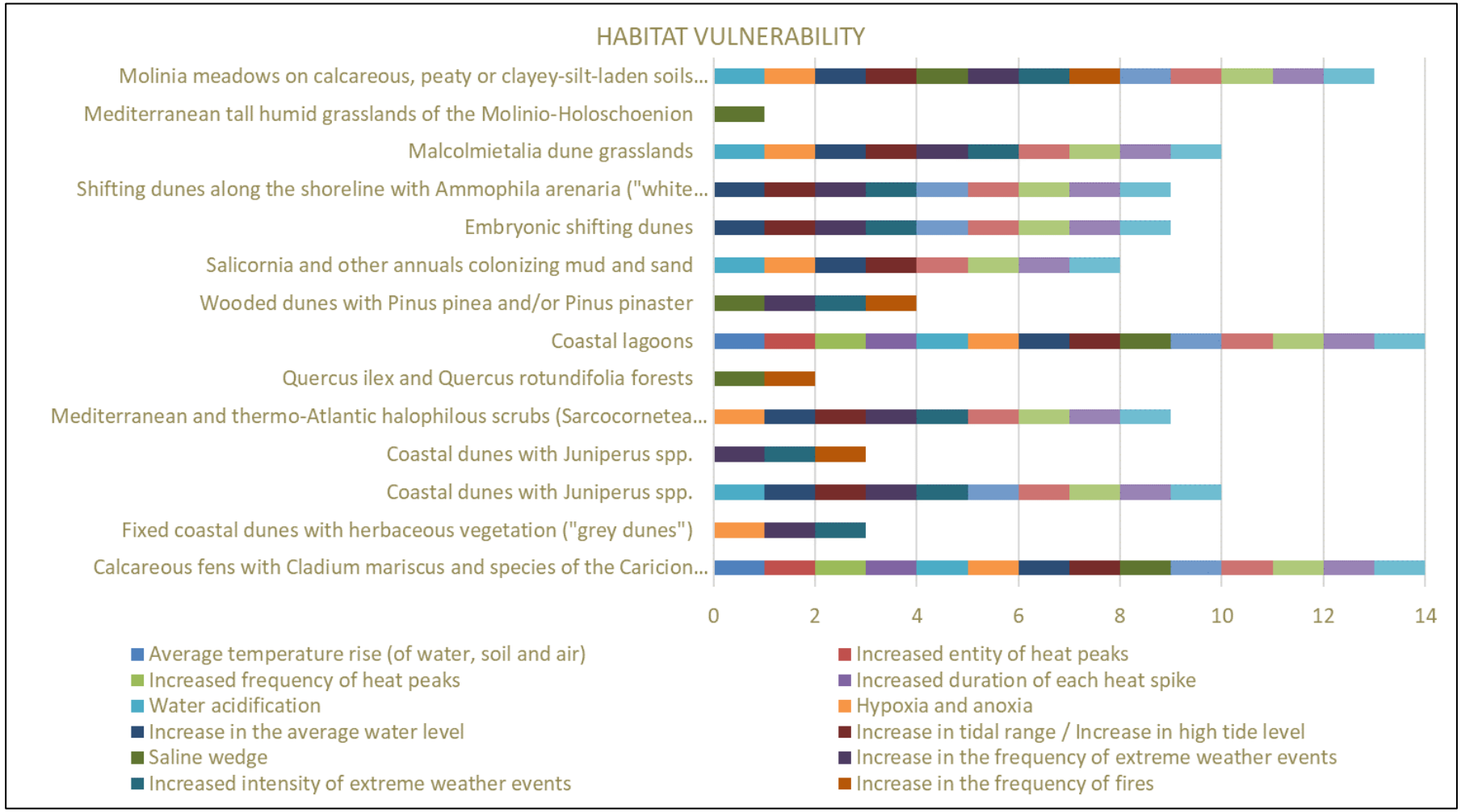
8 APPENDIX 1 – VULNERABILITY ANALYSIS

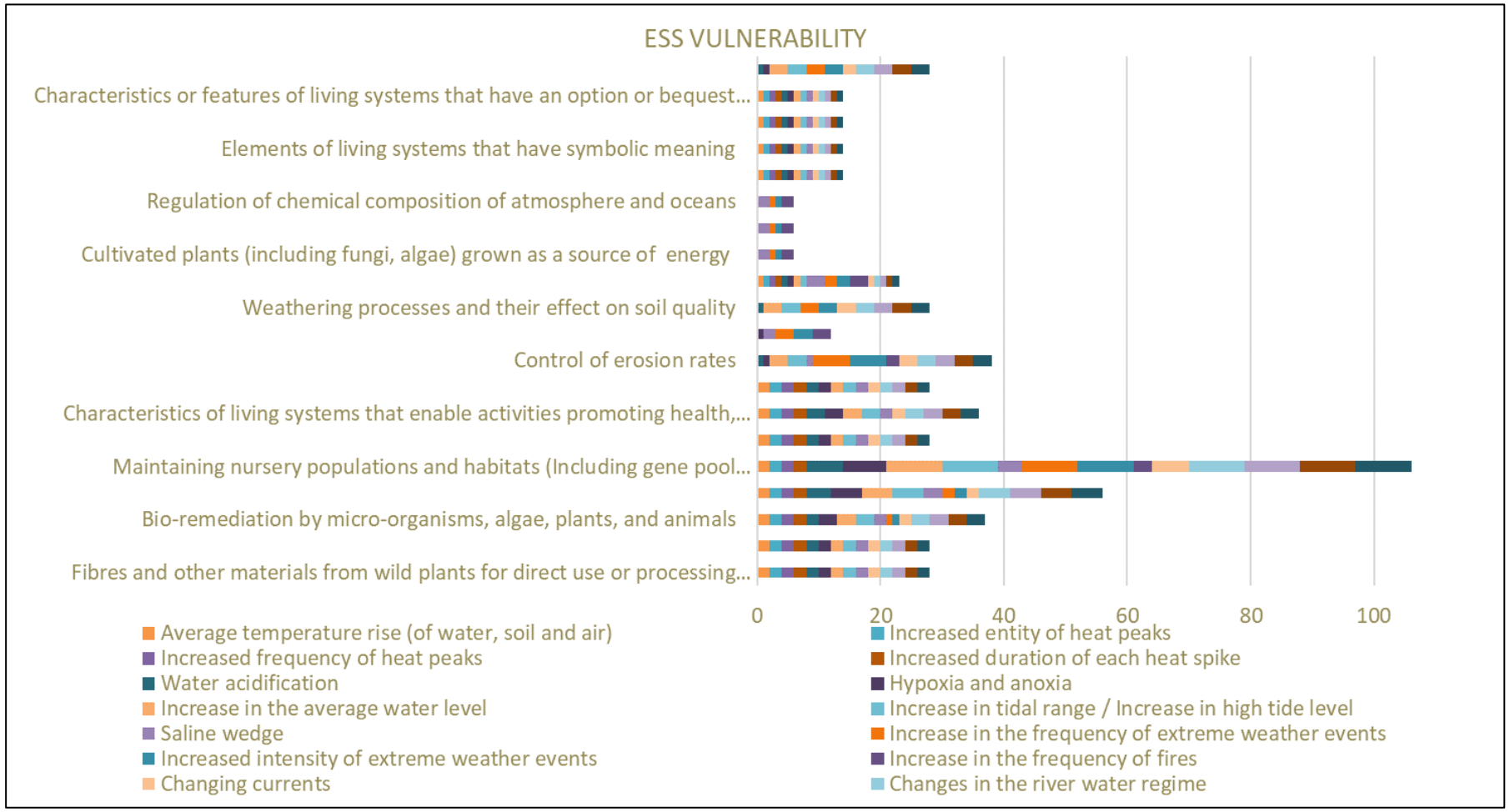
8.1 Veneto region: Upper Lagoon Venice (IT3250031)



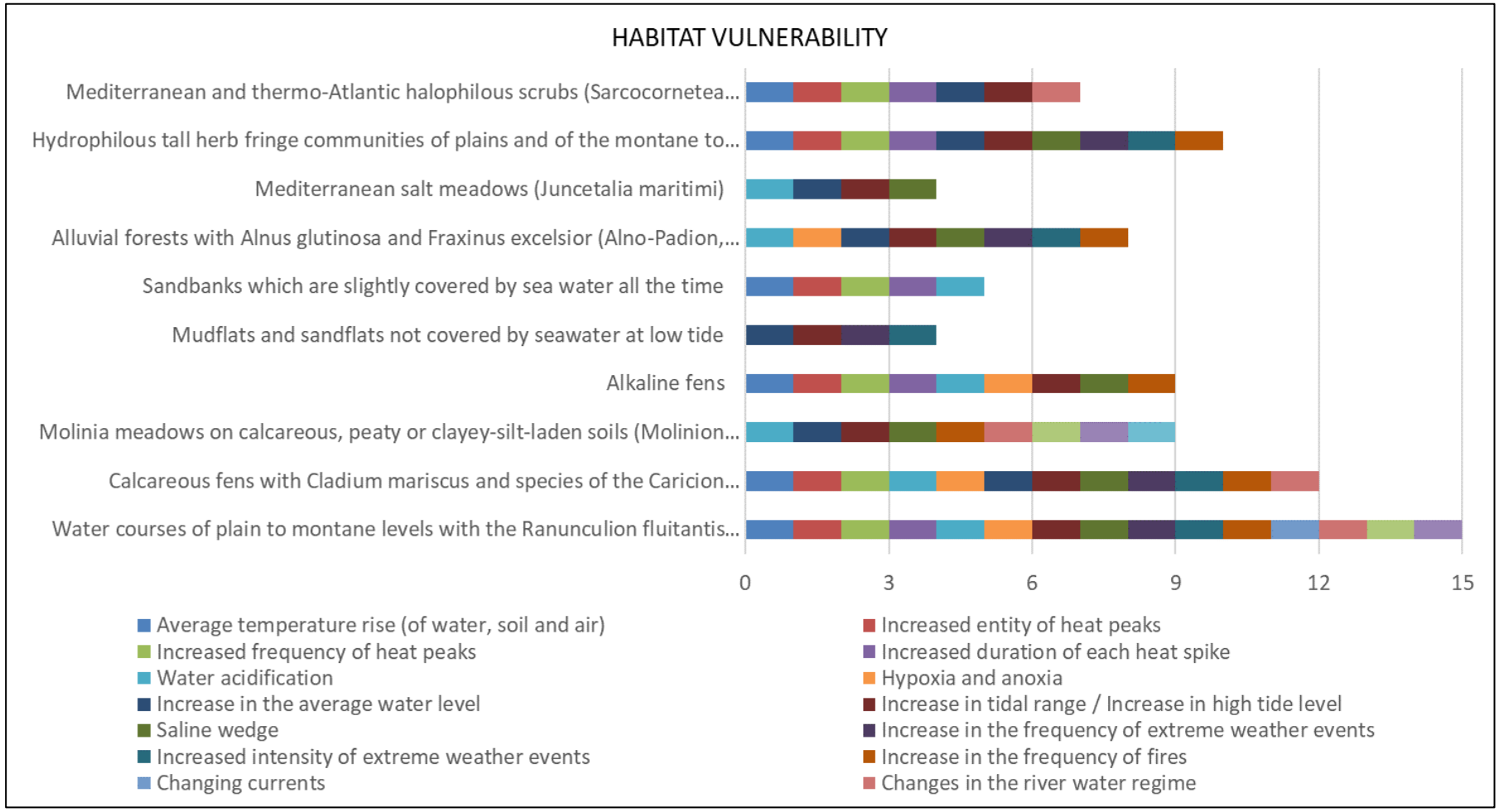

ESS Vulnerability
Regulation of the chemical condition of freshwaters by living processes
Seeds, spores and other plant materials collected for maintaining or establishing a population
Weathering processes and their effect on soil quality
Maintaining nursery populations and habitats (including gene pool protection)
Seed dispersal
Control of erosion rates
Characteristics of living systems that enable aesthetic e1periences
Characteristics or features of living systems that have an option or bequest value
Characteristics of living systems that enable activities promoting health, recuperation or enjoyment through passive or observational interactions
Characteristics or features of living systems that have an e1istence value
Elements of living systems that have symbolic meaning
Hydrological cycle and water flow regulation (including flood control, and coastal protection)
Characteristics of living systems that that enable activities promoting health, recuperation or enjoyment through active or immersive interactions
Wild animals (terrestrial and aquatic) used for nutritional purposes
Fibres and other materials from wild plants for direct use or processing (e1cluding genetic materials)
0
2
4
6
8
10
12
14
16
18
20
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

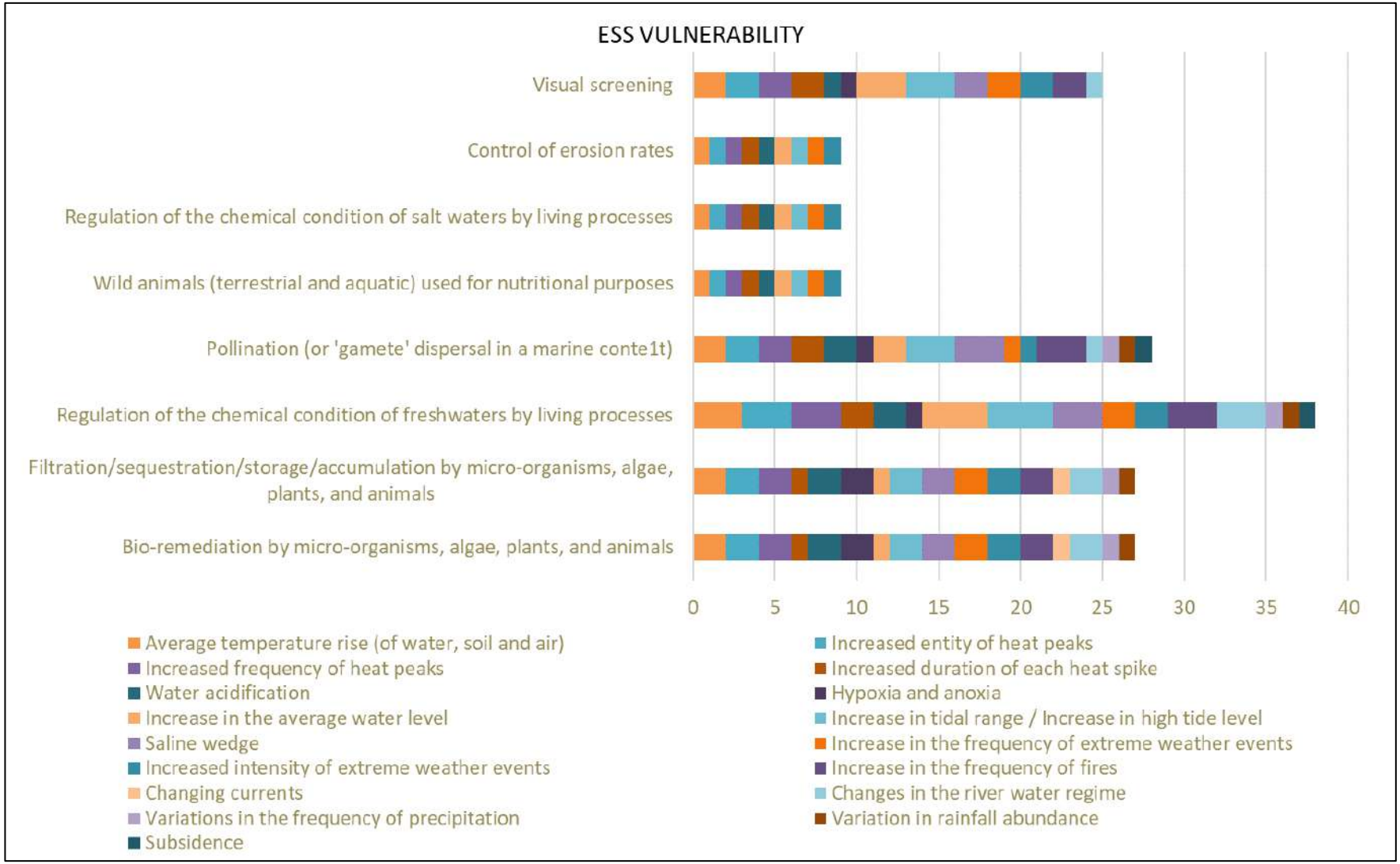
6.2 Veneto region: Caorle Lagoon-Mouth of the Tagliamento (IT3250033)



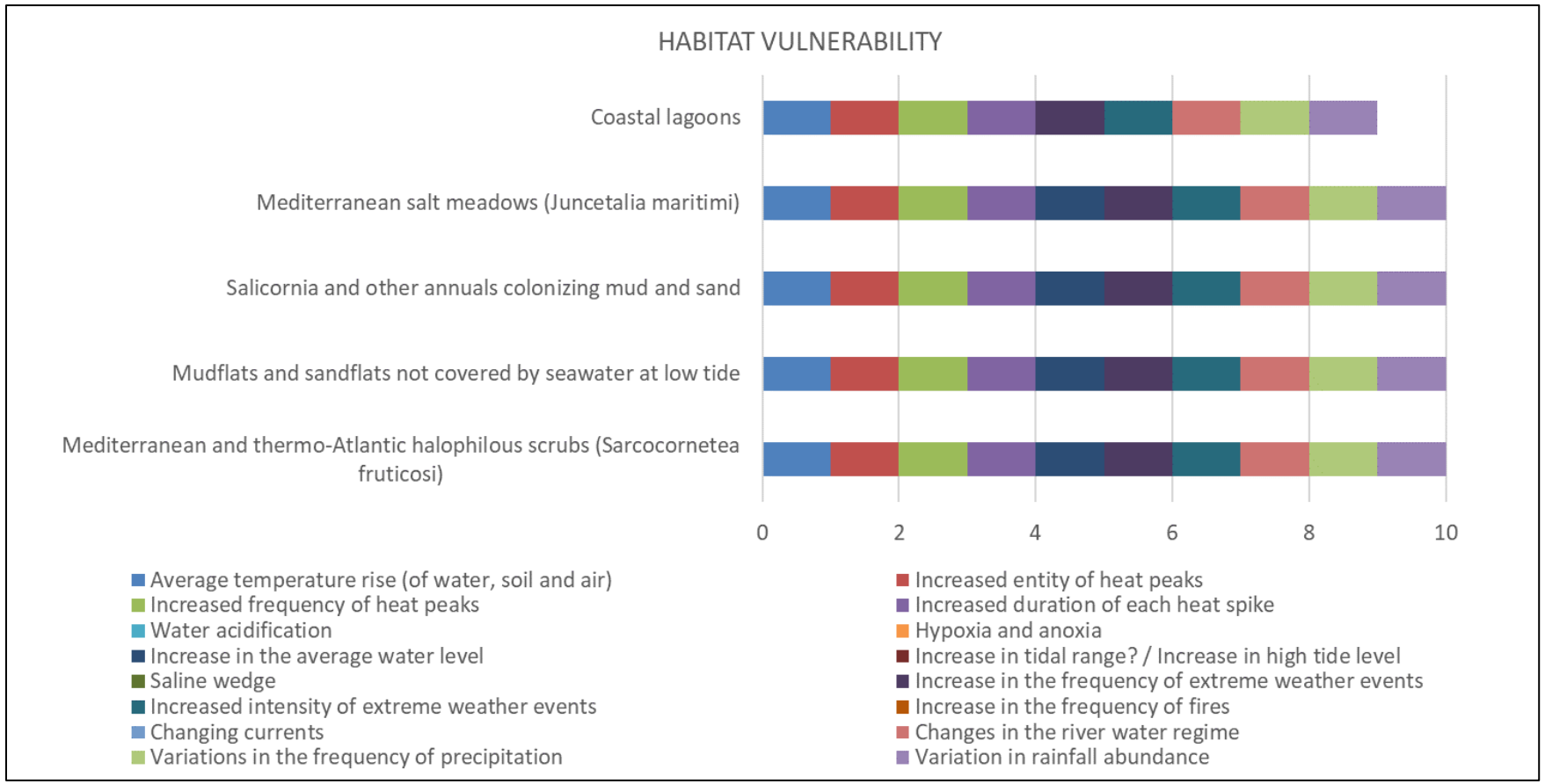

ESS VULNERABILITY
Characteristics or features of living systems that have an option or bequest...
Elements of living systems that have symbolic meaning
Regulation of chemical composition of atmosphere and oceans
Cultivated plants (including fungi, algae) grown as a source of energy
Weathering processes and their effect on soil quality
Control of erosion rates
Characteristics of living systems that enable activities promoting health,...
Maintaining nursery populations and habitats (Including gene pool...
Bio-remediation by micro-organisms, algae, plants, and animals
Fibres and other materials from wild plants for direct use or processing...
0
20
40
60
80
100
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

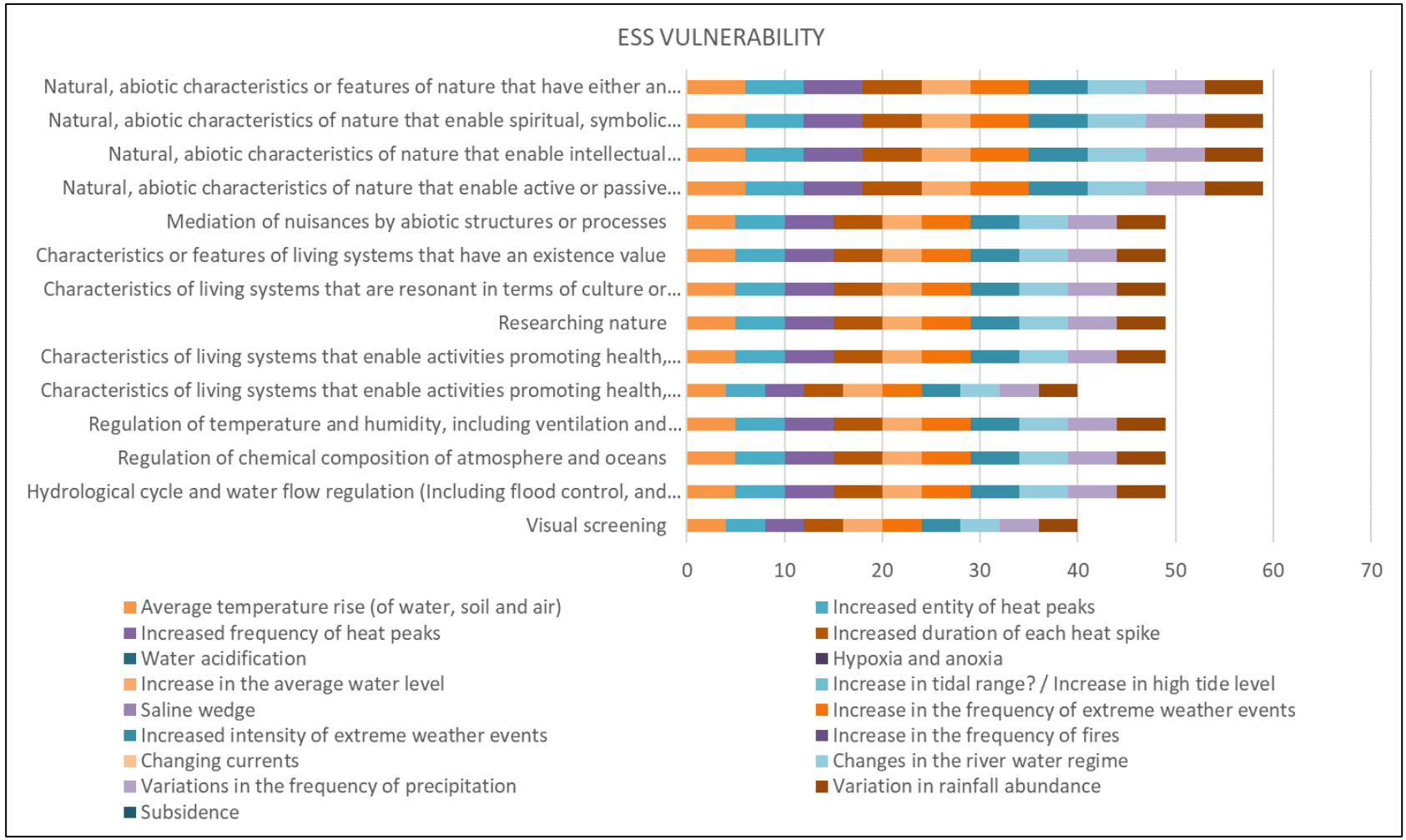
8.2 Friuli Venezia Giulia Region: Cavana of Monfalcone (IT3330007)




ESS VULNERABILITY
Visual screening
Control of erosion rates
Regulation of the chemical condition of salt waters by living processes
Wild animals (terrestrial and aquatic) used for nutritional purposes
Pollination (or 'gamete' dispersal in a marine conte1t)
Regulation of the chemical condition of freshwaters by living processes
Filtration/sequestration/storage/accumulation by micro-organisms, algae, plants, and animals
Bio-remediation by micro-organisms, algae, plants, and animals
0
5
10
15
20
25
30
35
40
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

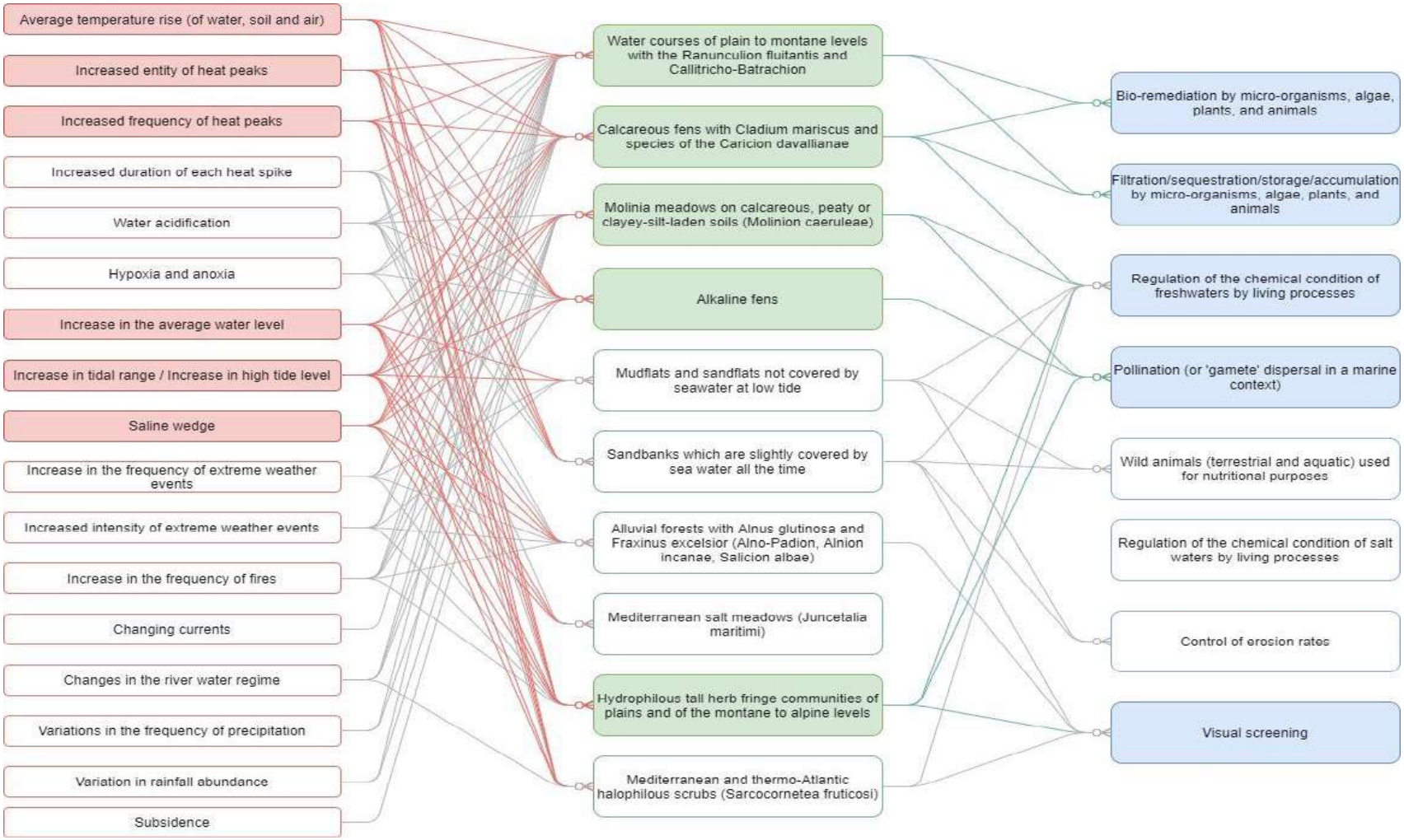
8.3 Slovenia: Škocjanski zatok (SI3000252)




ESS VULNERABILITY
Natural, abiotic characteristics or features of nature that have either an...
Natural, abiotic characteristics of nature that enable spiritual, symbolic...
Natural, abiotic characteristics of nature that enable intellectual...
Natural, abiotic characteristics of nature that enable active or passive...
Mediation of nuisances by abiotic structures or processes
Characteristics or features of living systems that have an existence value
Characteristics of living systems that are resonant in terms of culture or...
Researching nature
Characteristics of living systems that enable activities promoting health,...
Characteristics of living systems that enable activities promoting health,...
Regulation of temperature and humidity, including ventilation and...
Regulation of chemical composition of atmosphere and oceans
Hydrological cycle and water flow regulation (Including flood control, and...
Visual screening
0
10
20
30
40
50
60
70
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

9 APPENDIX 2 – IMPACT CHAIN EXAMPLE

9.1 Impact chain of the Cavana of Monfalcone (IT3330007)



Interreg
ITALIA-SLOVENIJA
ECO-SMART


Foto/fotografija: @Life Redune


Foto/fotografija: SELC F.Scarton


Foto/fotografija: Pierpaolo Merluzzi


Foto/fotografija: Tina Primožič

Sistema della laguna di Caorle
Lagunski sistem Caorle

Laguna Superiore di Venezia
Zgornja beneška laguna


Cavana di Monfalcone
Cavana v Tržiču


Val Stagnon
Škocjanski zatok

Golfo di Trieste

Mare Adriatico

Cartografia/ kartografija: Google Earth