



Improving ecosystem-based management of Natura 2000 sites in the Vouga River, from catchment to coast, Portugal

Ana Isabel Lillebø, Heliana Teixeira, Mariana Morgado, Javier Martínez-López, Asya Marhubi, Gonzalo Delacamara, Pierre Strosser, António J A Nogueira

universidade de aveiro
departamento de biologia



Human well-being

In the scope of the Millennium Ecosystem Assessment that was carried between 2001 and 2005 under the auspices of the United Nations, one of the key questions identified was – *“what options exist to enhance the conservation of ecosystems and their contribution to human well-being?”*



Ecosystem Based Management

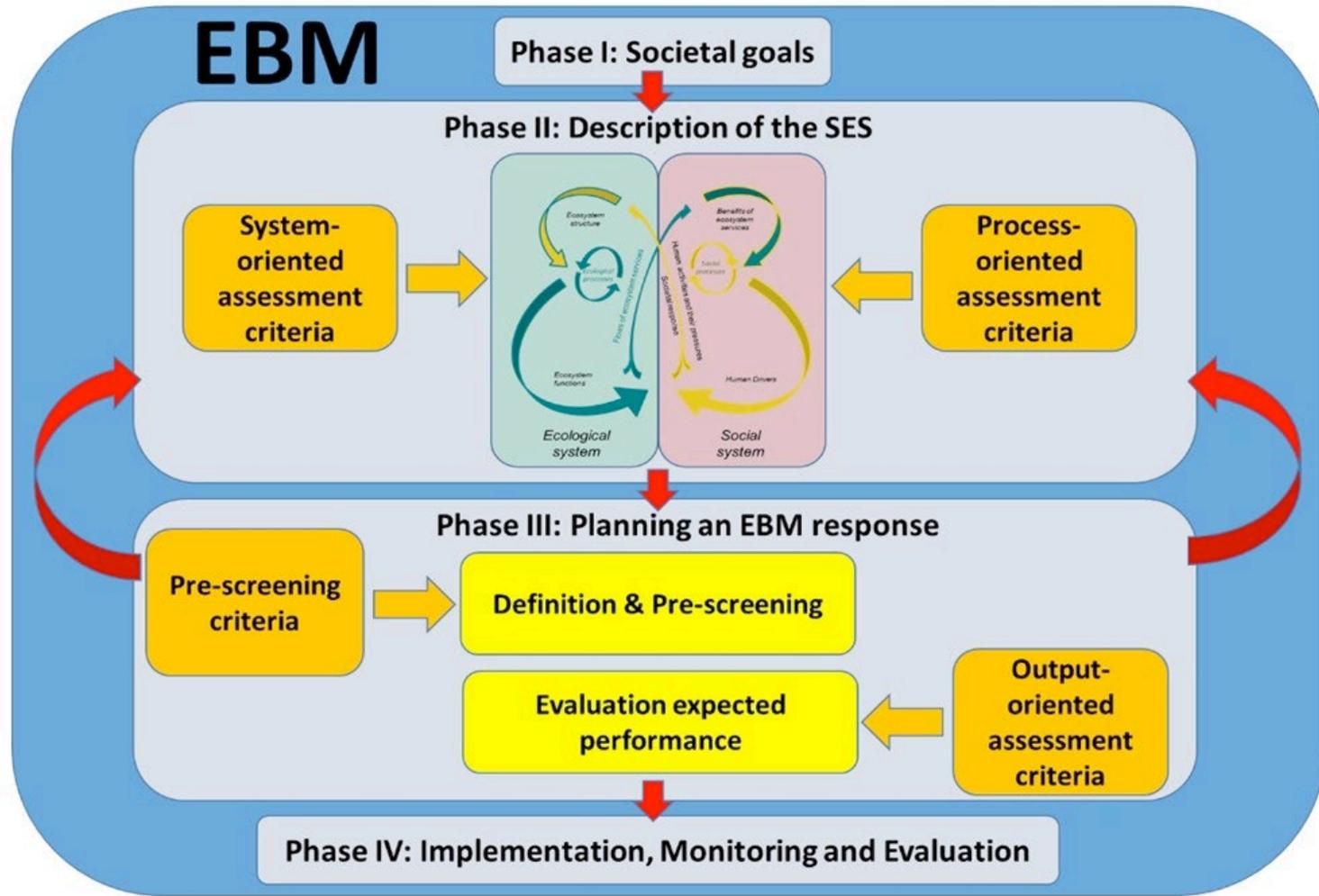


Image source: Making ecosystem-based management operational - Report and Executive Summary, Deliverable 8.1

Human well-being: social-ecological systems

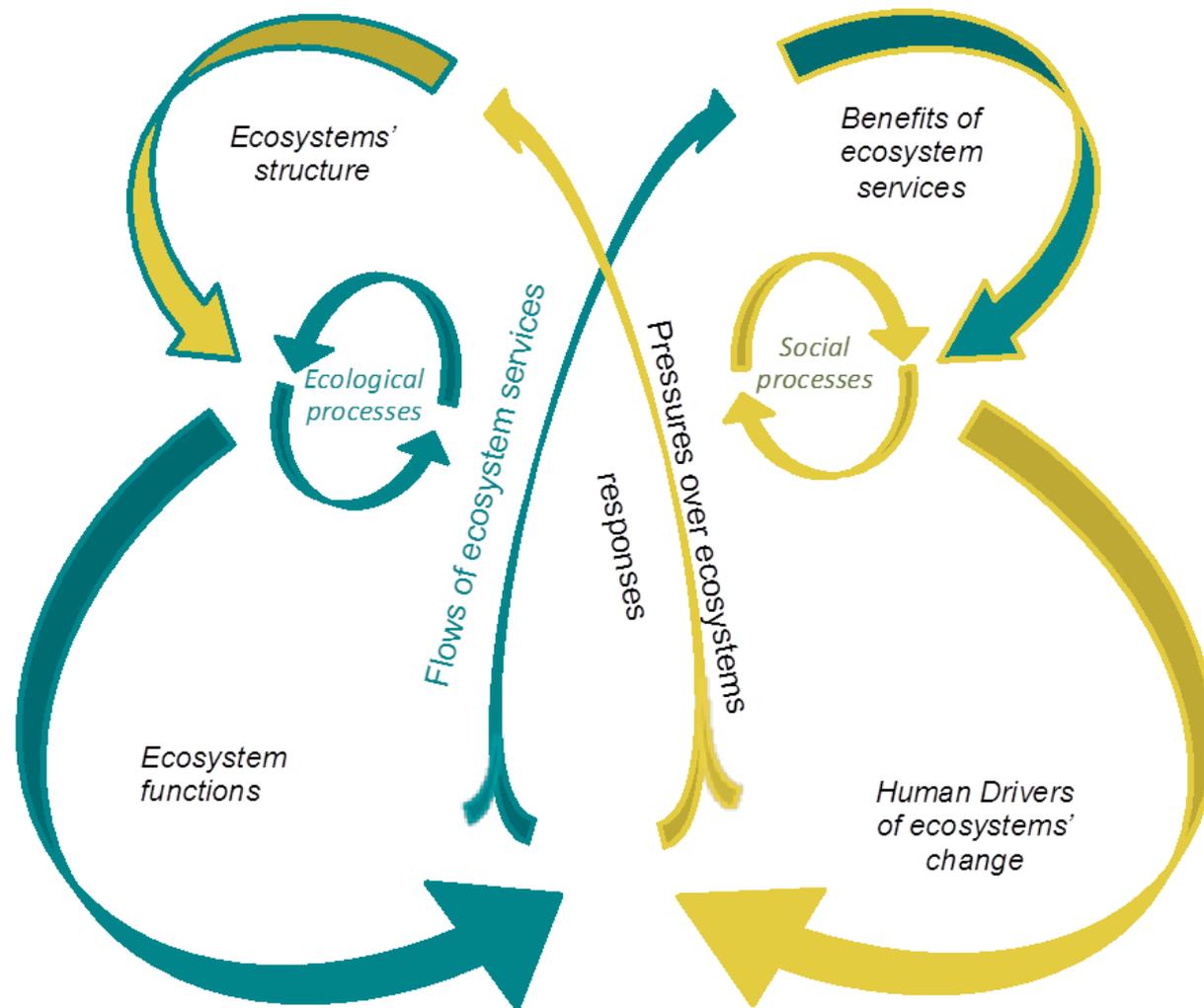
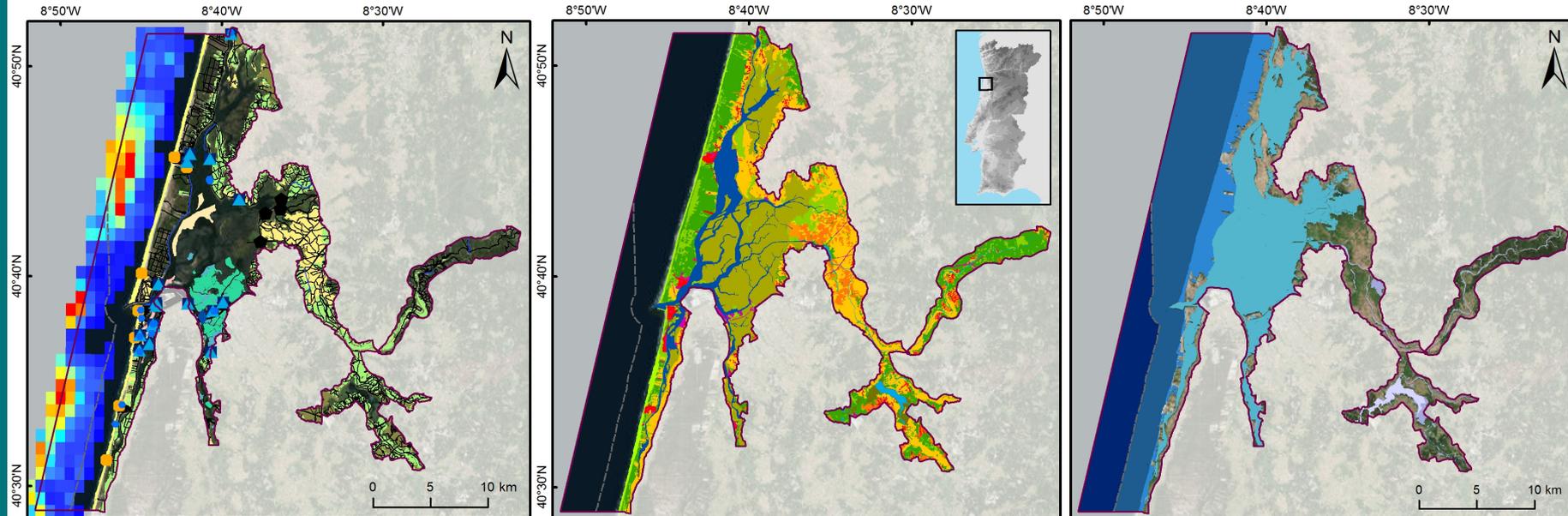


Image source: Deliverable 3.2: The AQUACROSS Assessment Framework and Executive Summary

The social-ecological system



Activities

- Boating without engine
- ▲ Boating with engine
- ◆ Diving
- Marinas and dock/port facilities
- ⬛ Tidal Sluices
- Public beach
- Angling and sport fishing
- Transport
- Public beach
- Shipping
- Coastal defence
- Urban dwellings
- Fin-fish aquaculture
- Macro-algae aquaculture
- Shellfish aquaculture
- Saltworks
- Bait digging
- Shellfish hand collecting
- Agriculture
- Livestock
- Forestry
- Fishing (h/yr)
- 110.28
- 0.18

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- WFD coastal boundary
- Natura 2000 Study Area

Land Use

- 1.1 Urban fabric
- 1.2 Industrial, commercial and transport units
- 1.3 Mine, dump and construction sites
- 1.4 Artificial, non-agricultural vegetated areas
- 2.1 Arable land
- 2.2 Permanent crops
- 2.3 Pastures
- 2.4 Heterogeneous agricultural areas
- 3.1 Forests
- 3.2 Scrub and/or herbaceous vegetation associations
- 3.3 Open spaces with little or no vegetation
- 4.1 Inland wetlands
- 4.2 Maritime wetlands
- 5.1 Inland waters
- 5.2 Marine waters

Realms

- Lakes
- Rivers
- Wetlands
- Riparian
- Inlets & Transitional
- Coastal Terrestrial
- Coastal
- Shelf
- Agricultural
- Terrestrial Natural
- Urban

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

- Natura 2000 Study Area
- WFD coastal boundary

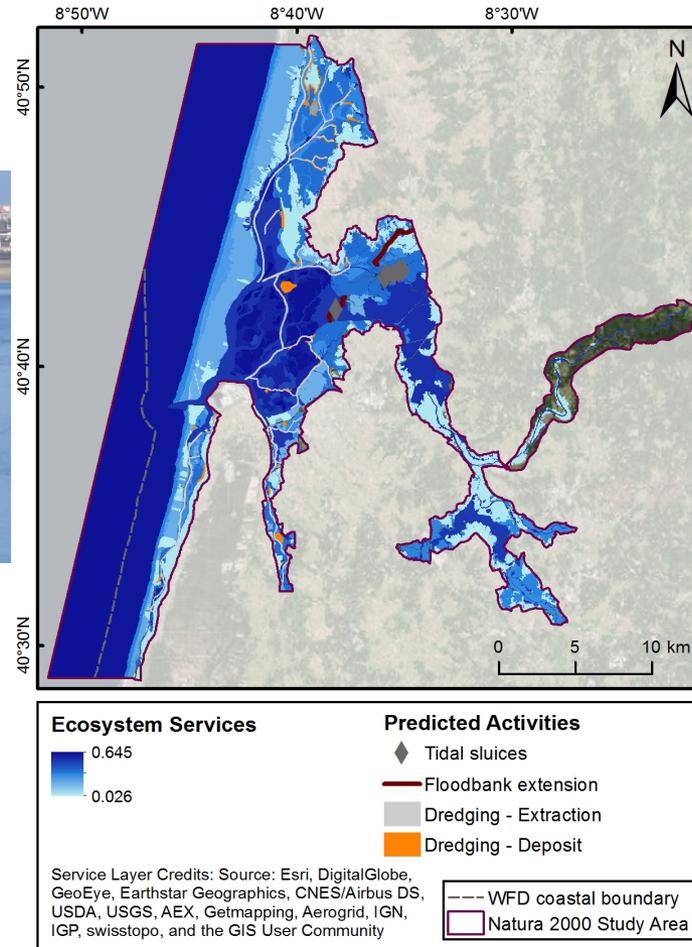
Main Challenge

Mitigate negative unintended impacts on biodiversity in a Natura 2000 freshwater–marine continuum

In 2018/2019, two management interventions will be implemented:



i) a dredging programme to enable hydrodynamic equilibrium and navigability in the lagoon

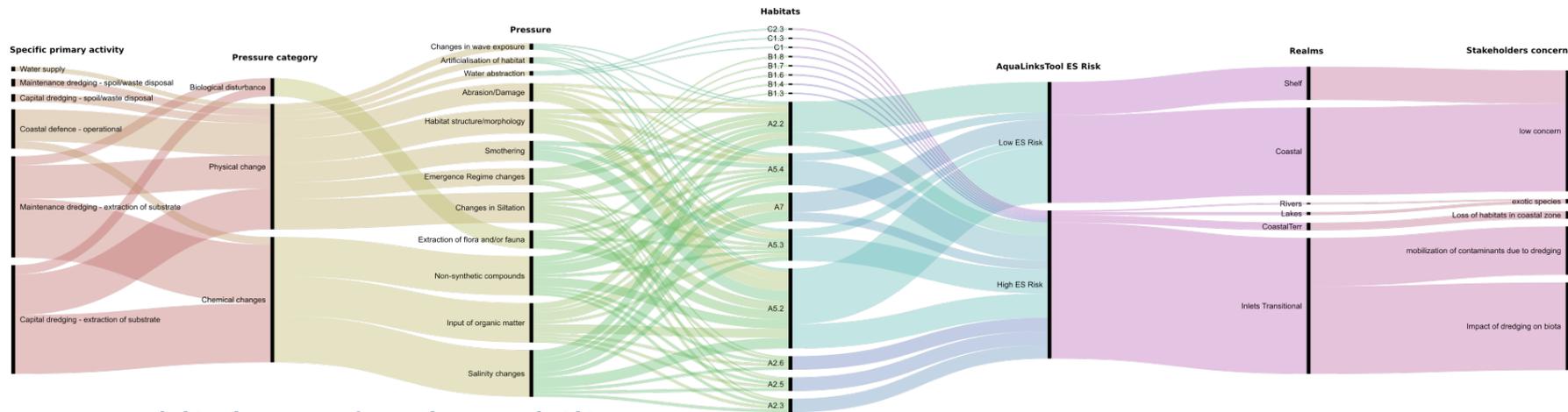


ii) the extension of a floodbank to disable surface saltwater intrusion into Baixo Vouga Lagoon agricultural area.

Both measures are:
Acceptable – political
Feasible – financial incentives
Institutional fitness check – governance

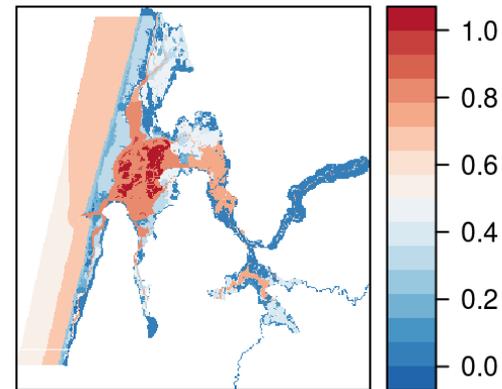
Understand the social-ecological system

- Policy instruments



- Casual links and vulnerability assessment

Linkage framework between Drivers-Pressures-Ecosystem Component-Ecosystem Services vulnerability assessment with AquaLinksTool and the major concern identified by stakeholders



- Spatial Multicriteria Analysis

Stakeholders participatory process on Ecosystem Services valuation

Policy instruments



<i>Selected policy plans and programmes</i>	<i>Objectives</i>	<i>a) Link to EU Policies</i>
<p>River Basin Management Plan (PGBH - RH4) <i>Portuguese Environment Agency (APA/ARHC)</i></p>	<p>Outlines the water planning for the tri-basin region of Vouga, Mondego and Lis, in accordance with WFD</p>	<p>WFD (2000/60/EC)</p>
<p>Sectoral Plan for Natura 2000 Network (PSRN2000) <i>Institute for Nature Conservation and Forests (ICNF)</i></p>	<p>Territorial management tool for the implementation of the national policy for the conservation of biological diversity, aiming at the safeguarding and enhancement of the sites and SPAs of the continental territory, as well as the maintenance of species and habitats in a favourable conservation status in these areas</p>	<p>Birds Directive (2009/147/EC); Habitats Directive (92/43/EEC)</p>
<p>National Water Plan (Decreto-Lei n.o 76/2016) Inter-ministerial Commission for Water management: <i>APA/ARHC; ICNF; Regional Directorate for Agriculture and Fisheries (DRAP); Directorate-General for Marine Resources (DGRM)</i></p>	<p>Governmental cross-sectoral management for the next 10 years: Increase water productivity and promoting its rational use, with maximum respect for the territorial integrity of the river basins; Protection, conservation and rehabilitation of water resources and associated ecosystems; Meeting the needs of the population and the country's economic and social development; Respect for relevant national and Community legislation and satisfaction of the international commitments assumed by the Portuguese State; Access to information and participation of citizens in the management of water resources</p>	<p>WFD (2000/60/EC) Floods Directive (2007/60/EC) MSFD (2008/56/EC)</p>
<p>National Strategic Plan for Tourism (PENT) <i>Ministry of Economy and Innovation</i></p>	<p>Serves as the basis for the implementation of a series of initiatives aimed at fostering sustained growth of national tourism over the coming 10 years, and guiding the activities of Portugal National Tourism Authority, as the key public body for the sector.</p>	<p>EU strategy for a smart, sustainable and inclusive growth (COM(2014) 85 final, 2014/0044)</p>
<p>National Strategic Plan for Climate change adaptation (EN AAC) <i>Ministry of Environment</i></p>	<p>Sets the ground for the need for adaptation. Contains the National adaptation strategy, and the associated action plan, including reducing vulnerability and increasing the response capacity.</p>	<p>EU Strategy on Adaptation to Climate Change (COM (2013) 216)</p>

<i>Selected policy plans and programmes</i>	<i>Objectives</i>	<i>b) Link to Regional/local Policies</i>
<p>Polis Litoral Ria de Aveiro APA/ARHC; ICNF</p>	<p>Integrated Operations of Rehabilitation and Recovery of Coastal Areas. Strong collaborative work between central administration and the Ria de the Aveiro Region Inter-municipal Community (CIRA)</p>	<p>This study Address the regional policy instruments</p>
<p>Coastal Zone Management Programme Ovar – Marinha Grande (POC-OMG) APA/ARHC</p>	<p>Reconcile the various conflicts of uses of the coastal zone, promoting the articulation of environmental, economic and social factors related to coastal management.</p>	<p>Contribute to the Vouga estuary management plan Contribute to the Regional strategy for</p>
<p>Vouga Estuary Plan (PE Vouga – not yet developed) APA/ARHC</p>	<p>Territorial planning tool, which establish appropriate measures for the protection and valorisation of water resources in the area to which their sustainable (RIS3 - approved) in a secure manner, linking the Public Administration and users.</p>	<p>from the operationalization and (RIS3 - approved)</p>

Key Stakeholders



Policy / Governance

<i>Environment</i>	APA/ARHCentro - Portuguese Environmental Agency
<i>Fisheries and Agriculture</i>	ICNF - Institute for Nature Conservation and Forests
<i>Marine</i>	DRAPC - Centro Region Department of Agriculture and Fisheries
	DGRM - Directorate-general for Natural Resources, Safety and Maritime Services

Business

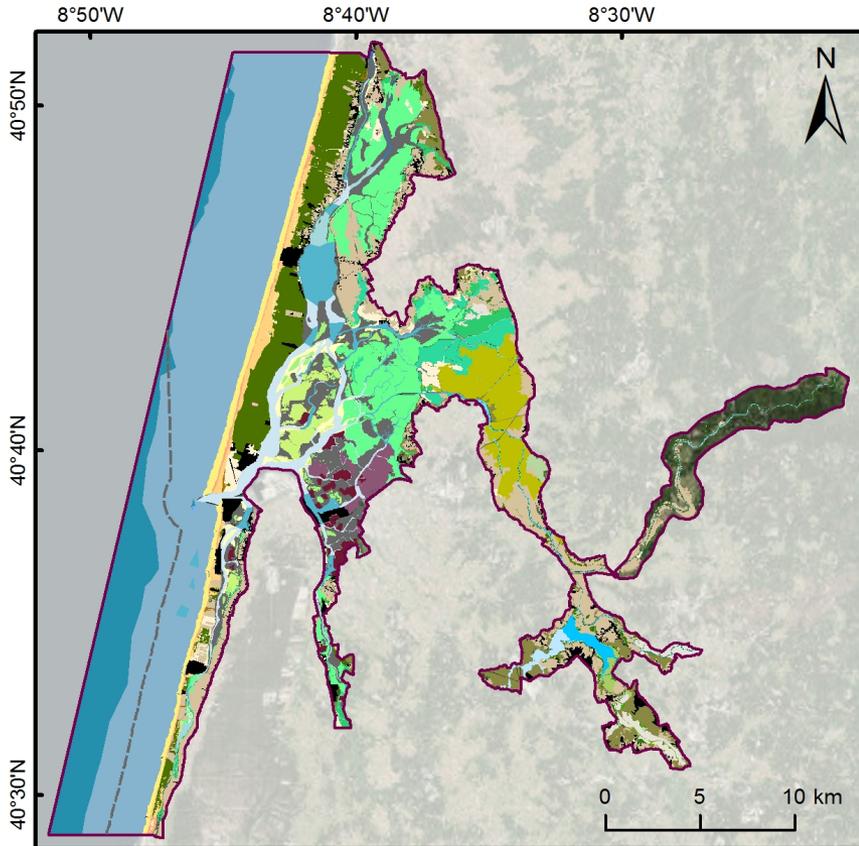
<i>Industry</i>	Portucel - The Navigator Company
<i>Tourism</i>	Incrível Odisseia - Moliceiros boat rides
	Sterna - Solar boat tours and bird watching
<i>Agriculture</i>	ABBVL - Association of Beneficiaries of Baixo Vouga Lagunar
	ACRM - Association of Breeders of Marinhoa Breed
	ALDA - Association of Agriculture of the District of Aveiro
<i>Fisheries</i>	APARA - Artisanal Fishing Association of the Region of Aveiro
<i>Aquaculture</i>	APA - Portuguese aquaculture association
<i>Services</i>	APA - Port of Aveiro Administration (APA)

Public Administration

<i>Regional Administration</i>	CCDRC - The Centro Regional Coordination and Development Commission
<i>Municipalities within the Natura 2000 classified area</i>	CIRA - Inter-municipal Community of the Aveiro Region
<i>Parish within the Natura 2000 classified area</i>	Águeda, Albergaria-a-Velha, Anadia, Aveiro, Estarreja, Ílhavo, Mira Murtosa, Oliveira do Bairro, Ovar and Vagos. E.g., Angeja, Avanca, Beduído & Vieiros, Bunheiro, Cacia, Canelas & Fernelã, Esgueira, Espinhel, Fermentelos, Gafanha Da Boa Hora, Gafanha Da Encarnação, Gafanha Da Nazaré, Gafanha Do Carmo, Glória & Vera Cruz, Murtosa, Óis da Ribeira, Ouca, Ovar Union of parishes, Pardilhó, Requeixo, Salreu, Santo André De Vagos, São Jacinto, São Salvador, Sosa, Torreira, Vagos & Santo António De Vagos, Válega.

Other

<i>Local associations</i>	À VELA - Sailing club
	ADERAV - Association for the study and protection of the Natural and Cultural Heritage of Aveiro Region
	CCPAV - Hunting and Fishing Club of Aveiro/Vouga
<i>Non-governmental organizations (NGO's)</i>	FAPAS - Fund for the Protection of Wild Animals
	GEOTA - Study Group on Spatial Planning and Environment
	LPN - League for the Protection of Nature
	SPEA - The Portuguese Society for the Study of Birds
	ASPEA - Portuguese Association of Environmental Education



Habitats and Ecosystem Services

Habitats

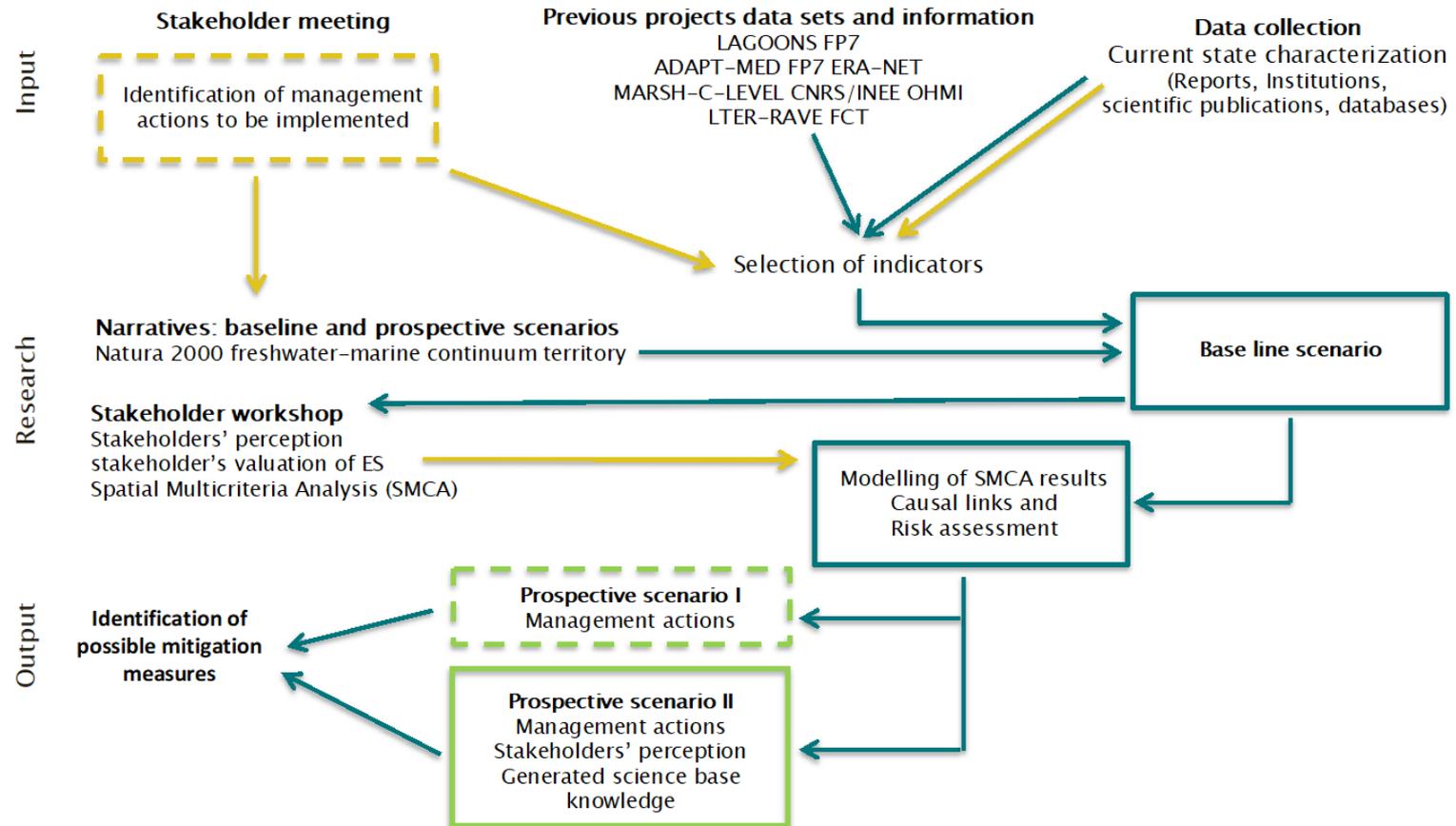
A2.2	A5.22	A5.33	C1.3	G1.22	J2
A2.22	A5.23	A5.43	C2.3	G1.31	J5.11
A2.3	A5.23*	B1.3	C3.21	G1.7	J5.12
A2.5	A5.24	B1.4	C3.22	G5.1	X10
A2.535	A5.24*	B1.6	E5.44	G5.4	Unknown riparian
A2.53C	A5.25	B1.7	G1	I1.1	
A2.554	A5.25*	B1.8	G1.1	I1.4	
A2.61	A5.32	C1	G1.21	I1.53	

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Natura 2000 Study Area
 WFD coastal boundary

Scenario development workflow

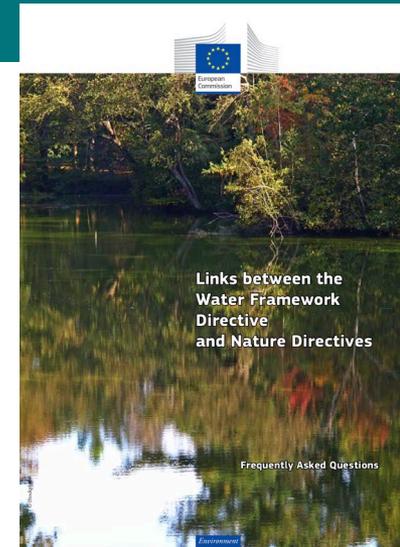
Scenario development workflow



Ecosystem Based Management co-developed solutions

Overall policy instruments applicable to water-dependent Natura 2000 sites

- ❖ Harmonised WFD and HD monitoring programmes



Case study specific policy plans and programmes

- ❖ Development of the Vouga estuary management plan



Planos de Ordenamento de Estuários

Políticas > Água > Ordenamento > Planos de Ordenamento de Estuários

Os Planos de Ordenamento dos Estuários, abreviadamente designados por POE, são planos especiais de ordenamento do território que consagram as medidas adequadas à protecção e valorização dos recursos hídricos na área a que se aplicam de modo a assegurar a sua utilização sustentável, vinculando a Administração Pública e os particulares.

- ❖ Engage local users and landowners in the restoration actions



- ❖ Promote the value of ecosystems services provided by tidal wetlands

- ❖ Restoration of tidal wetlands, namely saltmarshes and seagrasses



<http://www.tampabaywatch.org/salt-marsh.html>



<http://seagrassrestoration.net/zostera-restoration-in-nz/>

- ≡ Ria de Aveiro region illustrates the challenges of an EBM planning process in a Natura 2000 freshwater–marine continuum territory.
- ≡ The applied approach follows a stepwise procedure in line with resilience principles where:
 - 1) the baseline condition was framed taking into account the foreseen management measures under implementation in 2018/19
 - 2) the objectives were formulated considering the undesirable pressures, as side effects of the dredging programme and the extension of the floodbank

- 3) the screening of measure and instruments took into account the articulation between ecological and social components, combining fundamental and applied sciences;
- 4) the narrative reflecting the foreseen management measures, the stakeholders' perception on ES valuation through spatial multi-criteria analysis and the generated science-based knowledge supported the planning EBM response that consist in saltmarshes and seagrasses meadows restoration programs;
- 5) the proposed measures were evaluated through EBM criterion regarding policies and feasibility, showing that compliance is achievable.

- ≍ Biodiversity is interlinked with habitats, namely with aquatic habitats, and in most coastal territories habitats cannot be dissociated from human activities and well-being.
- ≍ Therefore, Natura 2000 sites require an active and sustainable management involving the integration of science-based knowledge, environmental related policies and people holding stakes.
- ≍ In the case of Ria de Aveiro region the proposed EBM response can contribute to the Vouga estuary management plan (not yet developed) and the regional strategy for smart specialization (RIS3 Centro).



Thank you!



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Ecosystem-based management planning across aquatic realms at the Ria de Aveiro Natura 2000 territory



Ana I. Lillebø^{a,*}, Heliana Teixeira^{a,*}, Mariana Morgado^a, Javier Martínez-López^b, Asya Marhubi^c, Gonzalo Delacámara^c, Pierre Strosser^d, António J.A. Nogueira^a

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universidade de aveiro
departamento de biologia



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