

PML

Plymouth Marine
Laboratory

Listen to the ocean

Application of Ecosystem Service Assessment: 3 case studies

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Why use Ecosystem Services Assessment in Policy and Management?

1. Increasing human activity and conflicts:

Renewables; Shipping; Recreation and Leisure; Fisheries; Aggregate extraction; Conservation

2. Complex policy:

EU Marine Strategy Framework Directive; EU Maritime Strategy; UK Marine and Coastal Access Act 2009; WFD; Energy policy & legislation etc.

3. Variety of organisations:

Marine Management Organisation (MMO), Defra, DfT, DECC, EU, NGO's, Natural England, CCW, Marine Scotland, Crown Estate...

Barriers to using Ecosystem Service Assessment in Policy and Management

- Values not robust enough
- Poor understanding – particularly of uncertainties and aggregation issues
- Confusion in terminology
- Expectations
- Spatial, temporal and problem specificity
- Expense
- Inflexible regulatory frameworks
- Application poorly documented

Ecosystem Service (ES) Assessment



Conceptual diagram illustrating the ecosystem services provided by oceans and the ways in which humans depend on oceans.

Symbols library courtesy of the Integration and Application Network (ian.umces.edu/symbols), University of Maryland Center for Environmental Science.

Conceptual diagram illustrating the ecosystem services provided by oceans and the ways in which humans depend on oceans. Diagram courtesy of the Integration and Application Network (ian.umces.edu), University of Maryland Center for Environmental Science. Source: Samonte G, Karer L, Orbach M. 2010. *People and Oceans*. Science and Knowledge Division, Conservation International, Arlington, Virginia, USA.

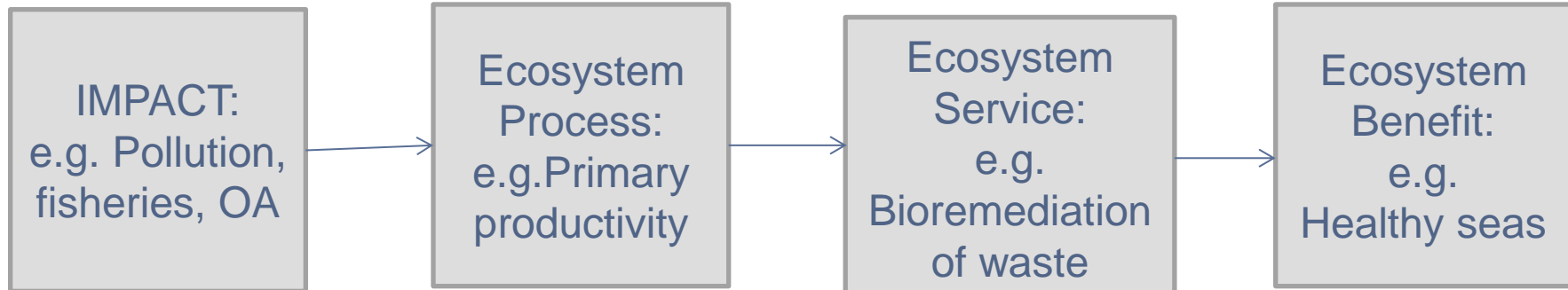
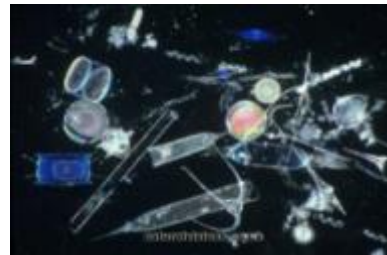
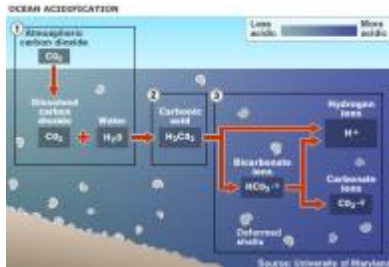
“the aspects of ecosystems utilised (actively or passively) to produce human well-being” (Fisher et al. 2009)

Ecosystem Service Assessment

UK National Ecosystem Assessment



RESILCOAST



UK National Ecosystem Assessment

Independent and peer-reviewed assessment of UK ecosystems

Raise awareness of the importance of the natural environment to human well-being and economic prosperity

Ensure **stakeholder participation** and **academic inter-disciplinary cooperation**

UK NEA Broad Habitats (ecosystems)

1945 – present - 2060



Freshwater, wetlands
and floodplains



Urban



Marine



**Coastal margins
(>mean high tide)**



Mountains, moors and
heathlands



Semi-natural grasslands



Enclosed farmland

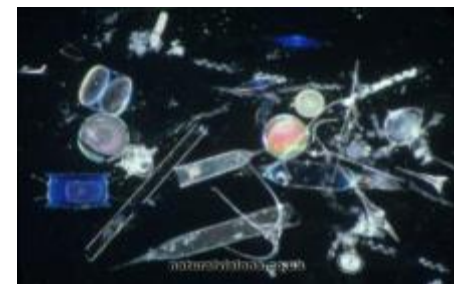
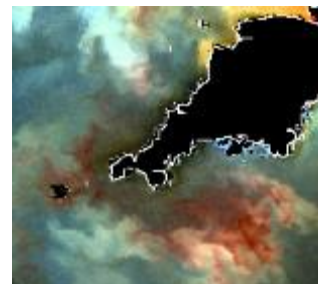


Woodland

Service	Method	Units	Time Series	Values
Fisheries (2008 prices)	Market prices	UK tonne/yr	1948 - 2000	1948: 1.2 million tonnes/yr 2000: 0.5 million tonnes/yr
		UK £/yr		1938: £1465 million/UK/yr 2008: £596 million/UK/yr Decrease of £869 million/UK/yr
		UK £/tonne	1956 - 2008	Demersal 1956: £1026/tonne Demersal 2008: £1119/tonne Pelagic 1956: £404/tonne Pelagic 2008: £561/tonne Shellfish 1966: £1488/tonne Shellfish 2008: £1796/tonne



Service	Method	Units	Time Series	Values
Carbon sequestration – coastal margin	Avoided damage cost	tCO ₂ /yr	1945 - 2060	Saltmarsh: Decrease of 34, 774 tCO₂/yr
		£/ha/yr	2010	Saltmarsh: £60.63 – 622.30/ha/yr
		£/UK/yr	2010 - 2060	Saltmarsh: 2010: £11.93 million/UK/yr 2060: £63.22 million/UK/yr Increase of £51.29 million/UK/yr
Carbon sequestration - marine	Avoided damage cost	tCO ₂ /yr	1961 - 2050	Variable, no clear trend
		£/UK/yr	2004 - 2050	2004: £6.74 billion/UK/yr 2050: £32.35 billion/UK/yr Increase of £25.61 billion/UK/yr



Service	Methods	Units	Time Series	Values
Disturbance prevention	Cost savings	£/ha £/ha/yr	2010	Saltmarsh: Capital costs: £0.47 – 0.94 million/ha Maintenance costs: £9400/ha/yr
		£/UK/yr	1945 - 2060	Saltmarsh: 1945: £481million/UK/yr 2060: £418 million/UK/yr Decrease of £63million/UK/yr

Impact of UK National Ecosystem Assessment

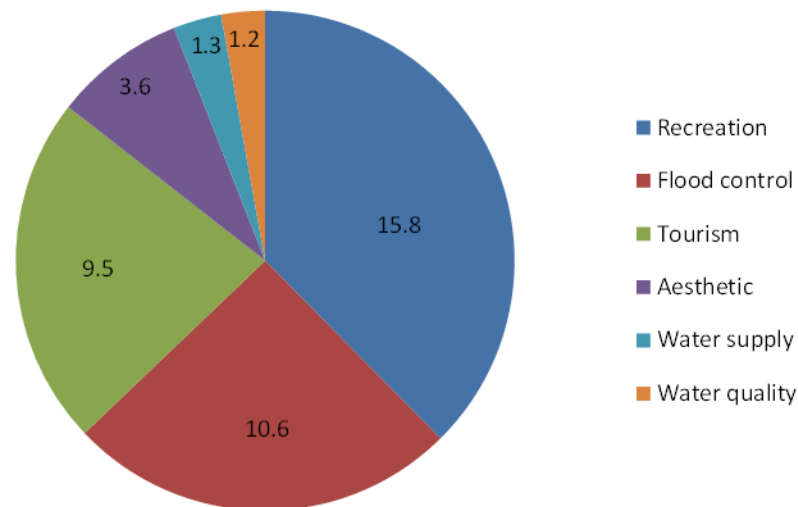
UK Natural Environment White Paper

- ✓ Natural Capital Committee – State of UK natural capital
- ✓ International coalition of business, to help business understand and address environmental impacts
- ✓ Nature Improvement areas (NIA)

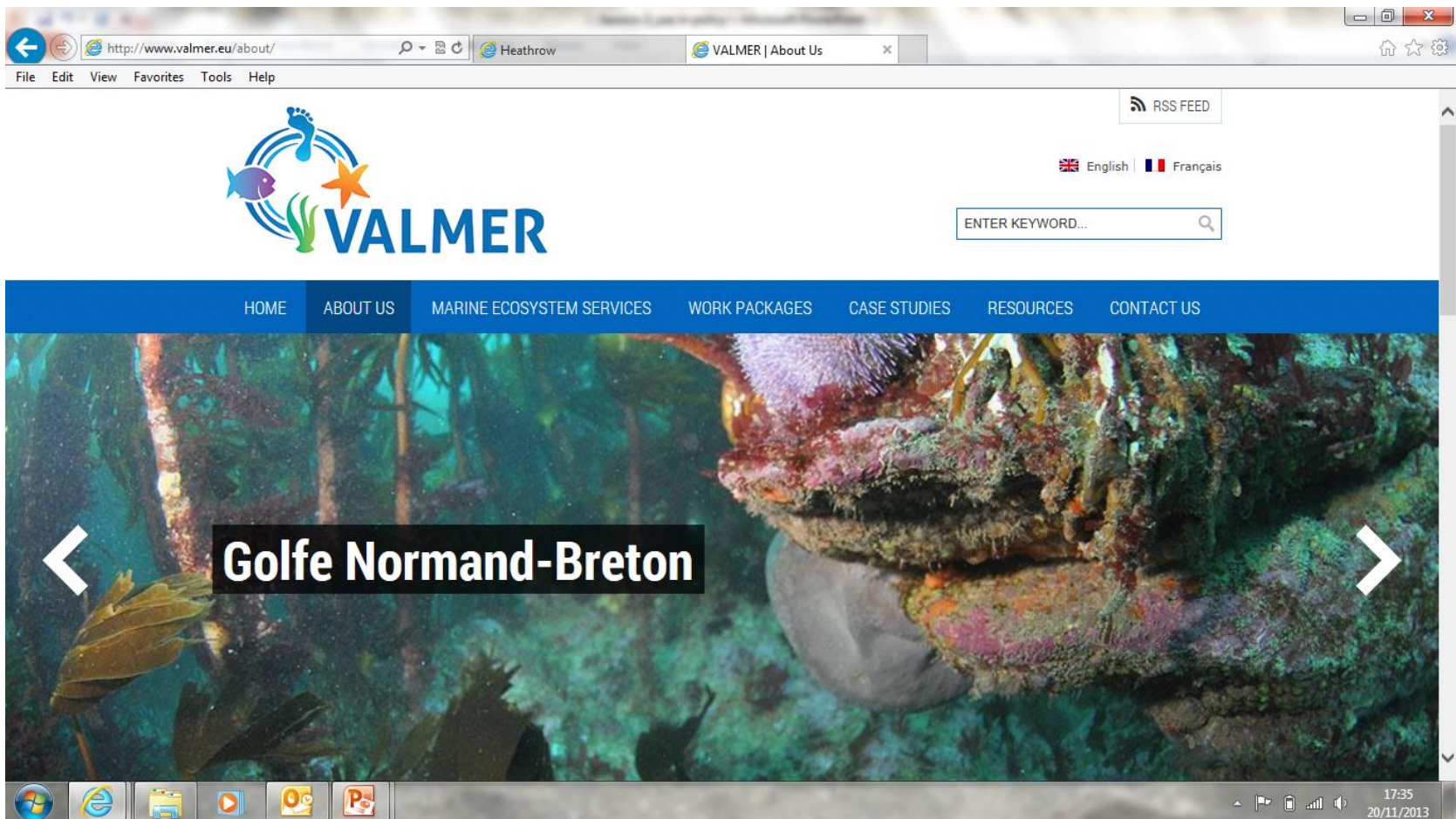
But what about decision making at a local level?

Current Model

- Drive by county councils for “balance sheets”
- An economic assessment of the contribution to human well-being by ecosystem services from terrestrial habitats on the Isle of Man (Brander and McEvoy 2013)
- Figure 1. Summary of total annual values for six ecosystem services (£ millions)



VALMER aims to examine how improved marine ecosystem services assessment can support effective and informed marine management and planning (eleven partner, €4.7 million project INTERREG IV A Channel Programme co-funded)



North Devon



Sub-tidal
benthic
habitats

Golfe Normand-Breton



Intertidal
and sub-tidal
habitats

Poole Harbour



Recreation
activities

1 North Devon



UK

English Channel

La Manche

Cherbourg

Caen

Granville

Saint-Malo

Saint-Brieuc

Brest

Vannes

FRANCE

PNMI

PNMI

3 Plymouth Sound - Fowey

2 Poole Harbour

4 Golfe Normand-Breton

5 PNMI

6 Golfe du Morbihan

PNMI



Kelp habitats

Plymouth Sound - Fowey



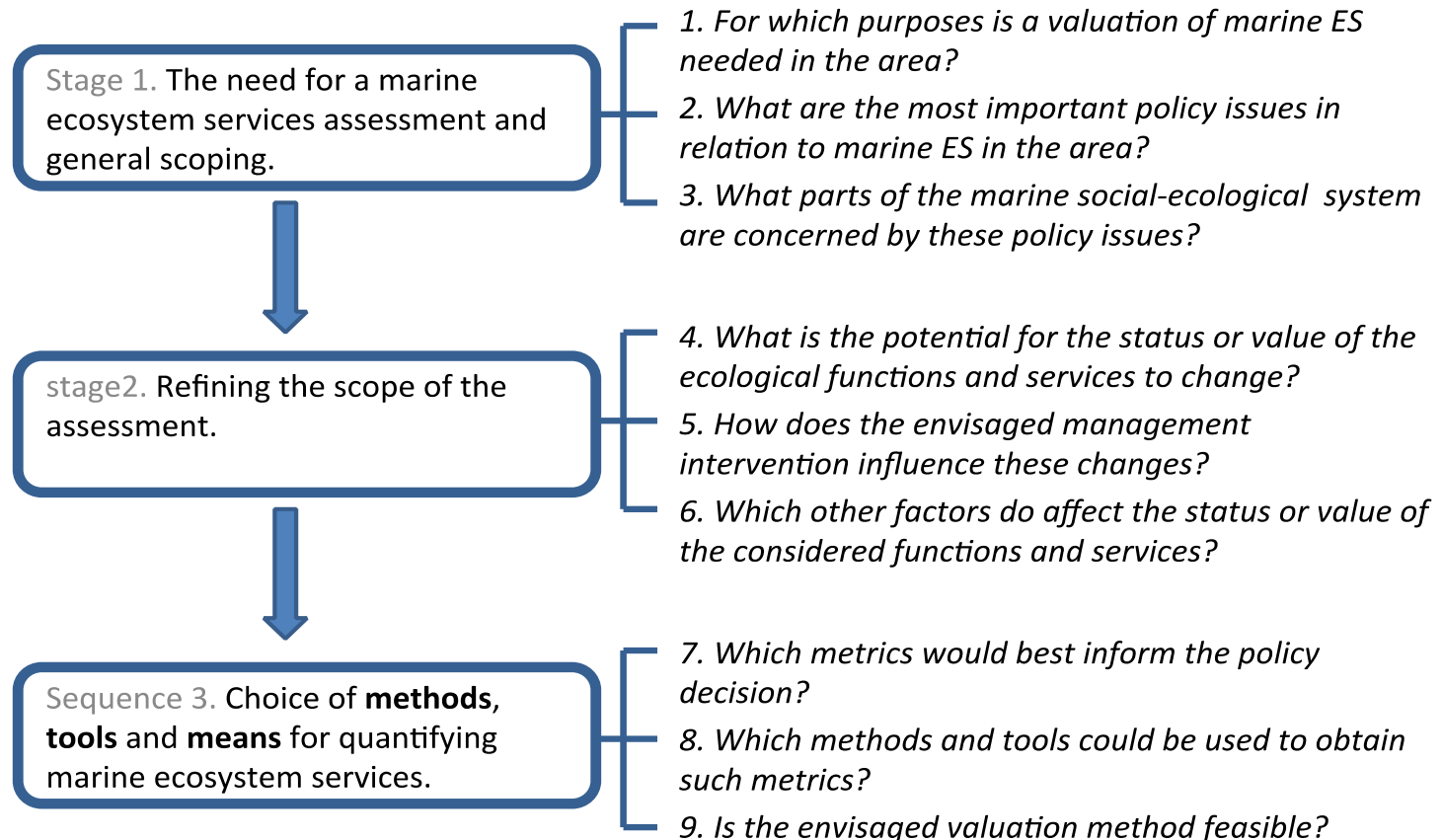
Intertidal
and sub-tidal
habitats

Golfe du Morbihan



Seagrass
habitats

The Triage Approach



Case Study Overview

	NDMR	Poole Harbour	Sound - Fowey	Golfe Normand-Breton	PNMI	Golfe du Morbihan
Aim	Design management options	Improve knowledge	Initial diagnosis	Initial diagnosis; Exploratory scenarios	Compare Management options	Raising awareness
Habitat	Benthic offshore	Mixed (Harbour)	Mixed (coastal and offshore)	Intertidal zone; fish habitats	Kelp forests	Seagrass beds
Issue	Impact on benthic habitats	Recreational Use	Mixed	Increasing demand of all uses	Increasing demand for kelps	Improve seagrass preservation
Services	Fisheries, nutrient cycling, carbon cycling	Recreation	Varied	Recreative services, Provisioning services	Food, remarkable species, ecotourism	Maintenance and regulation services
Methods	B.B.Networks , MCA	TCM, AHP survey	Varied	INVEST Ecosystem accounting	Indicators Dynamic modelling	Choice experiment

VALMER North Devon case study: Modelling change in ecosystem service provision under divergent management scenarios

Led by Olivia Langmead^{1,2} and
Tara Hooper⁴

In collaboration with Wendy Dodds², Laura
Friedrich², Ness Smith², Charly Griffiths¹, Becky
Seeley¹, Steven Guilbert³, Andy Bell³, Tara Hooper⁴

¹ Marine Biological Association, ² Plymouth University,
³ Devon County Council, ⁴ Plymouth Marine Laboratory



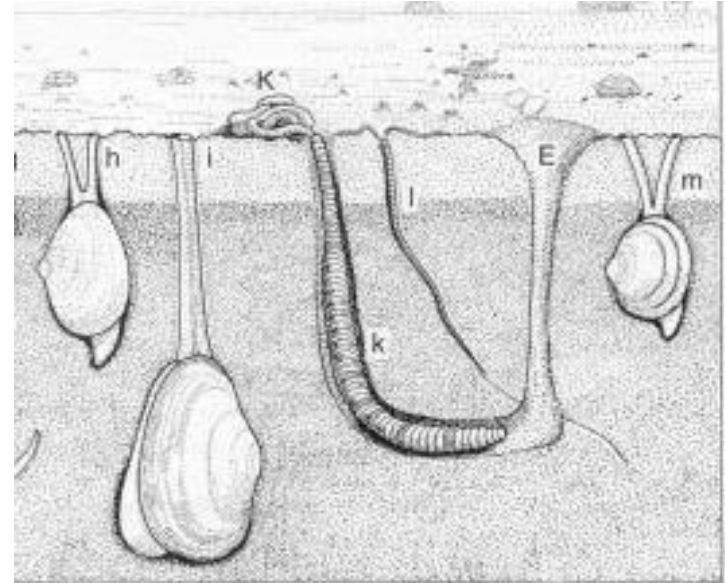
North Devon Benthic Habitats

3 Ecosystem Services:

- Nursery habitats
- Waste processing
- Carbon storage

3 Scenarios:

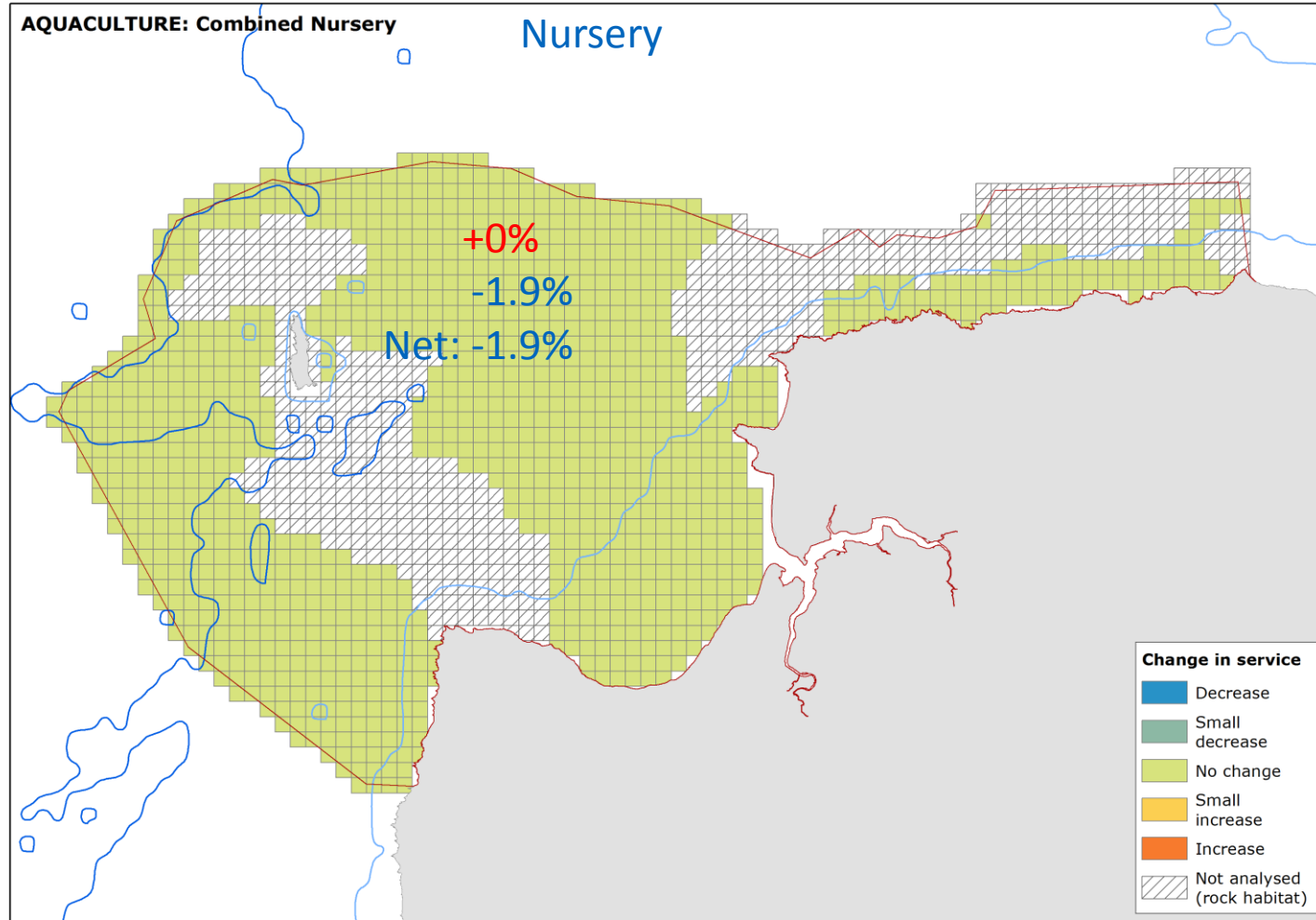
- Aquaculture development
- Aggregate extraction
- Marine conservation zone



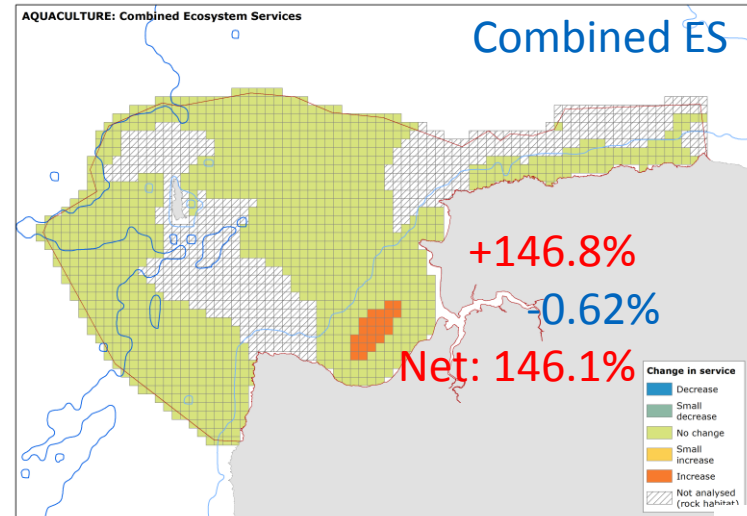
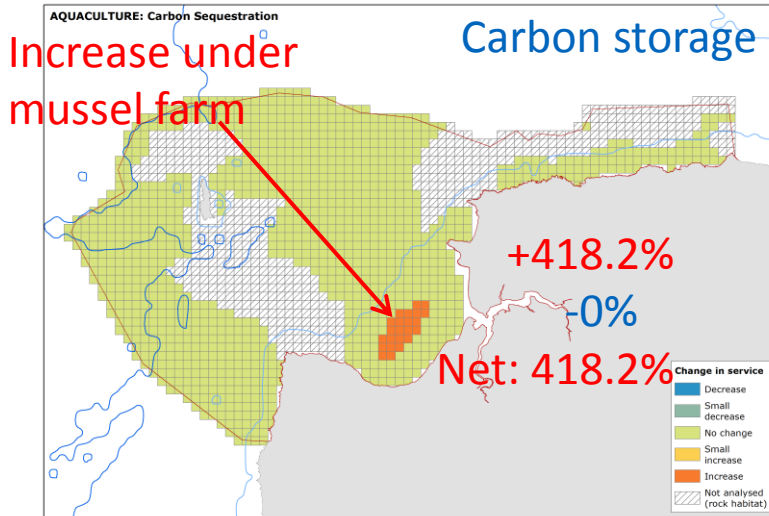
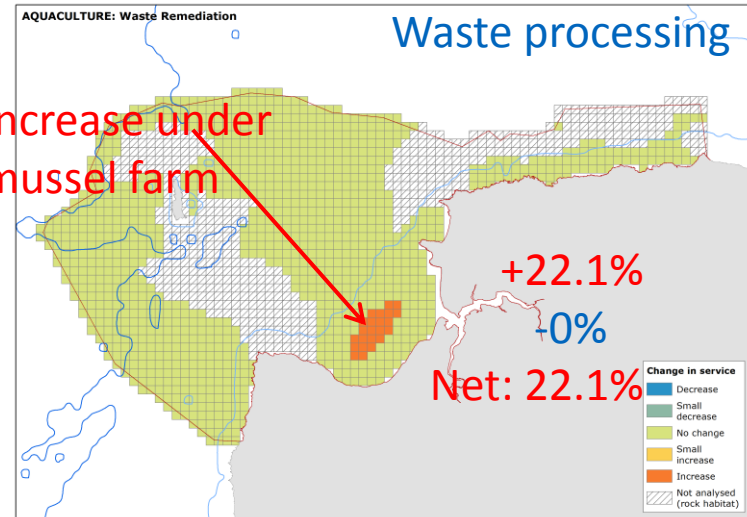
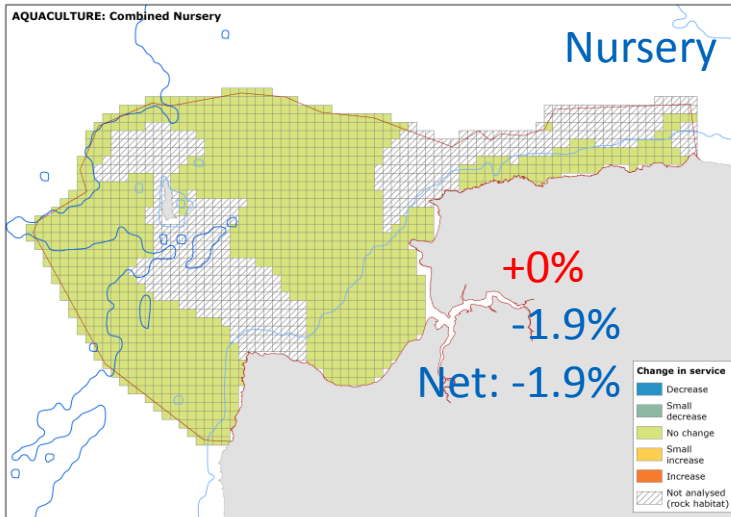
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Scenario: Aquaculture development



Scenario: Aquaculture development

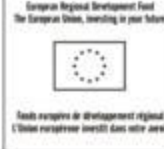


Valmer Legacy

- 🌿 Results
- ★ Data
- 👣 Understanding
- 🐟 Real management impact
- 🐟 Lessons Learned
- Relationships

www.valmer.eu





Protected Area Network Across the Channel Ecosystem



Marine Management Organisation



Les projets VALMER et PANACHE ont été sélectionnés par le programme européen de coopération transfrontalière INTERREG IV A France (Manche) – Angleterre co-financé par le FEDER.

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- Values not robust enough
- Poor understanding – poor communication and aggregation issues
- Confusion in terms
- Expectations
- Spatial, temporal
- Expense
- Inflexibility
- Application

1. NEA

2. Local

3. Valmer

Lessons Learned:
www.valmer.eu

4. ??