

Valuing Change in UK Seas

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Creating sustainable solutions for the marine environment



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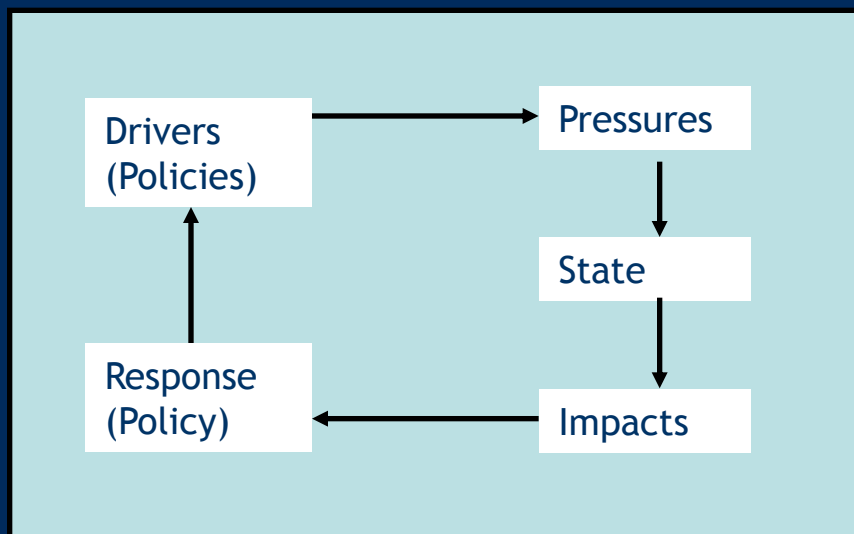
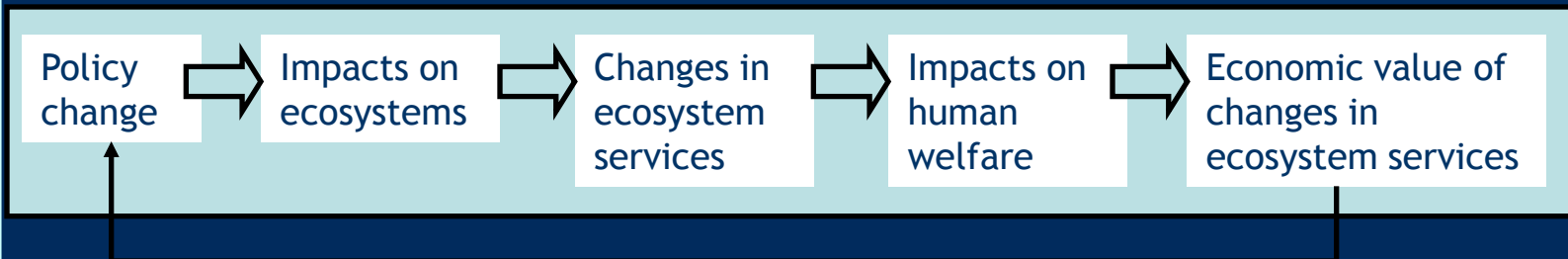
Aim of the study

- To develop a framework that can assess the impact of policy decisions on the value of UK Seas, taking into account the full range of values (Total Economic Value) and employing an ecosystem services approach
- This will help assist The Crown Estate (and other bodies with governance responsibilities) to ensure that the marine estate is developed sustainably:
 - Living within Environmental Limits
 - Ensuring a Strong, Healthy and Just Society
 - Achieving a Sustainable Economy



Assessing the impacts of policies - existing frameworks

From TEEB (The Economics of Ecosystems and Biodiversity) 2009



Stages of study

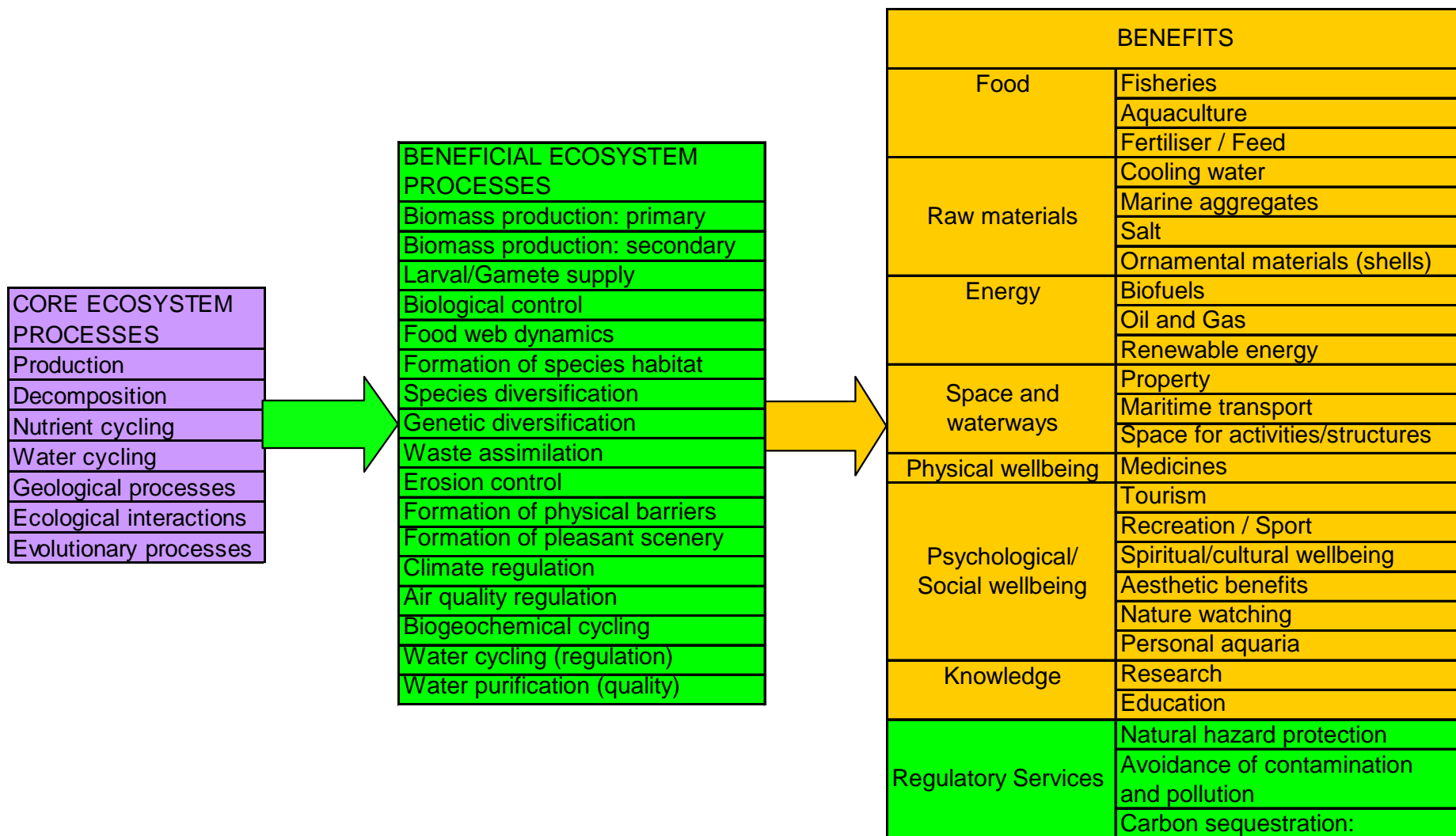
1. Scoping study - What are the units of valuation?
 - Ecosystem services models
2. Static baseline assessment - What is the value of UK Seas as at 2008?
 - Based on refined version of Productive Seas Evidence Group assessment for Charting Progress 2
3. Dynamic baseline assessment - How could baseline values change over time?
 - Uncertainty managed through the use of development scenarios
4. Spatialisation assessments - Where are values distributed and how could this distribution change over time?
 - GIS exercise

Stage 1. Development of an appropriate Ecosystem Services Model

The Millenium Ecosystem Assessment model:

- **Provisioning services**
e.g. generation of resources used as food and fuel
- **Regulating services**
e.g. regulation of air quality, control of pests and diseases
- **Cultural services**
e.g. spiritual/artistic inspiration, institutions surrounding resources
- **Supporting services**
e.g. photosynthesis, nutrient cycling

A Marine Ecosystem Services Model



Stage 2. Static baseline values

1. Built on the Productive Seas Evidence Group (PSEG) Feeder Report
2. Aim is to develop indicator values that can be used to assess change. They do not reflect the total value of UK Seas
3. Many constraints and assumptions

Time	Static baseline (2008 £millions)	Measure
Fisheries	520	GVA
Aquaculture	147	GVA
Fertiliser and Feed	90	Turnover
Marine aggregates	31	GVA
Cooling water	100	Replacement value
Oil and Gas	37000	GVA
Renewable Energy	62	Avoidance cost (of CO ₂)
Biofuels	10	Avoidance cost (of CO ₂)
Maritime Transport	7100	GVA
Storage for gas	In development	
Telecoms	Unknown	
Tourism & Recreation	3790	GVA
Residents Aesthetic values	unknown	
Spiritual/cultural wellbeing	unknown	
Research and Education	162	Investment
Natural Hazards	Not quantified	
Pollution Avoidance	1000	Avoidance cost
Carbon Sequestration	Not quantified	Avoidance cost (of CO ₂)

Stage 3. Dynamic baseline values

Four development scenarios:

- World markets
- Global commons
- Fortress Britain
- Local stewardship



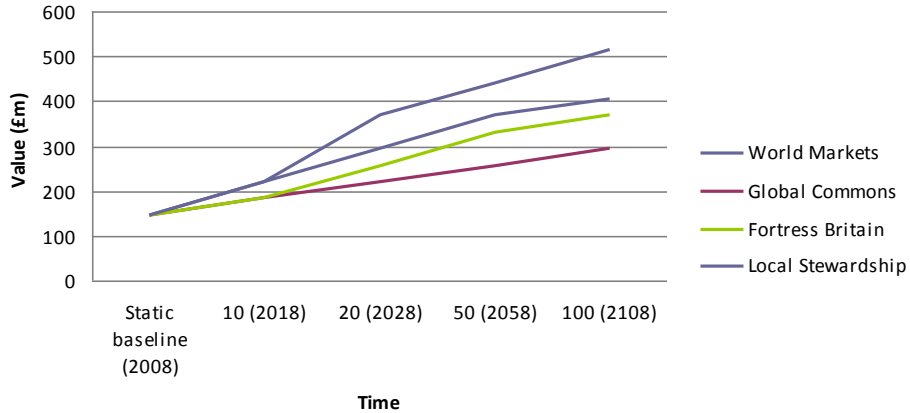
For each service:

- Impact on the service
- Caveats in the assessment
- Trends in supply of and demand for the service
- Confidence in the assessment
- Spatial characteristics
- Interactions with other services

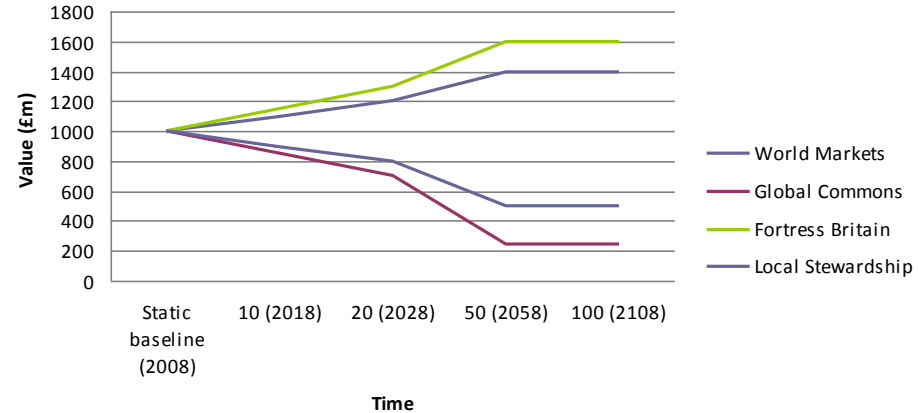
Scenario	Static baseline (2008)	World Markets			
		10 (2018)	20 (2028)	50 (2058)	100 (2108)
Fisheries	520	520	442	130	130
Aquaculture	147	221	368	441	515
Fertiliser and Feed	90	108	153	180	180
Marine aggregates	31	33	34	36	37
Cooling water	100	75	50	45	45
Oil and Gas	37000	31450	25900	3700	0
Renewable Energy	62	186	248	279	310
Biofuels	10	10	10	10	10
Maritime Transport	7100	8165	9230	10650	12780
Storage for gas	<i>In development</i>				
Telecoms	<i>Unknown</i>				
Tourism & Recreation	3790	3790	3411	4548	8338
Residents Aesthetic values	<i>unknown</i>				
Spiritual/cultural wellbeing	<i>unknown</i>				
Research and Education	162	162			
Natural Hazards	<i>Not quantified</i>				
Pollution Avoidance	1000	1100	1200	1400	1400
Carbon Sequestration	<i>Not quantified</i>				

Example of trends

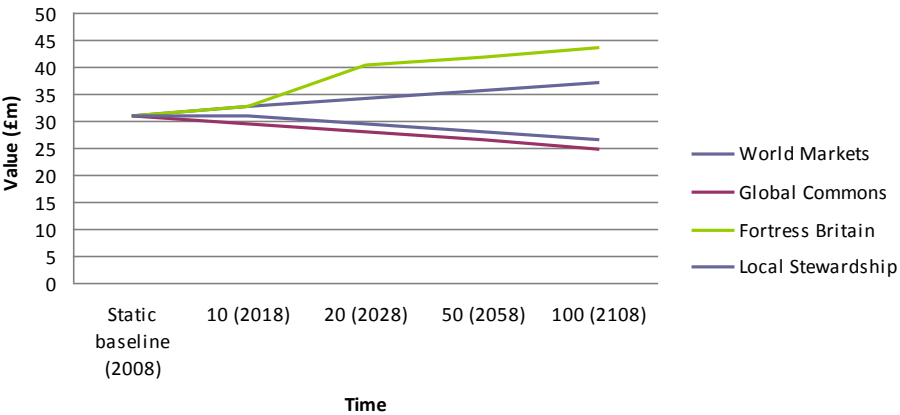
Aquaculture



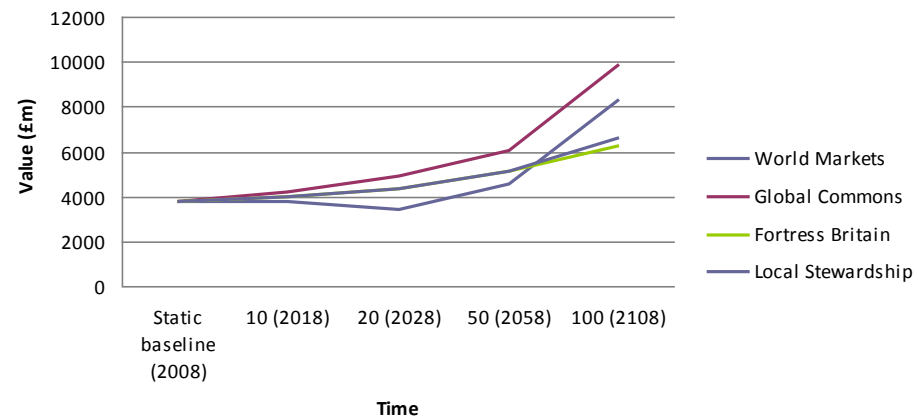
Pollution Avoidance



Marine Aggregates



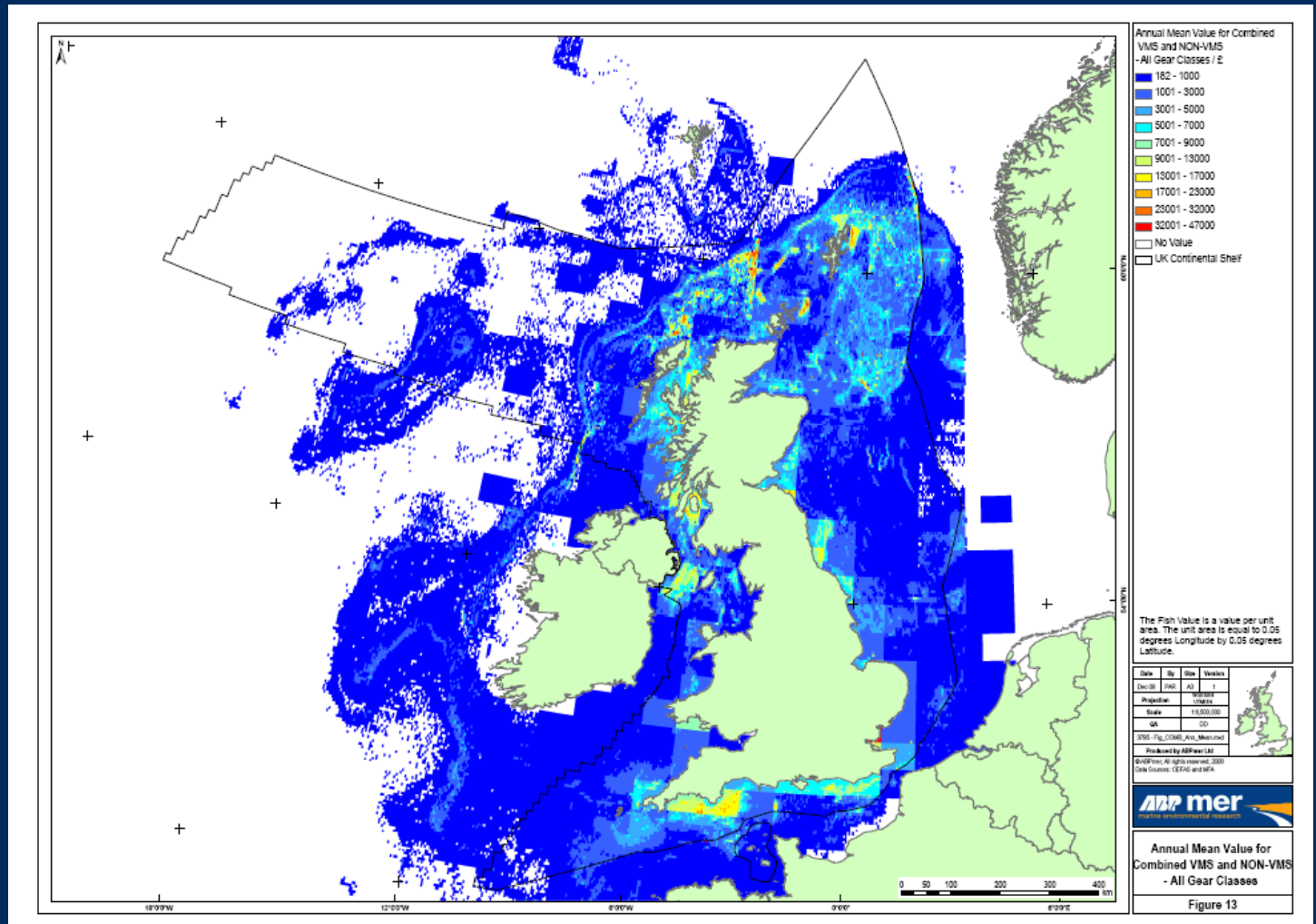
Tourism & Recreation

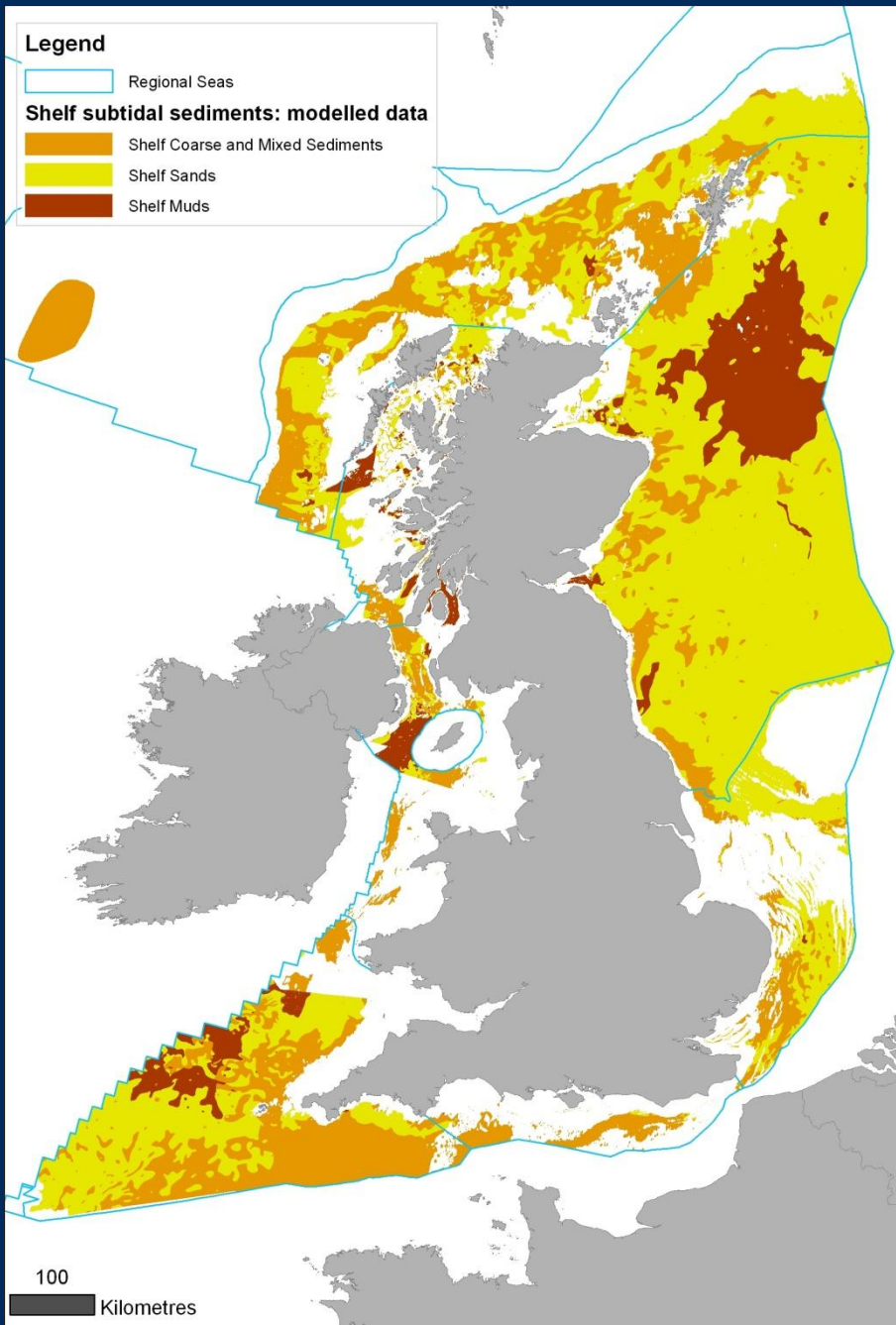


Stage 4. Spatial information on values

- Location of classic provisioning services (e.g. food, raw materials, energy and space) - based on the location of human use activities
- Location of cultural values based on distribution of conservation features, proximity of populations to coast?
- Location of regulatory services (e.g. carbon sequestration, natural hazards) - based on the distribution of relevant sea-bed habitats

e.g. Fisheries





e.g. UK Shelf
Subtidal
Sediments
throughout UK
waters
(JNCC)

Health warnings!!

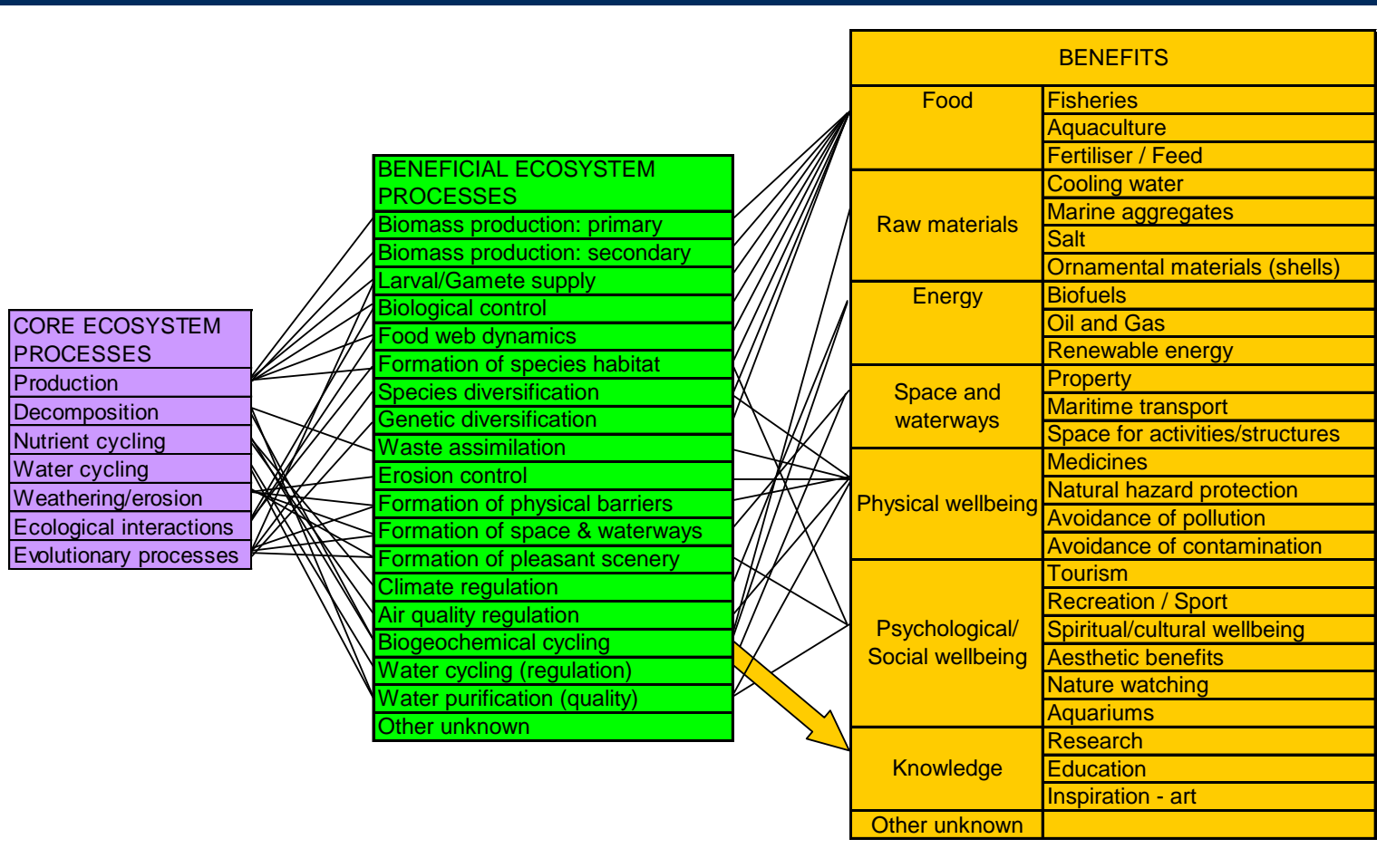
- This is a decision support tool and it is not the only one
- Range of different valuation methods available but they will not capture all aspects of value:
- E.g. Marine Aggregates
 - Direct: £116m turnover in 2007
 - Upstream: 28 vessels with a replacement value of £1 billion (2007)
 - Downstream: Processing - £80m GVA; Sales of concrete product £303m GVA (2005)
 - Employment: 640 in 2008
 - Supports 'Built Environment' and 'Soft Coastal Defences'
 - Cultural values

Health warnings!!

- Uncertainties and assumptions need to be considered (i.e. don't just rely on the summary figures in the tables)
- Significant limitations in information availability, particularly in relation to the evaluation of non-use benefits
- Application will require good information about the impacts of policy decisions on ecosystem services (sensitivity matrices, compatibility matrices of socio-economic uses)

PRESSURES		ECOSYSTEM PROCESSES																	
ACTIVITIES		Primary production	Secondary production	Larval/ Gamete supply	Biological control	Food web dynamics	Species habitat	Species diversification	Genetic diversification	Waste assimilation	Erosion control	Physical barriers	Space & waterways	Pleasant scenery	Climate regulation	Air quality regulation	Biogeochemical cycling	Water cycling (regulation)	Water quality
Food	Fisheries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aquaculture	+/-	+/-	+/-	-	+/-	-	-	-	-	-	+/-	-	-	-	-	-	-	-
	Fertiliser / Feed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Raw materials	Cooling water	+/-	+/-	-	+/-	+/-	+/-	+/-	-	-	+/-	+/-	-	-	-	-	-	-	-
	Marine aggregates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Salt	-	-	-	-	-	-	-	-	-	+/-	+/-	-	-	-	-	-	-	-
	Ornamental materials	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy	Biofuels	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-
	Oil and Gas	-	-	-	-	-	-	-	-	-	+/-	+/-	-	-	-	-	-	-	-
	Renewable energy	-	-	-	-	-	-	-	-	-	+/-	+/-	-	-	+	+	-	-	-
Space and waterways	Maritime transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pipelines, cables etc	-	-	-	-	-	-	-	-	-	+/-	+/-	-	-	-	-	-	-	-
	Military defence	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physical wellbeing	Medicines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Coastal defence	-	-	-	-	-	-	-	-	-	+/-	+/-	-	-	-	-	-	-	-
	Waste disposal	-	-	-	-	-	-	-	-	-	+/-	+/-	-	-	-	-	-	-	-
Psychological/ Social wellbeing	Tourism	-	-	-	-	-	-	-	-	-	-	+/-	-	-	-	-	-	-	-
	Recreation / Sport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Nature watching	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Knowledge	Research / Education	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-





Further Research Recommendations

- Further primary research on e.g. resident aesthetic values, carbon sequestration and natural hazard avoidance
- Further industry research on the value of CCS and telecommunication
- Incorporation of primary research outputs and NEA outputs
- Application of value transfer techniques to marine values
- Improved quantification of spatial pressures and impacts
- Research and reporting protocols for future valuation studies

Thank-you!

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http://www.thecrownestate.co.uk/mrf_general_studies



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