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Economics for the Environment Consultancy

Environmental Economics in Marine Management

Risk Assessment and Management in Marine Systems: State of the Art and the Challenges Ahead

Brussels, Belgium

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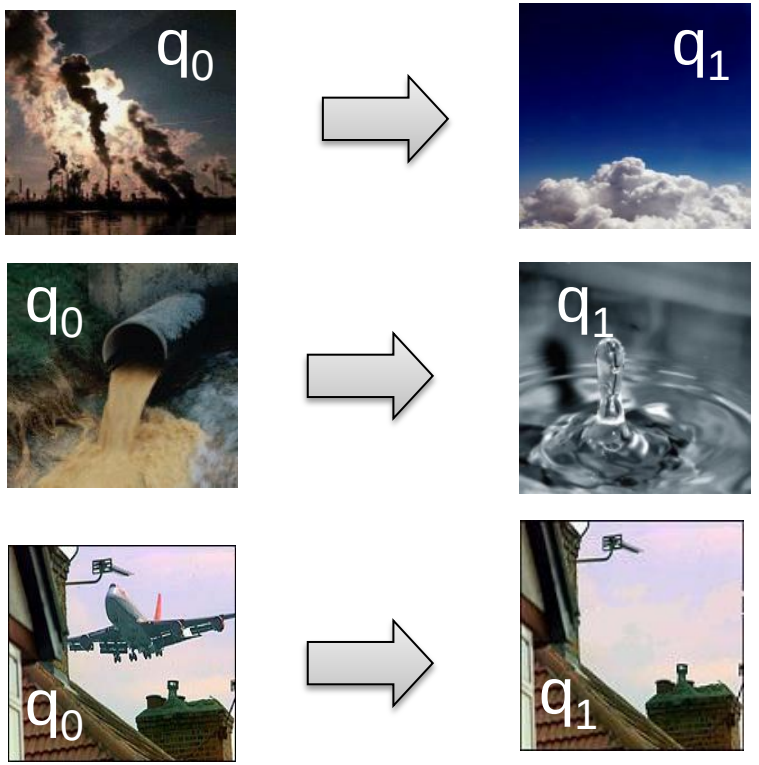
- Extending Environmental Economics into Marine Environment
- Examples of Analysis - developing marine economics thinking
- Challenges

A little reminder about economics…

- Economic:
  - Not ‘the cheapest’ way but ‘the highest net benefit’
  - Not commercial gain but social welfare
- Welfare:
  - Wellbeing, utility
  - ‘Net’ changes in wellbeing
  - Not only money income but *total economic value*
  - ‘Market’ vs ‘Non-market’
  - ‘Internal’ vs ‘External’

Valuing non-market impacts

from this… *to this…*



How much does individual's wellbeing change?

Why economic value evidence?

- Understand the value:
  - Ultimately estimate 'the demand for the environment'
  - Everything that will help us do a demand function we must collect information on (through questionnaire and/or other sources)
- Demonstrate value:
  - Economic appraisal (CBA, IA etc.)
  - Environmental accounting
- Capture value:
  - Economic instruments

Environmental Economics

- Strengths: commensurate unit (money) allows tradeoffs between different sources of welfare, etc …
- Weaknesses: difficulty of capturing non-market values, accounting for complexity of environment (e.g. non-linear changes), etc ...

Environmental Valuation

- Not ‘putting a price on nature’, not a moral judgement
- Values of change:
  - Needs a baseline and a measure of change
  - Values are context (e.g. location, time) specific
- Only as accurate as underlying science

Environmental Economic Analysis into the Marine Environment

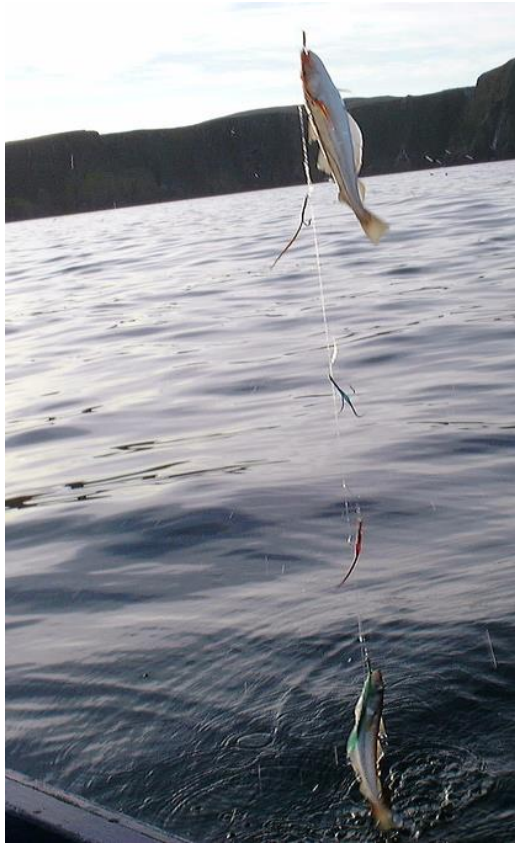
- Often lagged behind terrestrial analysis
- As marine science develops, the usefulness of marine environmental economics develops
  - Looking at the consequence of changes
  - Dynamics of marine environment are challenging
- Marine environmental economics – a developing field of work

Examples of Analysis developing Marine Economics thinking

- UK Fish Stocks - Natural Capital
- MPAs - Primary Valuation work, Value Transfer
- MSFD implementation
- Economic instruments in marine environment

UK Fish Stocks

- Economic consequences of overfishing:
- Achieving MSY would allow stock recovery and increase yield by £1m - €48m over 13 yrs.
- Fishing down the food chain in Irish sea:
  - 1970 demersal fish were 40% of catch
  - In 2009 they had reduced by over 4/5ths and accounted for 10% of catch
  - Shellfish catches doubled,
  - Overall landings value nearly halved
- IUU fishing costings in UK/yr to 2020: €200m of landings and 3,700 jobs
- Degradation of fish stocks is a significant cost to society



Natural capital

- UK Natural Capital Committee definition: "*the elements of nature that produce value (directly and indirectly) to people*"

  … It is the capacity to produce ecosystem services

- Degradation of fish stocks reduces ecosystem service (landings) … this is also a loss of natural capital

- One particular point of concern is where there are thresholds, where state of natural capital becomes a limiting factor on goods and services

Example: Saltmarsh & Fisheries

- Combination of spawning stock biomass and nursery grounds in saltmarsh support adult population of some commercial species (= natural capital)
- Loss of saltmarsh in UK is large and ongoing
- Is loss of natural capital a limiting factor on availability of commercial fish?

Reference Saltmarsh

Nutrient-enriched Saltmarsh

Marine Protected Areas

- Controversial area of policy
- Hard to describe benefits of protecting dynamic environment in economic terms

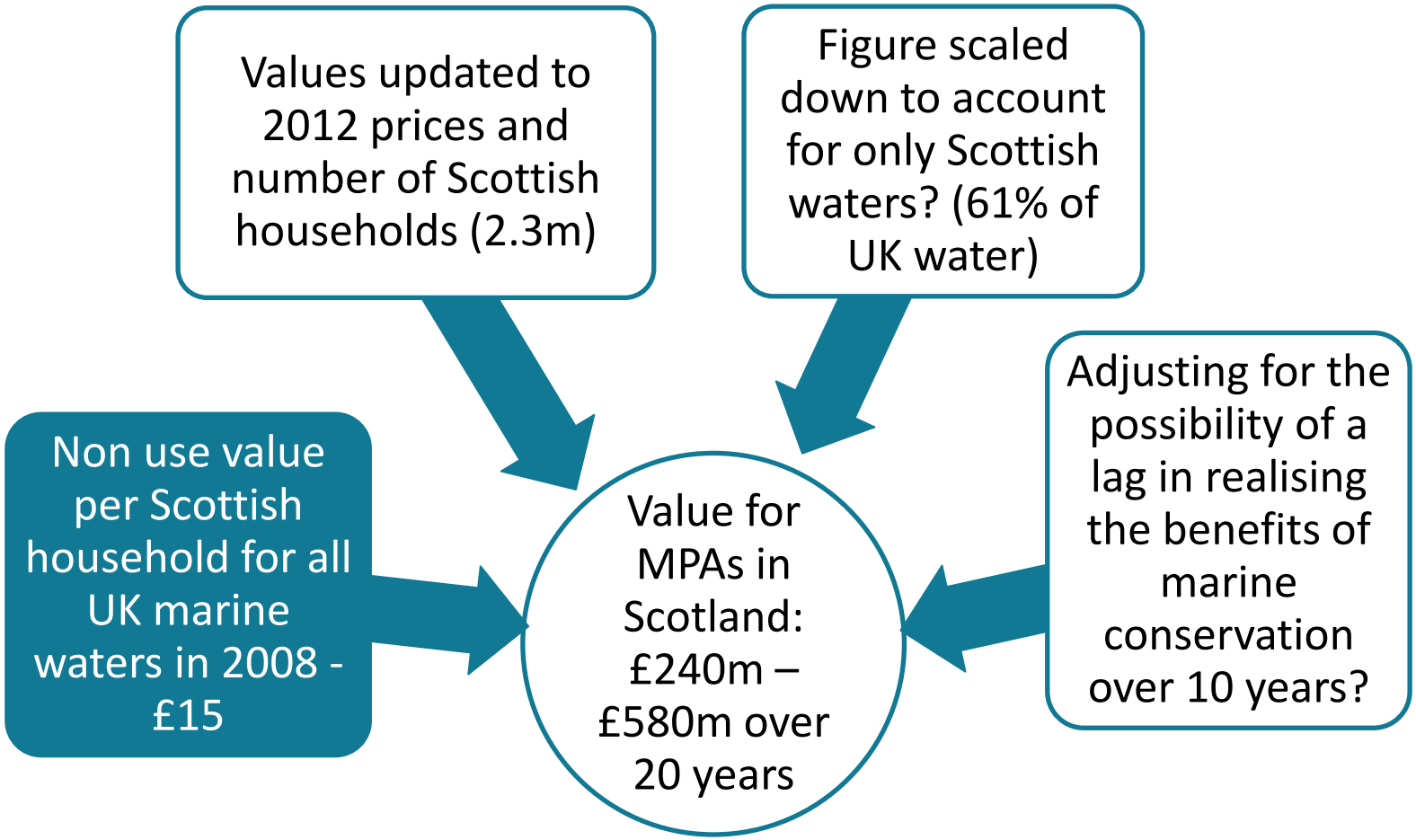
- Valuation studies
- Value transfer
- Management Costs

Primary Valuation work

- SAC (2008): UK study on value to 'halt the loss of marine biodiversity through a network of MPAs'
- Per household value of £15 per year
- Total value £bn's
- Reflects non-use value of conserving environment

- Kenter et al (2013): value in Scotland to divers and anglers of designating 35 MPAs: £125 – 255m (one-off)
- Reflects value of reduced risk of deterioration to marine environment

Example: Scottish Analysis



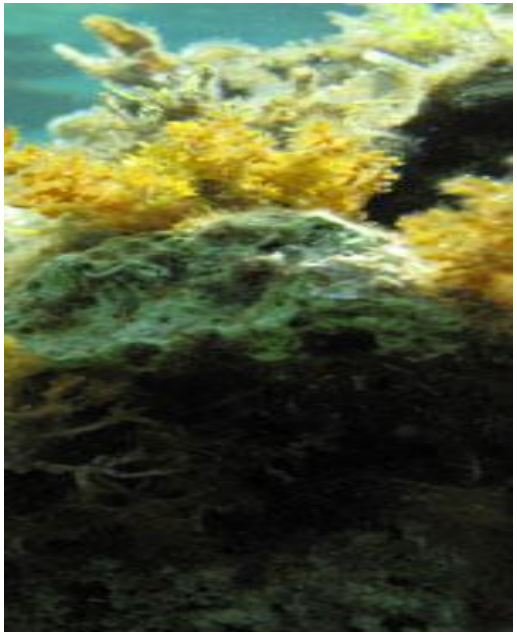
Costs of MPA Management

- Single largest pressure on proposed Marine Conservation Zones (MPAs in England) is mobile benthic fishing gear
- Value of all catches from this gear on 100+ proposed sites give GVA of £1-2 million per year (2011)
- Banning mobile demersal gears would allow some increase in static gear
- Overall tiny cost compared to terrestrial nature conservation

Economics of MPAs

- Analysis could be better developed to look at cumulative impacts of networks:
  - Value to public of protecting network of sites
  - Opportunity costs to human activities
  - Increases in ecosystem services (e.g. supported by increased primary productivity)

- Data on individual sites exists

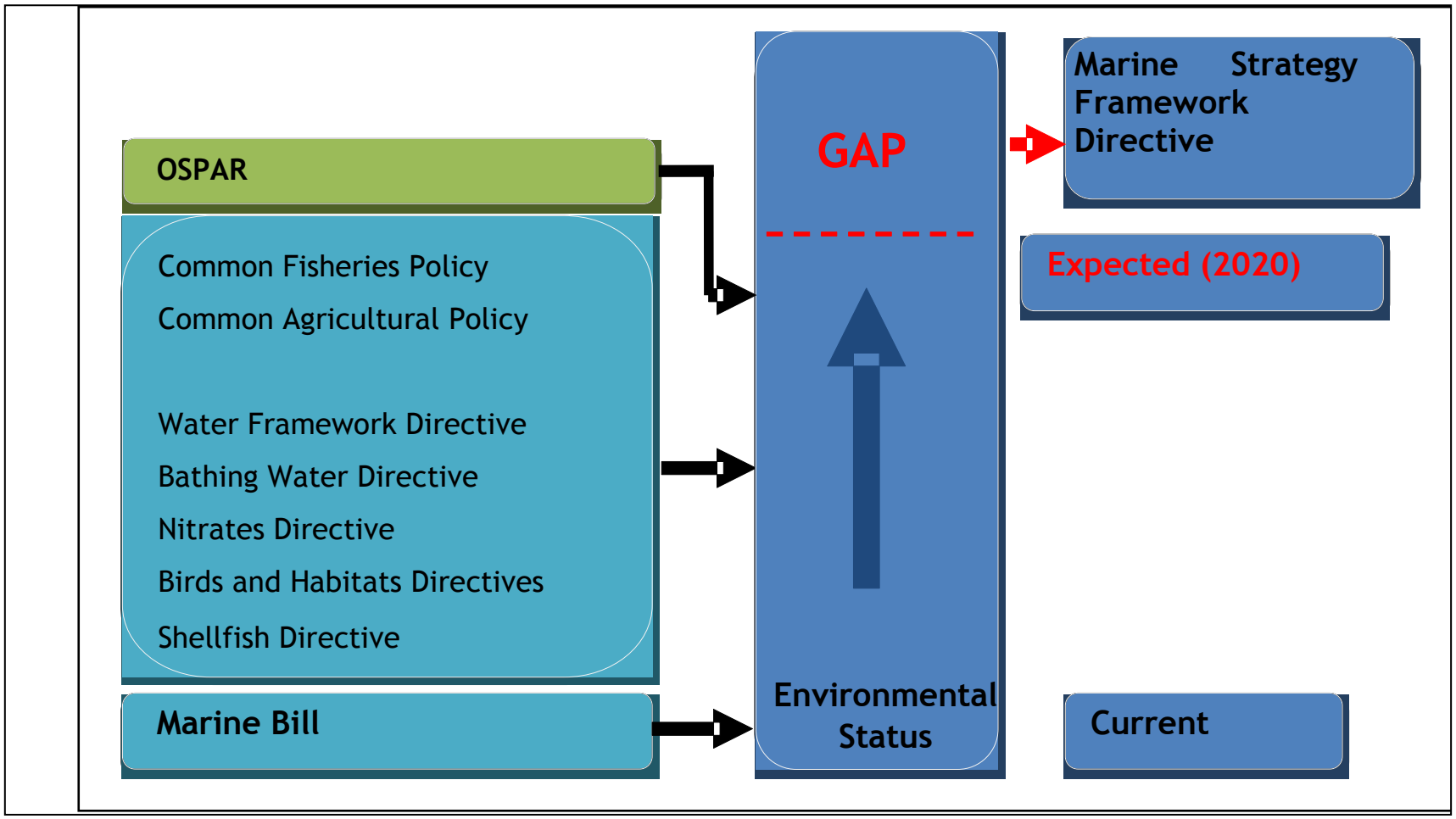


Economics in MSFD

- Assess costs of degradation
- Cost-effective measures
- CBA of new measures
- Disproportionate costs exemption
- Economic incentives to support GES

- Regional cooperation – follow bio-regional boundaries
- Opportunity to develop analysis across regional seas

Economics in MSFD - Additionality



Costs of Degradation

- Litter affecting fishing: UK benefits of £4.3m to £10.7m over 13 years to the fishing industry from reducing litter levels in marine waters (market value)
- Fish landings: loss of landings due to overfishing (market values)
- Reduction in welfare to recreational users from lower quality of marine environment (market and non-market values)
- Reduction in welfare to public from knowing marine environmental quality is reduced (non-market value)

Economic analysis in MSFD implementation

- Understand motivations of value and distribution of impacts

- Value changes from specific policy measures:
  - how will marine environment respond?
  - needs support by appropriate science.

- Design of economic instruments

Economic Instruments – Plastic Bag Tax

- Plastic Bag Tax
- Objectives:
  - Cleaner countryside
  - Marine litter reduction
  - Raise finances
  - Examples
    - Ireland: 15 cents/bag (2012)
    - England: 5 pence/bag (proposed, 2015)

Economic Instruments – Marine Biodiversity Offsets

- Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development
- Several potential appropriate uses, e.g.
- Business Case (win-win?):
  - Avoid expensive re-routing of a linear Marine Development (e.g. pipeline, cable)
  - Recreate benthic habitat several times greater than that damaged at less cost

Economic Instruments – Marine Biodiversity Offsets

- Needs viable restoration options:
  - Restoration: biogenic reef, kelp forest, seagrass beds, former aggregate extraction sites.
  - Create: Islands, reefs, sediment seeing
  - Averted risk ?

Challenges in the Deep Sea

- Biogeochemical processes crucial to life on earth
- Unsustainable harvesting of slow growing species
- The research agenda is being defined…

- Challenging to do quantitative economics
- Ecosystem services analysis helps to integrate economics into science...

Knowledge of ecosystems and habitats, and their value. Cell colours indicate the state of natural science knowledge on the contribution of these ecosystems and habitats to the provision of goods and services (updated and expanded from table 2.2 of van den Hove and Moreau (2007). Key: blue=good knowledge; green=some knowledge; yellow=little knowledge; grey=no knowledge; white=irrelevant). Value is defined as being; present (+); not present (0); unknown (?); monetarily known (c.f. Beaumont et al. (2008)).

Services/Ecosystems and habitats		Cold water corals	Open slopes and basins	Canyons	Sea-mounts	Chemo-synthetic	Water column	Sub-seabed
Supporting	Nutrient cycling	?	+	?	?	+	+	0
services	Habitat	+	+	+	+	+	+	0
	Resilience	?	?	?	?	?	?	0
	Primary production	?	?	?	?	+	+	0
	Biodiversity	+	+	+	+	+	+	?
	Water circulation and exchange	0	+	+	?	0	+	0
Provisioning	Carbon capture and storage (artificial)	0	0	0	0	0	+	€
services	Finfish, shellfish, marine mammals	+	+	+	+	+	€	0
	Energy: Oil, gas, minerals	?	?	0	?	?	0	€
	Chemicals compounds—industrial/ pharmaceutical	+	?	?	?	+	?	?
	Waste disposal sites	0	+	+	0	0	0	+
Regulat-ing	Gas and climate regulation	0	?	+	0	+	+	+
Service	Waste absorption and detoxification	0	+	+	0	0	+	0
	Biological regulation	?	+	?	?	+	+	0
Cultural services	Educational	+	+	+	+	+	+	+
	Scientific	+	+	+	+	+	+	+
	Aesthetic	+	?	?	?	+	+	0
	Existence/Bequest	+	?	?	?	?	+	?

… [Source: Armstrong et al. 2012]

Meeting Challenges

- More multidisciplinary (science & economics) teams
- Economics can learn from science: marine environment responses to human activities may not conform to economic assumptions (e.g. thresholds exist)
- Science can learn from economics: crucial for human welfare to identify which changes will affect people, by how much, where and for how long?

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