

# MARINE STRATEGY FRAMEWORK DIRECTIVE MSFD Workshop

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Assessment of marine ecosystem services  
and link to the Good Environmental Status



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## Structure of the presentation

- Legal basis for MSFD ecosystem services
- EU Biodiversity Strategy 2020
- Ecosystem services definitions
- Indicator for marine ecosystem services
- Assessing the benefits of ecosystems services
- Examples of assessing benefits of Marine ecosystem services



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## Legal basis for MSFD ecosystem services

- EU environmental policies (e.g. MSFD, WFD, BDST 2020) require **economic and social evaluation of the trade-offs and cost of degradation**
- EU Integrated Maritime Policy: *“marine activities to be conducted within the sustainable boundaries”*
- Marine Strategy Framework Directive = environmental pillar of IMP
  - Requires ecosystem-based approach
  - Environmental targets based on ecosystem structure and functioning, analysis of pressures and impacts, programme of measures
  - Includes socio-economic assessment
  - GEnS to be achieved in all marine waters by 2020!



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## EU Biodiversity Strategy 2020

### EU Biodiversity Strategy 2020 (Target 2, Action 5) aims to:

- restoring at least 15 % of degraded ecosystems;
- requires mapping and assessment of the state of ecosystems and their services by 2014;
- apply EU-level reporting data/information for ecosystem assessment (WFD, MSFD);
- assess the economic value of ecosystem services;
- to promote the integration of these values into accounting and reporting systems at EU and national level by 2020.



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## Ecosystem services: definitions

**The benefits that obtain from ecosystems** - UN Millennium Ecosystem Assessment (2005)

**The direct and indirect contributions of ecosystems to human well-being** - The Economics of Ecosystems and Biodiversity to guide economic valuation of ecosystem services (2010)

**'Final products'** from ecosystem services - The Common International Classification of Ecosystem Goods and Services (CICES)  
CICES identifies **provisioning, regulating, and cultural services** hierarchical structure with subdivision, aiming to allow use in ecosystem mapping and assessment, and valuation of ecosystem services.



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## Marine ecosystem services/ Socio-economic systems

- **Biophysical process** - (*e.g. transport of nutrients, nutrient uptake*)
- **Biophysical structure** - (*e.g. topography, nutrients; temperature, salinity, light, biological communities: species, biomass*)
- **Function** - (*e.g. Fixing of carbon Nutrient cycling*)
- **Ecosystem Services** - (*e.g. food, C-sequestration, recreation*)
- **Benefits** - (*e.g. Climate regulation, Food, materials, Safe recreational water*)
- **Value** - (*Economic value, Health value, Enjoyment, social value*)
- **Pressures** - (*e.g. climate change, fisheries, pollution, invasive species*)
- **Response** - *Institutions and policies, users and stakeholders*



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## Indicators of ecosystem services

EU policies, including the MSFD require an integrated approach to the management of marine environment

Marine Ecosystem services link **ecosystems and human systems**, a conceptual approach links the **state of ecosystem with flow of ecosystem services**, and benefits for human societies.

The DPSIR cycle (Drivers -Pressures -State Change –Impacts on Human Welfare –and policy Response on impaired welfare change) incorporates marine ecosystem services as a link between the state of the ecosystem and impacts on human welfare.

**Indicators of ecosystem services** should reflect **capacity of ecosystems to ensure flow of ecosystem services and benefits for humans**.



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## Examples of Indicators

| Ecosystem Service                              | Indicators of Capacity                         | Indicators of Flow                   | Indicators of Benefit            |
|--|--|--------------------------------------|----------------------------------|
| Food Provision                                 | Fish abundance, density                        | Fish catch, shrimp landings          | Fish sales, shrimp revenue       |
| Regulation and maintenance/ coastal protection | Vegetation density, Sea grass extent           | Surge reduction, sediment deposition | Maintenance cost of sea defenses |
| Cultural/ Recreation                           | Size of marine leisure and recreation hotspots | Annual number of recreational trips  | Value of recreational service    |



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## Benefits assessment

The **benefits of implementing the MSFD** are assessed by valuing the level of improvement in the marine environment brought about by achieving GES before or by 2020 or, by valuing the avoided costs arising from degradation in the marine environment if GES is not achieved within the timeframe.

The **benefits of achieving the GES targets** can be assessed by valuing the difference in societal welfare when we compare the expected state of the marine environment under the Business As Usual scenario with the expected state when GES targets are achieved before or by 2020.



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## Ecosystem services benefits assessment

The **ecosystem services framework** can be used to assess the changes in services to society caused by changes in the state of ecosystem components and pressures in the marine environment.

- Changes in the state of pressure or component (degradation)
- Changes in final ecosystem service (provisioning, regulating and cultural)
- Changes in human welfare (valuation or qualitative assessment)



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# Identification of changes in the ecosystem services

To identify the changes in the provision of the ecosystem services between the BAU scenario and the achievement of GES targets, the following steps were taken:

- Identification of the ecosystem components that provide these final ecosystem services and the key pressures that impact on them;
- Assessment of whether there is any degradation in the ecosystem components, or significant changes in the impact of the pressures, when comparing the BAU scenario with the achievement of GES.



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## Marine ecosystem services

- The marine environment provides us with a wide range of important ecosystem services which **have market values** such as the **provision of food** (e.g. fish and shellfish), **recreational opportunities** (e.g. clean water and beaches for water sports and leisure activities) and **regulating services** (e.g. helping to regulate our climate).
- Many of these services tend to be provided free of charge outside traditional markets, and can therefore be over exploited and inefficiently used.



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## Impact of loss of ecosystem services

- Additionally, the market price of some marine ecosystem services is an underestimate of the benefits they provide – these represent a market failure.
- Human activities can cause a **range of impacts on the marine environment**. These include the **loss or degradation of biodiversity, loss of habitats, contamination by hazardous substances and nutrients, and the possible future effects of climate change**.
- All these impacts can have a direct effect on the ability of the marine environment to provide the ecosystem goods and services outlined above.



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## Meeting GEnS

Marine biodiversity is central to ecosystem function and ecosystem services on which human welfare depends, i.e. production of food and raw materials, pharmaceuticals, ecotourism and leisure, etc...

**The central task for implementing the MSFD is to determine how the many different criteria/indicators should be combined into an integrative assessment framework.**

**The GEnS is achieved if the conservation objectives, the ecosystem services and the societal benefits are delivered sustainably.**



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## Criteria and indicators

EC gives flexibility for MS to select those criteria and associated indicators that address the most important impacts and threats to a particular marine ecosystem.

If this is accepted then the challenge is to make this operational and indicate how it can be linked to monitoring, management and spatial planning.

The assessment should include an analysis of ecosystem services across sea areas making use of Contingency valuation, biological valuation and other economic valuation technique available.



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## Perception on marine ecosystem services

Valuation can be done based on **research about the attitudes** towards the conservation and sustainable use of natural systems.

An assessment of **perceptions about marine ecosystem services** as well as willingness to engage in the conservation and sustainable use of these ecosystem services through taxation, donation, volunteering, or other activities has been done on a randomized survey of 1434 residents of the USA, assessing the marine ecosystem services, while identifying mechanisms most likely to meet with resistance from the general public.



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## Research results on perception (1)

Statistical analysis is presented, which suggests that:

- (1) respondents view oceans as a global commons with little distinction between the national and international indispensability of the ecosystem services they provide;
- (2) among the options for engaging citizens in the sustainable use of ecosystem services, respondents were most averse to taxation, a trend that is strongly correlated with age and more weakly correlated with gender;
- (3) perceptions about the potential loss of ecosystem services are a much stronger indicator for willingness to engage in their sustainable use than perceptions about the current status of the ecosystem services;



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## Research results on perception (2)

- (4) there is little or no correlation between geographical location of respondents and their perceptions of marine ecosystem services or readiness to engage in their conservation and sustainable use.
- (5) Among other things, these findings provide a basis for developing policies aimed at maximizing public engagement in sustainable management of marine ecosystem services, while identifying mechanisms most likely to meet with resistance from the general public.



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## Benefits – Reduction in litter under GES (1)

Marine litter directly and indirectly affect ecosystem services and the benefits we enjoy from the marine environment.

Litter can cause impacts to marine animals through or ingestion, smothering of the seabed, damage to propellers of boats, and can be an eyesore for tourists visiting beaches or taking boat trips. This in turn could result in economic costs and losses to coastal communities (tax payers), individuals, fishermen, farmers, ports and mariners and others.

The GES target for marine litter requires an over all reduction in litter on coastlines by 2020, with additional indicators for litter in the seafloor and litter on the water column.



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## Benefits – Reduction in litter under GES (2)

Action to reduce terrestrial sources of litter (estimated to make up 80% of litter on coastlines) are taken forward under the baseline scenario.

However to reach the MSFD target is likely to propose additional measures to reduce litter from marine sources, meaning that a proportion of the benefits from reducing litter levels should be attributed to MSFD.



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## Benefits assessment

As mentioned in the introduction, for the purposes of this analysis, only the direct benefits of reducing litter are considered to avoid double counting.

These include:

- Benefits from reducing litter levels in coastal areas
- This would lead to an increase in the aesthetic, recreational and cultural services experienced by people visiting coastal areas.



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## Benefits from reducing the numbers of litter items floating in the marine waters

The BAU scenario states that there is likely to be a continuing problem with litter in the water column.

This could result in negative impacts on boats and other vessels through damage to propellers, and to various other marine activities (such as aquaculture).



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## Benefits from reduction in litter items on beaches (1)

Litter on beaches can negatively affect people's experiences through reduced recreational opportunities, loss of aesthetic value and loss of non-use values.

There are two types of benefit arising from cleaner beaches – use benefits and non-use benefits.

- Use benefits are benefits that are directly enjoyed by beach users e.g. relaxation, walking.
- Non use benefits are benefits enjoyed by people who don't directly use beaches but are keen on maintaining their value so that they can be used by others (altruistic), future generations (bequest), or simply the benefit derived from knowing clean beaches exist (existence value) associated with cleaner beaches are not traded in the market alternative valuation techniques have to be used which take into account both use and non-use values e.g. Willingness to Pay techniques.



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## Benefits from reduction in litter items on beaches (2)

Based on the estimates of what people are willing to pay for complete removal of litter from the beaches, we can get an estimate of the benefits of achieving the proposed GES targets for litter, which aim to achieve an overall reduction in litter.

Additional benefits from MSFD arise from reduction in marine sources of litter (around 20% of litter on beaches) because reductions in terrestrial sources should be also included in the baseline scenario.

**This indicates that achieving the MSFD target for litter is likely to lead to additional benefits to society through reductions in beach litter.**



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# Thank you!



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