Managing aquatic biodiversity
in the case studies

Gerjan Piet, Wageningen Marine Research

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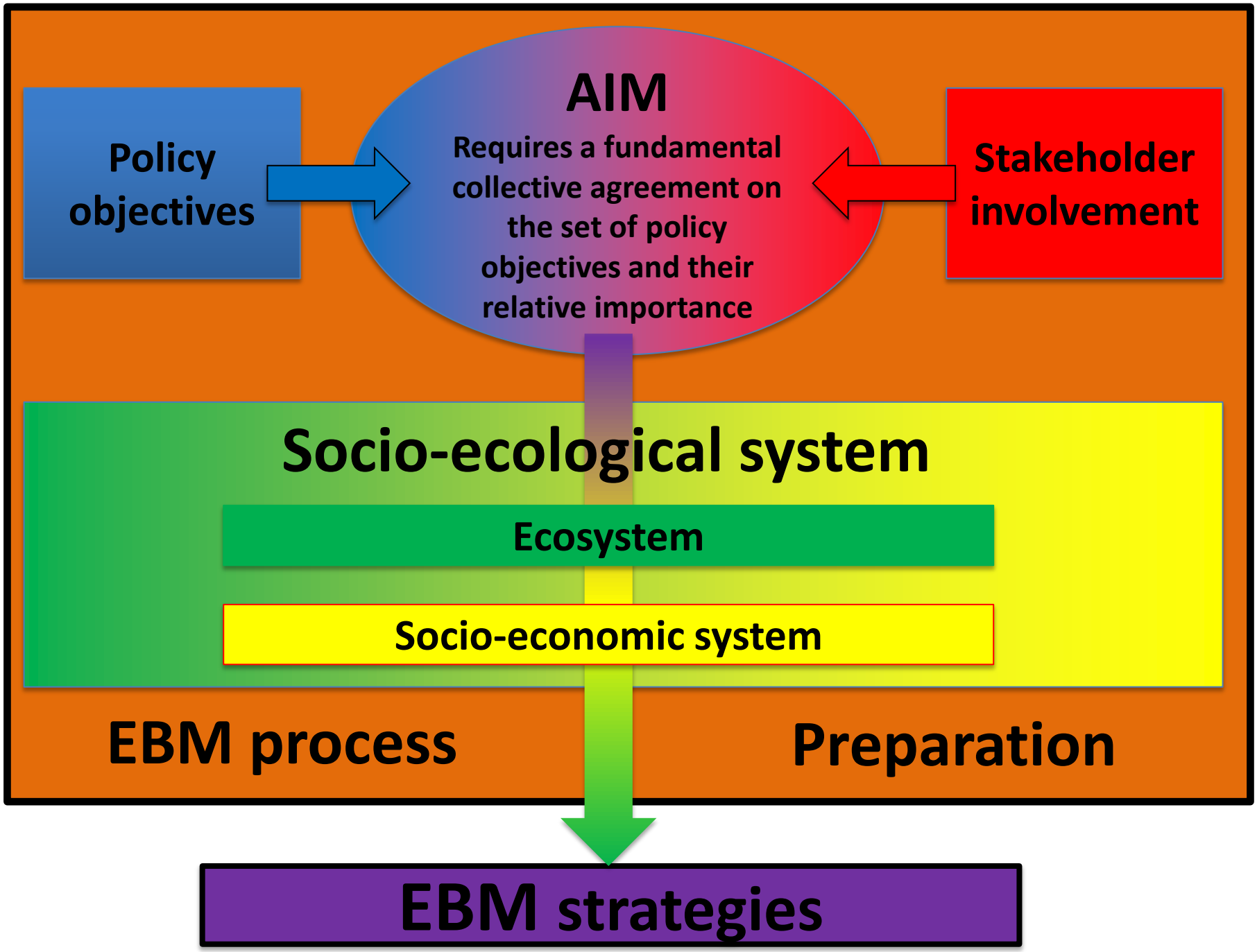
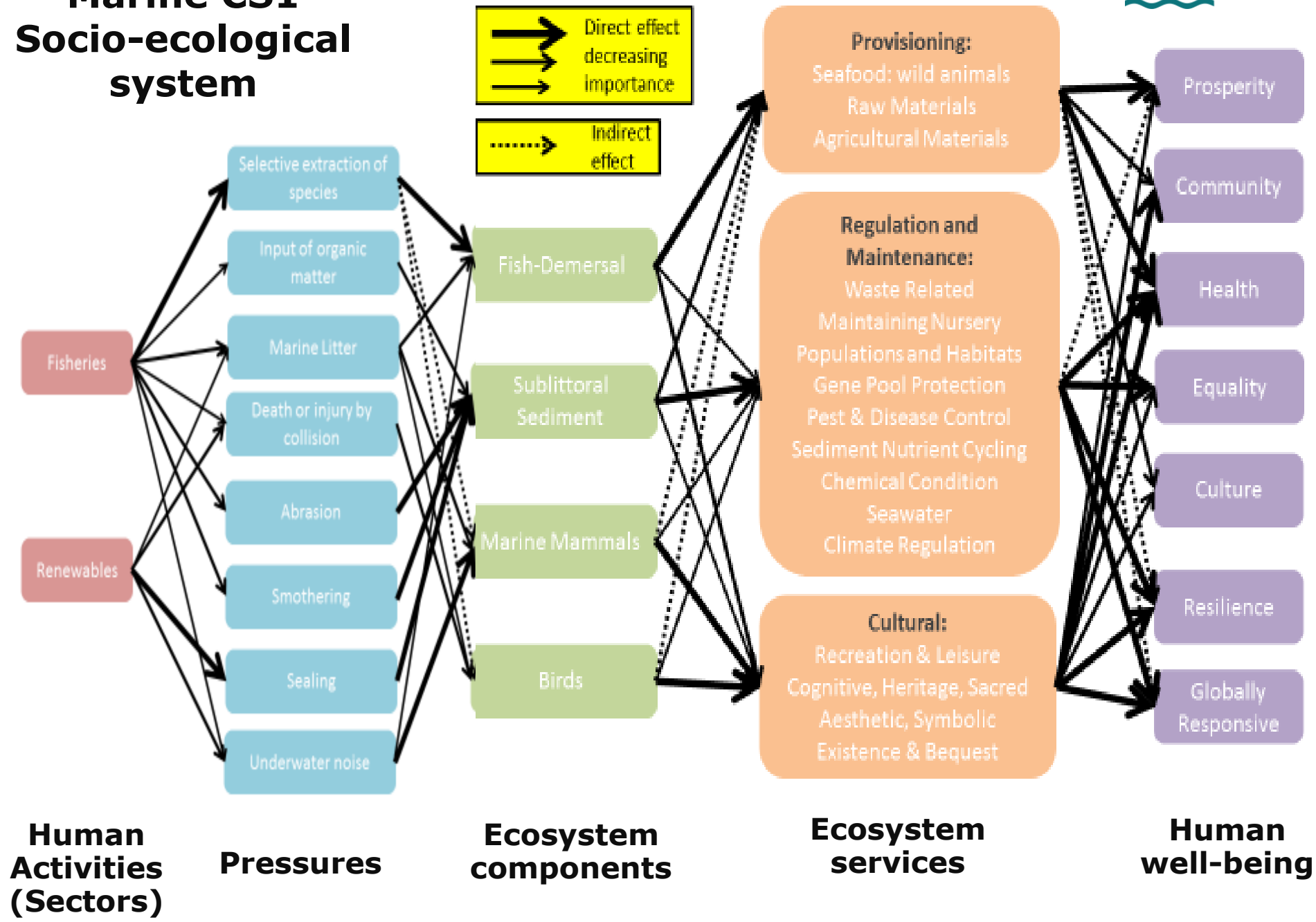
Session 1: 10.00–13.00

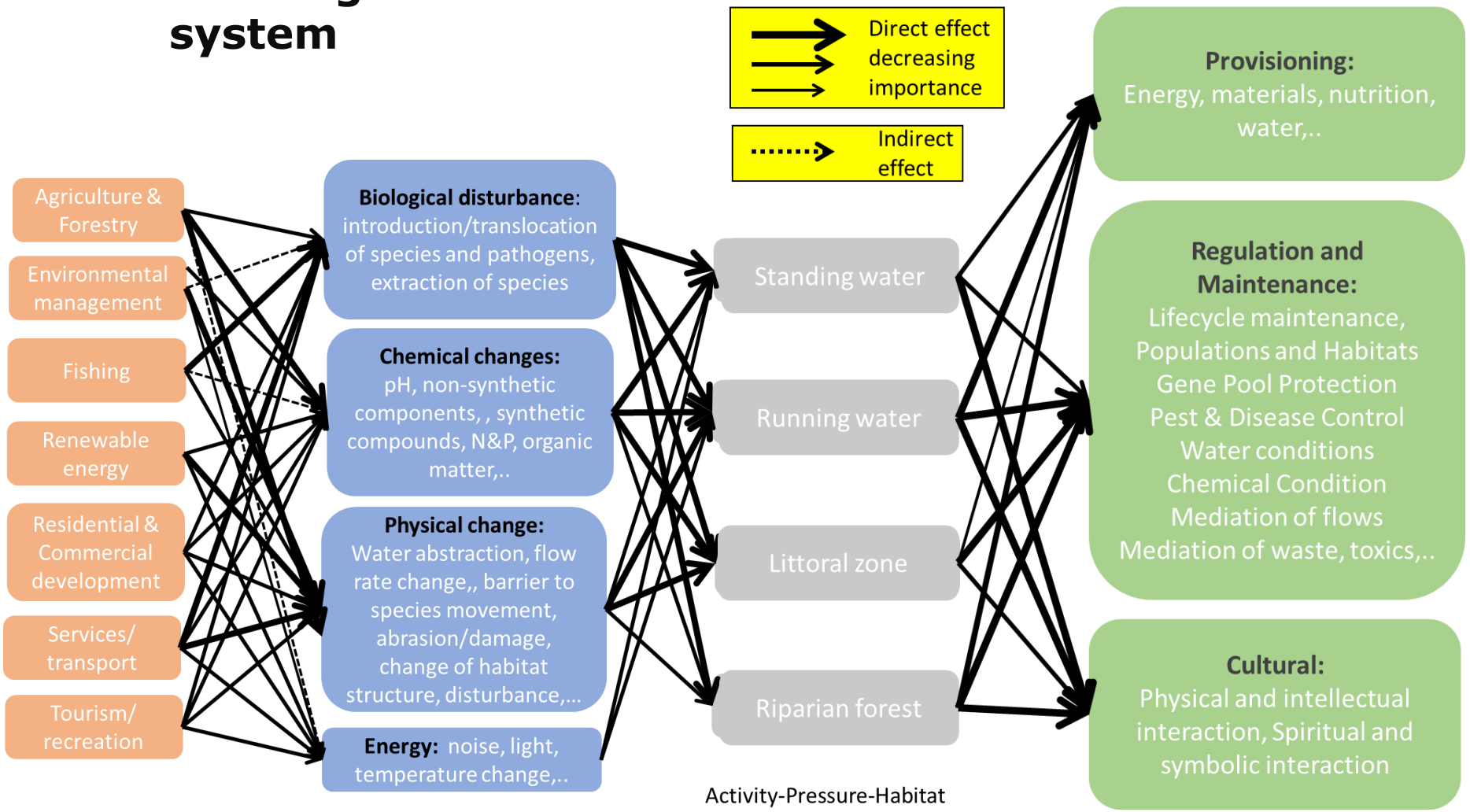
• Introduction	Gerjan Piet
• CS story lines	Ben Boteler
• Danube CS	Thomas Hein
• Managing aquatic biodiversity	Gerjan Piet
• Coffee break	
• Break-out sessions	
– Marine / Coastal	Gerjan Piet
– Inland waters	Thomas Hein
• Synthesis and contrasts	


Policy objectives
AIM
Requires a fundamental collective agreement on the set of policy objectives and their relative importance
Stakeholder involvement
Socio-ecological system
Ecosystem
Socio-economic system
EBM process
Preparation
EBM strategies

Marine CS1 Socio-ecological system



Inland waters (CS3) Socio-ecological system



Human Activities (Sectors) | **Pressures** | **Ecosystem components** | **Ecosystem services**

EBM strategy

A typical EBM strategy consists of

- **Measure**
  - Interacts directly with those parts of the linkage framework that fail to achieve the policy objectives, i.e. human activity, the pressure, the ecosystem component or any combination of them
  - May be implemented (bottom-up) by any stakeholder, i.e. sector, NGO but in practice usually occurs (top-down) through an instrument
- **Instrument**
  - Mechanism to initiate the measure
  - Usually applied by the government

EBM strategy: Instruments

- **Regulatory**
  - Emerge from the principle that human nature is self-centered/egoistic and should be controlled by the government
  - Modify behaviour of actors by imposing rules that limit or prescribe the actions of the target group
  - Specifics: Legislation, requires enforcement and control if they are to be successful
- **Economic**
  - Are based on the principle that the pursuit of individual economic self-interest will lead to the optimal benefit for everyone
  - Modification of the actors' behaviour through the price of a commodity in the market
  - Specifics: Fee-based systems, subsidies, liability and compensation regimes and trading systems
- **Social**
  - Key feature is the participatory nature
  - Modify behaviour of actors through image building and associated perception from society
  - Specifics: Involvement of stakeholders, Improving the knowledge base. Information (education, training) or awareness raising campaigns.

Marine/Coastal

CS		Management measure
CS1	1.	Fisheries technical measures, e.g. gear change to reduce physical disturbance
	2.	Input control fishery. Reduce capacity of specific métiers
	3.	Multi-use wind parks. Conservation area, Artificial substrate.
	4.	Reduce bycatch fisheries. Fish, Marine mammals
	5.	Technical measures to reduce the impulsive noise of wind farm construction phase
CS2	6.	Restoration measures through Nature-based Solutions
CS5	7.	Spatial planning
CS8	8.	Increase in MPA coverage and coherency

Linkage Framework Component	Type					
	Prevention		Mitigation			Restoration
	Spatial distribution controls	Temporal distribution controls	Input control	Output control	Remediation	Restoration
Activity	7		2			
Pressure	7			1,4,5		
State	7,8					3,6

Inland waters

CS	Management measure
CS3	1. Distribution control of hydropower plants 2. Hydro-morphological restoration
CS4	3. Physical removal of invasive species (Elodea) 4. Raising of lake levels during the Summer time
CS6	5. Biomanipulation 6. Sewage plans to decrease eutrophication
CS7	7. Reduction of pollution from agriculture 8. Restoration of impairments by barriers

Linkage Framework Component	Type					
	Prevention		Mitigation			Restoration
	Spatial distribution controls	Temporal distribution controls	Input control	Output control	Remediation	Restoration
Activity	1					
Pressure			7	6	3,4,5,8	8
State						2

Request

Management measures

- Perform a pre-screening of the management measures' compliance against the first 4 of the 10-tenets: Ecologically sustainable, Economically viable, Technologically feasible, Socially desirable
  - Full compliance: OK
  - Minimal compliance: provide CS-specific example why
- For those that fail: Can you provide an alternative measure (is the typology useful?)

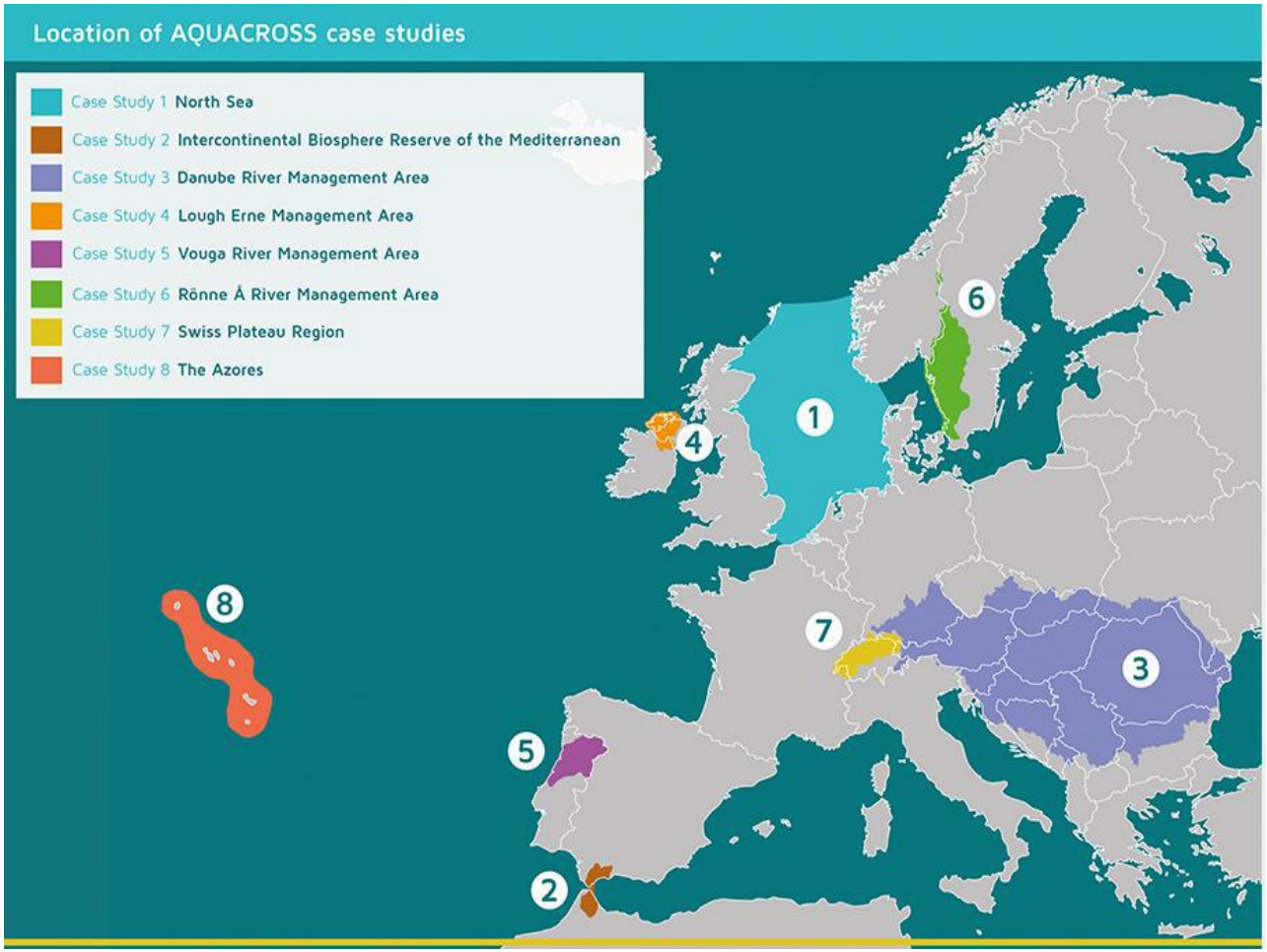
Four of the 10-tenets

Tenet	Compliance
Ecologically sustainable	Minimal compliance – the required measures are absent or will not ensure safeguarding ecosystem features and functioning, or fundamental and final ecosystem services Full compliance – there is confidence that the measures will ensure ecosystem features and functioning, and fundamental and final ecosystem services, will be completely safeguarded (i.e. the natural ecology is maintained where possible) at a local (site) scale; the measures associated with the activity/project will protect the site potentially impacted by the proposed development or activity
Technologically feasible	Minimal compliance – there is no technology or practice currently available to support the proposed measures Full compliance – methods, techniques and equipment for ecosystem and society/ infrastructure protection are available and have been demonstrated on similar projects, at a similar scale and under similar environmental circumstances
Economically viable	Minimal compliance – the measure is not economically viable, even in the short-term Full compliance – cost–benefit assessment of the environmental management measures indicates, with a high degree of certainty, both full (economic) viability and subsequent longterm sustainability
Socially desirable / tolerable	Minimal compliance – society at large actively rejects any suggestion that the management measures are needed; if implemented, measures would not be tolerated Full compliance – society at large views the management measures as an imperative; they are regarded as necessary

EBM Principles

- EBM considers ecological integrity, biodiversity, resilience and ecosystem services
- EBM is carried out appropriate scales
- EBM develops and uses multi-disciplinary knowledge
- EBM builds on social-ecological interactions, stakeholder participation and transparency
- EBM supports policy coordination
- EBM incorporates adaptive management

Break out groups



Marine
CS1, CS8

Transboundary
CS2, CS5

River
CS3, CS7

Lake
CS4, CS6

EBM strategy: Measures

Linkage Framework Component	Type					
	Prevention		Mitigation			Restoration
	Spatial distribution controls	Temporal distribution controls	Input control	Output control	Remediation	Restoration
Activity	10		6,7	4		
Pressure	11	5		2,9,12	3	
State						1,8

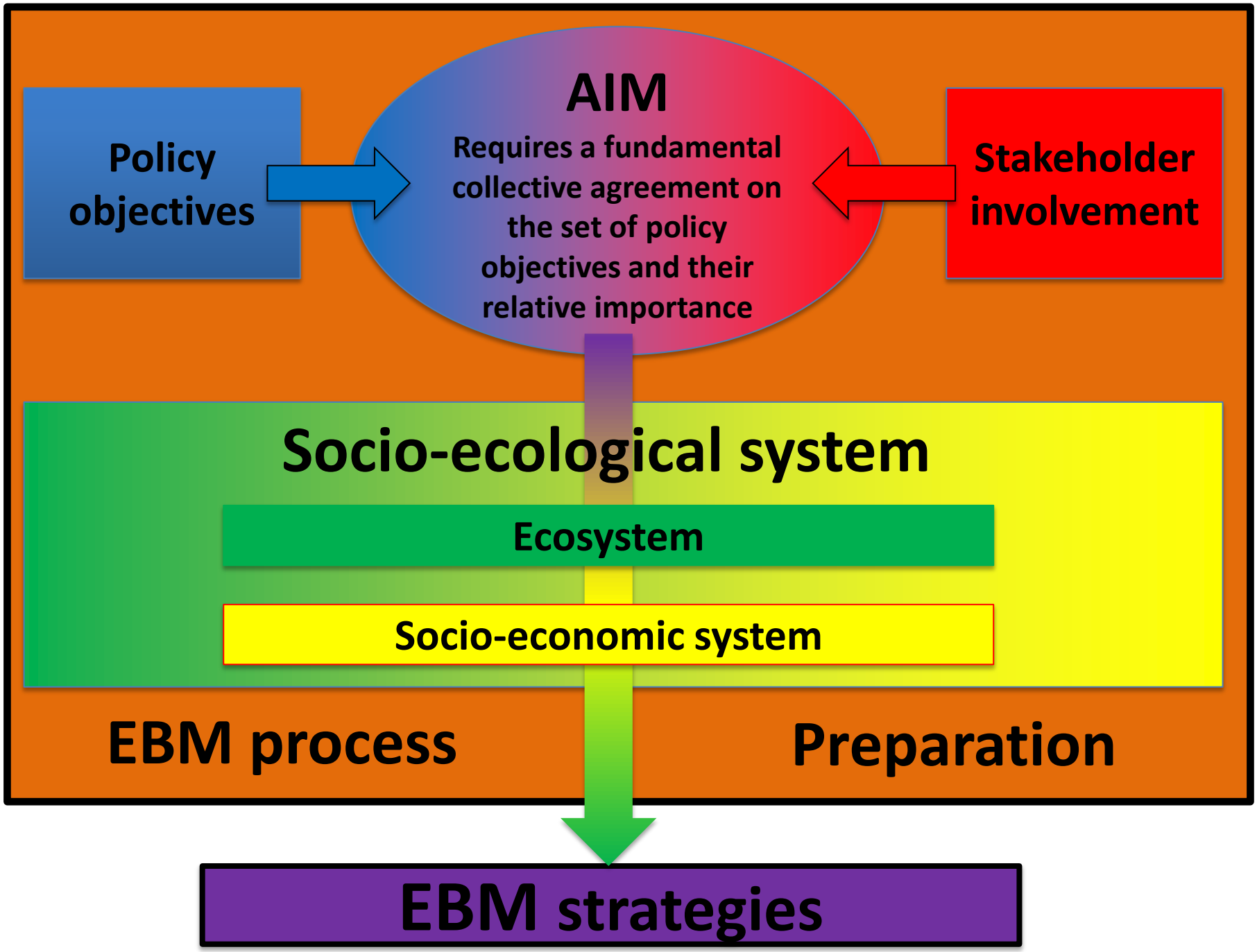
1. N2000 habitat conservation areas, size and positioning
2. Application Habitat credits system in fisheries
3. Additional hard substrate on wind turbine foundations
4. Fisheries technical measures, e.g. gear change or gear modification aimed at reducing physical disturbance
5. Seasonal closure of wind farm construction phase
6. Input control fishery. Reduce capacity of specific métiers
7. Input control wind farms. Slower construction
8. Multi-use wind parks. Conservation area, Artificial substrate, Aquaculture?
9. Reduce bycatch fisheries. Fish, Marine mammals
10. MPAs, fishery closures
11. MPAs closure for specific métiers
12. Technical measures to reduce (eliminate) the impulsive noise of wind farm construction phase

Pre-screening Management strategies: 10 tenets

Tenet	Considerations involving management strategies
Ecologically sustainable	Where needed, management measures should ensure that ecosystem features and functioning, and both fundamental and final ecosystem services, are safeguarded; the habitat and/or resource compensation will have the desired effect
Technologically feasible	Methods, techniques and equipment for ecosystem and society/infrastructure protection and the eco-hydrological and eco-engineering methods are available
Economically viable	A cost–benefit assessment of the management measures indicates (economic) viability and sustainability; habitat and resource compensation and user compensation are affordable
Socially desirable or tolerable	Society regards the environmental management measures (including mitigation and/or compensation) as necessary or they are at least understood and tolerated by society
Ethically defensible (morally correct)	The wishes and practices of individuals are respected in decision-making
Culturally inclusive	Local customs and accepted practices are protected and respected
Legally permissible	There are regional, national or international agreements and/or statutes which will enable and/or force the management measures to be performed
Administratively achievable	Statutory bodies (such as governmental departments, environmental protection and conservation bodies) are in place and functioning to enable successful and sustainable management
Effectively communicable	Horizontal links and vertical hierarchies of governance are accommodated and decision-making is inclusive
Politically	Management approaches and philosophies are consistent with the prevailing political

Linkage Framework Component	Type					
	Prevention		Mitigation			Restoration
	Spatial distribution controls	Temporal distribution controls	Input control	Output control	Remediation	Restoration
Activity	2,11,18		3			
Pressure	11,18		6, 13,15	16	17	17
State	18				4,7,8,12	1,5,7,8,9,14

CS2	1. Restoration measures through Nature-based Solutions
CS3	2. Distribution control of hydropower plants 3. Input control of hydropower plants 4. Floodplain reconnection and remediation, 5. Hydro-morphological restoration
CS4	6. Physical removal of invasive species (Elodea) 7. Raising of lake levels during the Summer time 8. Management Eel, Salmon. 9. Re-stocking of Salmon
CS5	10. Water management 11. Spatial planning
CS6	12. Bio-manipulation 13. Sewage plans to decrease eutrophication
CS7	14. Morphological river restoration, 15. Upgrades of waste water treatment plants to reduce organic micro-pollutants, 16. Reduction of pollution from agriculture 17. Restoration of impairments by barriers
CS8	18. Increase in MPA coverage and coherency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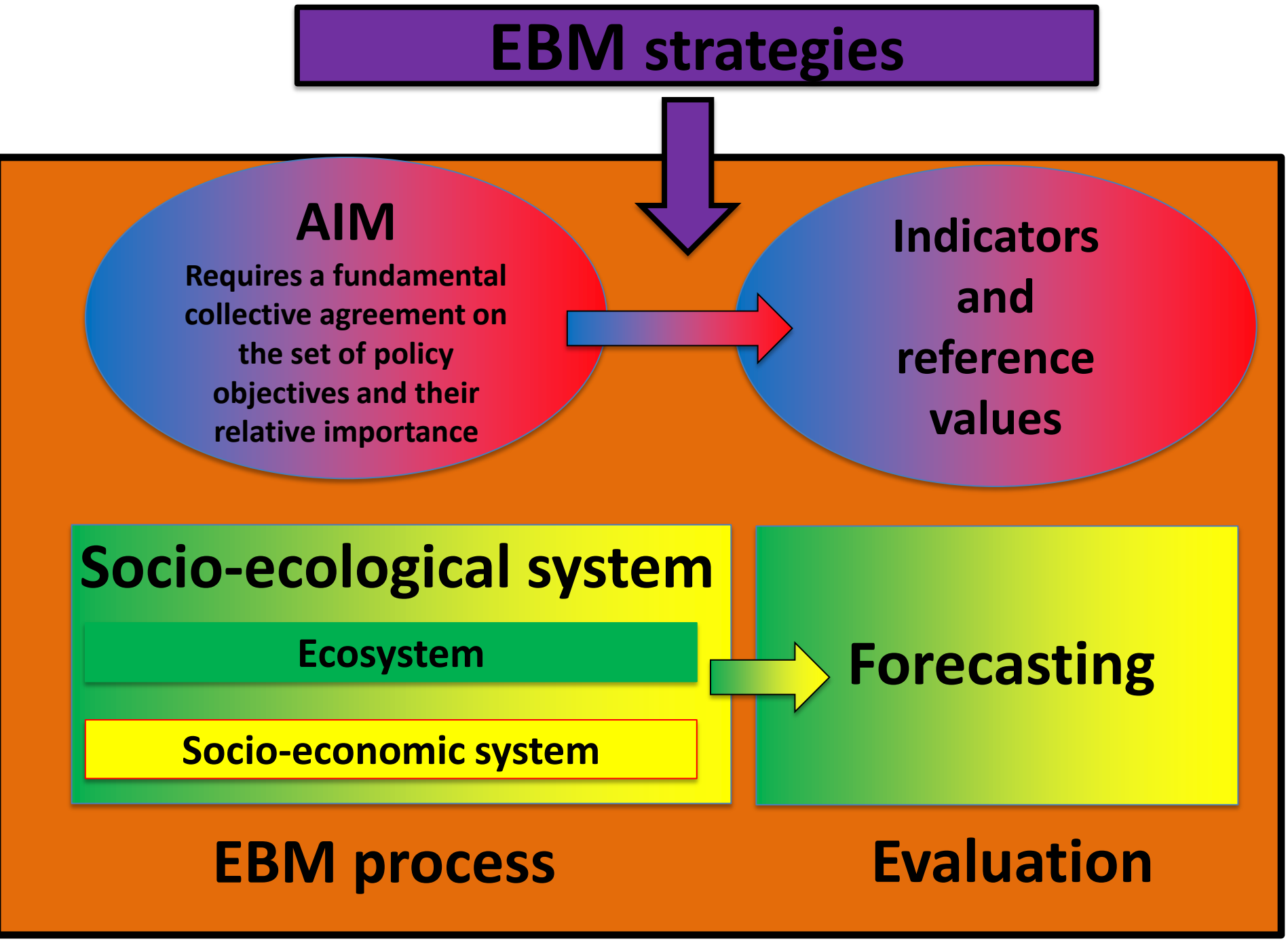
EBM strategies
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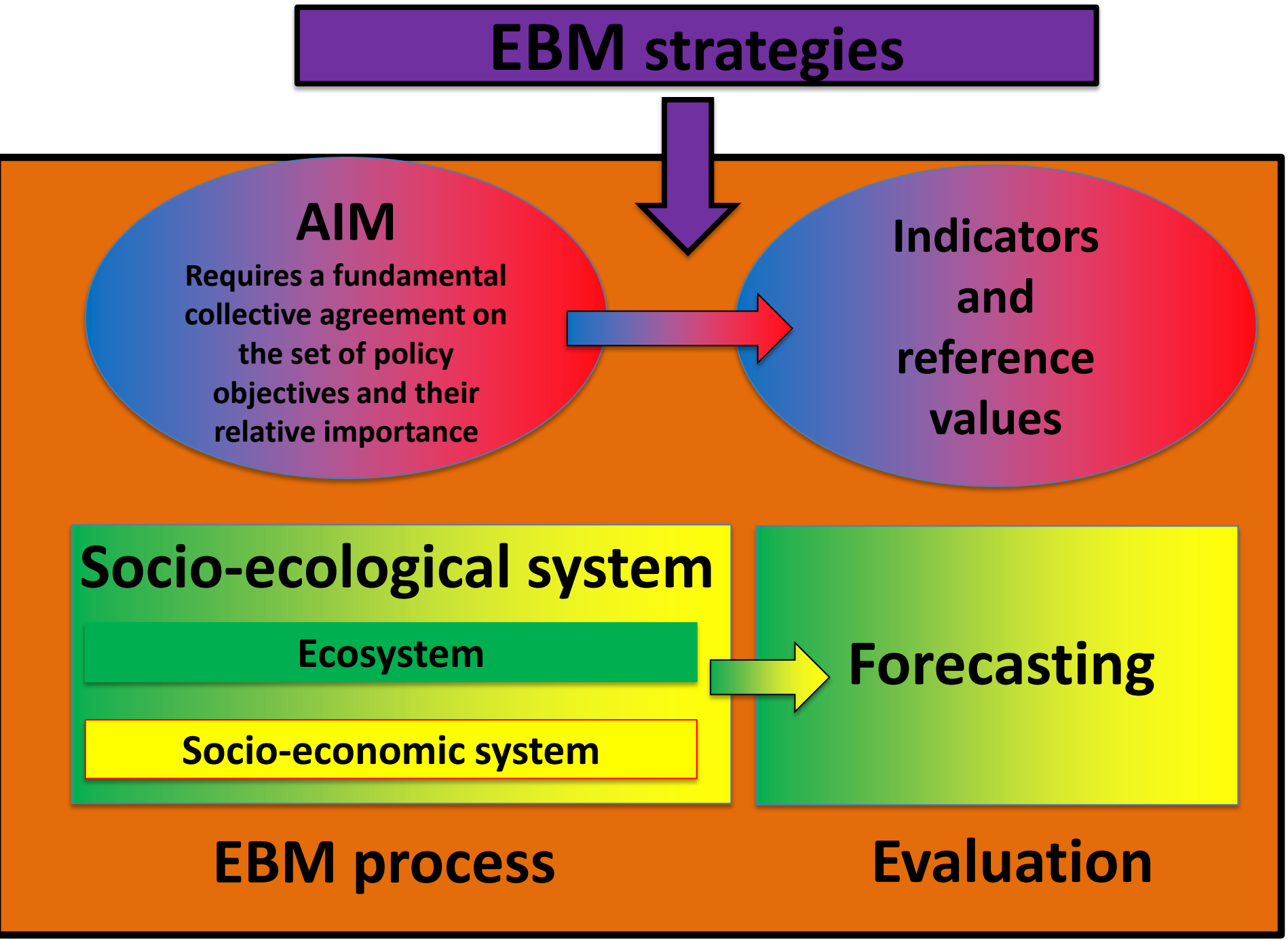
Indicators and reference values
Socio-ecological system
Ecosystem
Socio-economic system
Forecasting
EBM process
Evaluation

WP8

- Preparation → D8.1
  - Input WPs: 1,2,3,4,5
- Evaluation → D8.2
  - Input D8.1 and in addition WP7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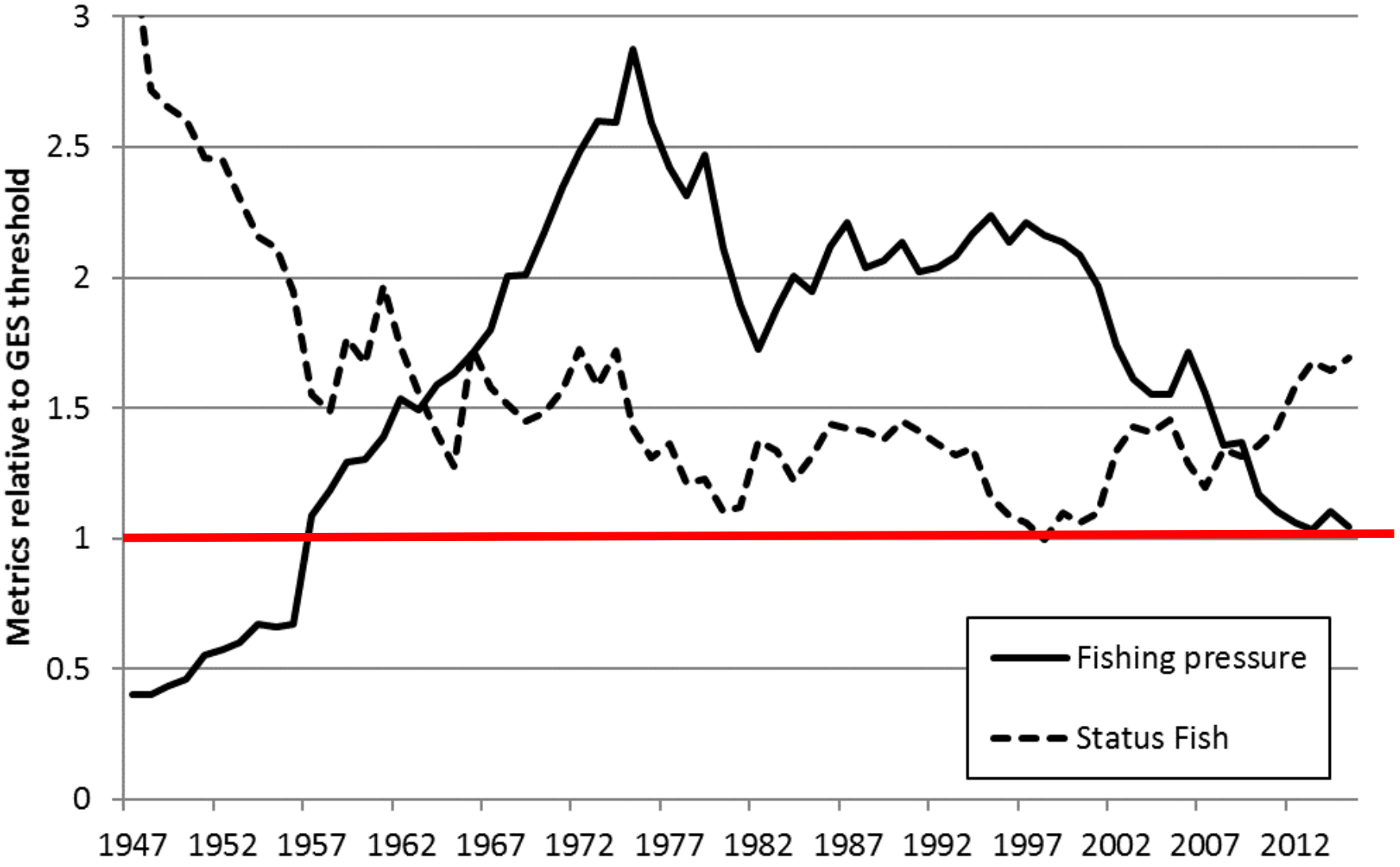
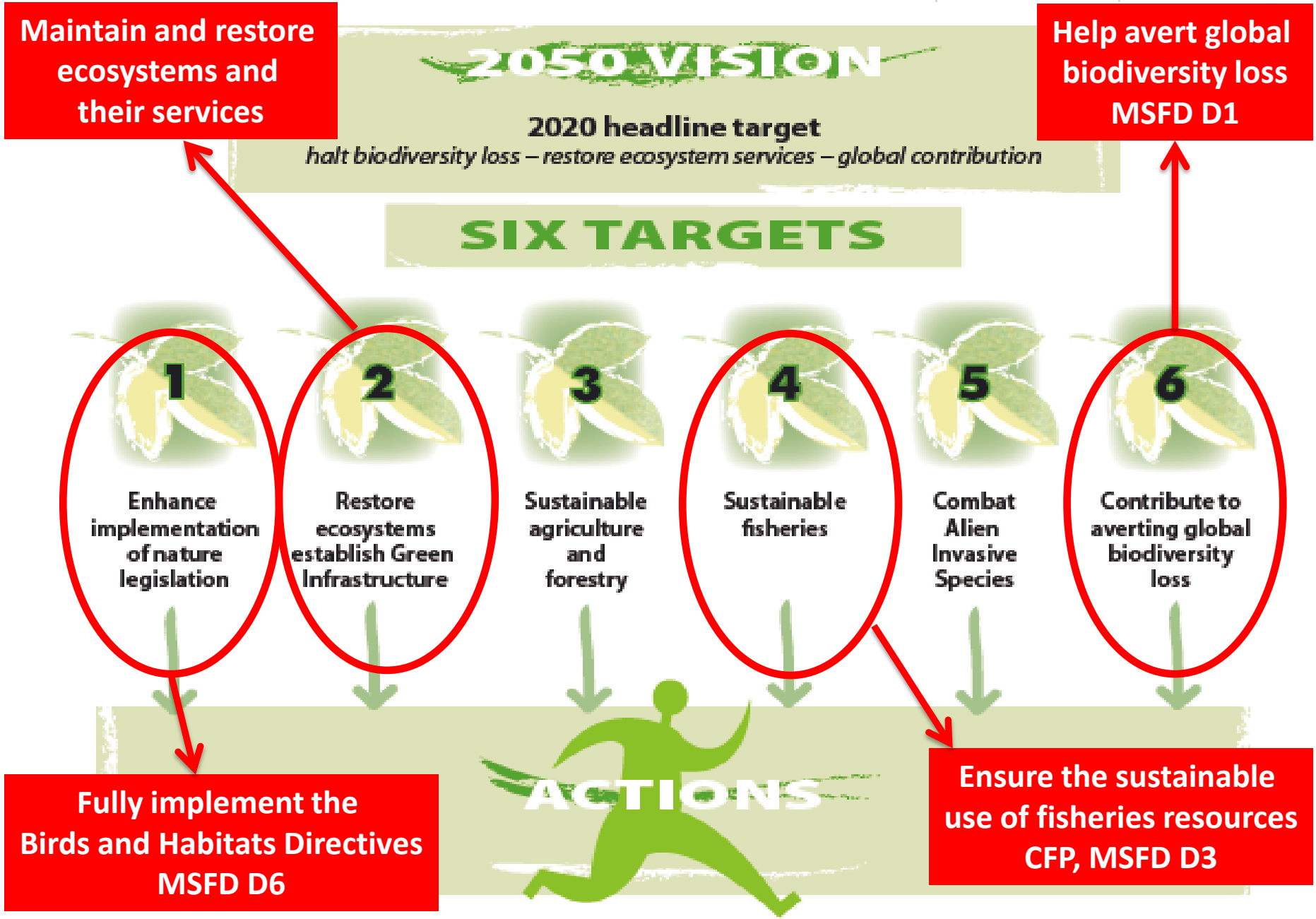
Evaluation

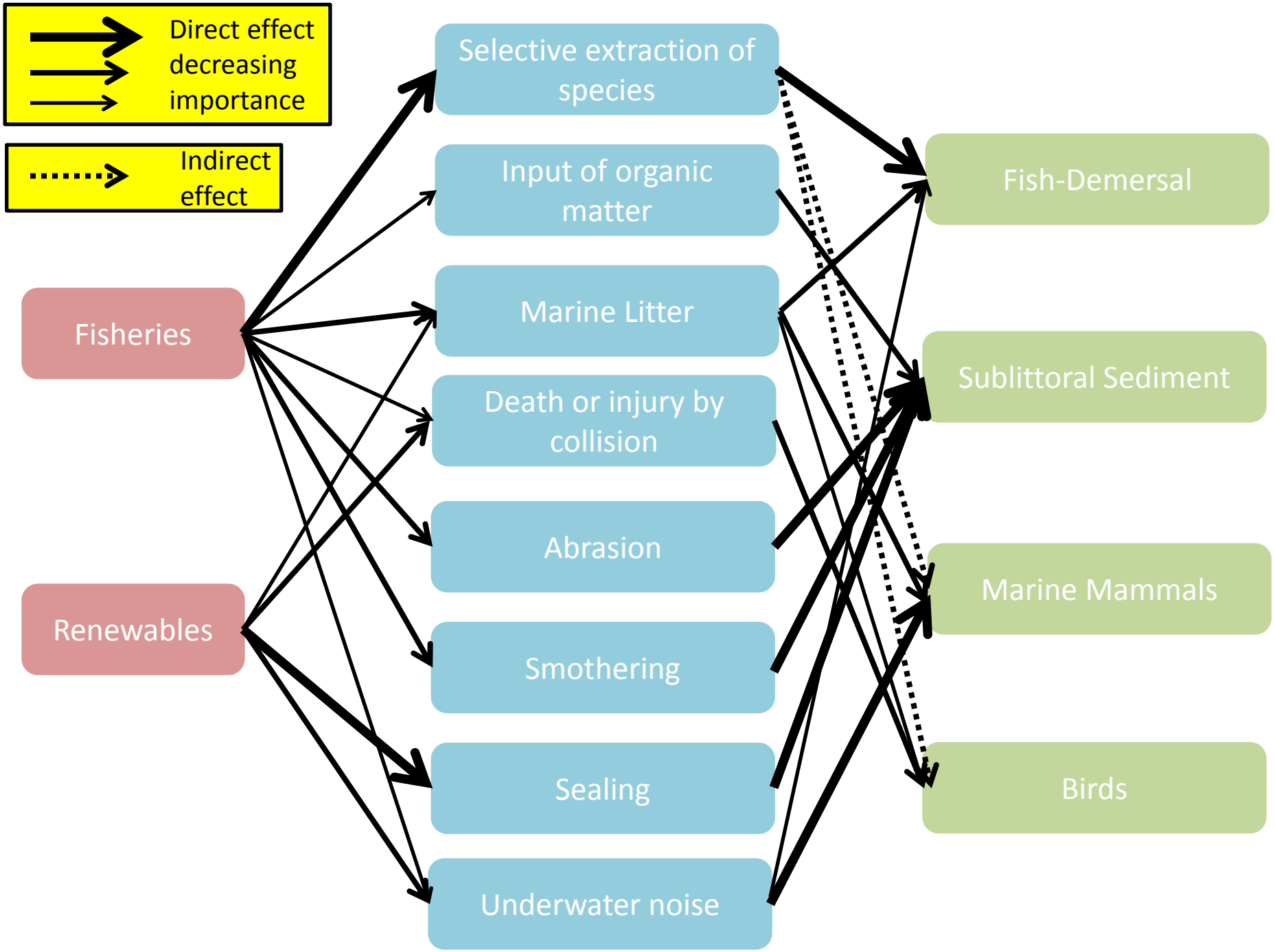
Operationalizing Policy objectives

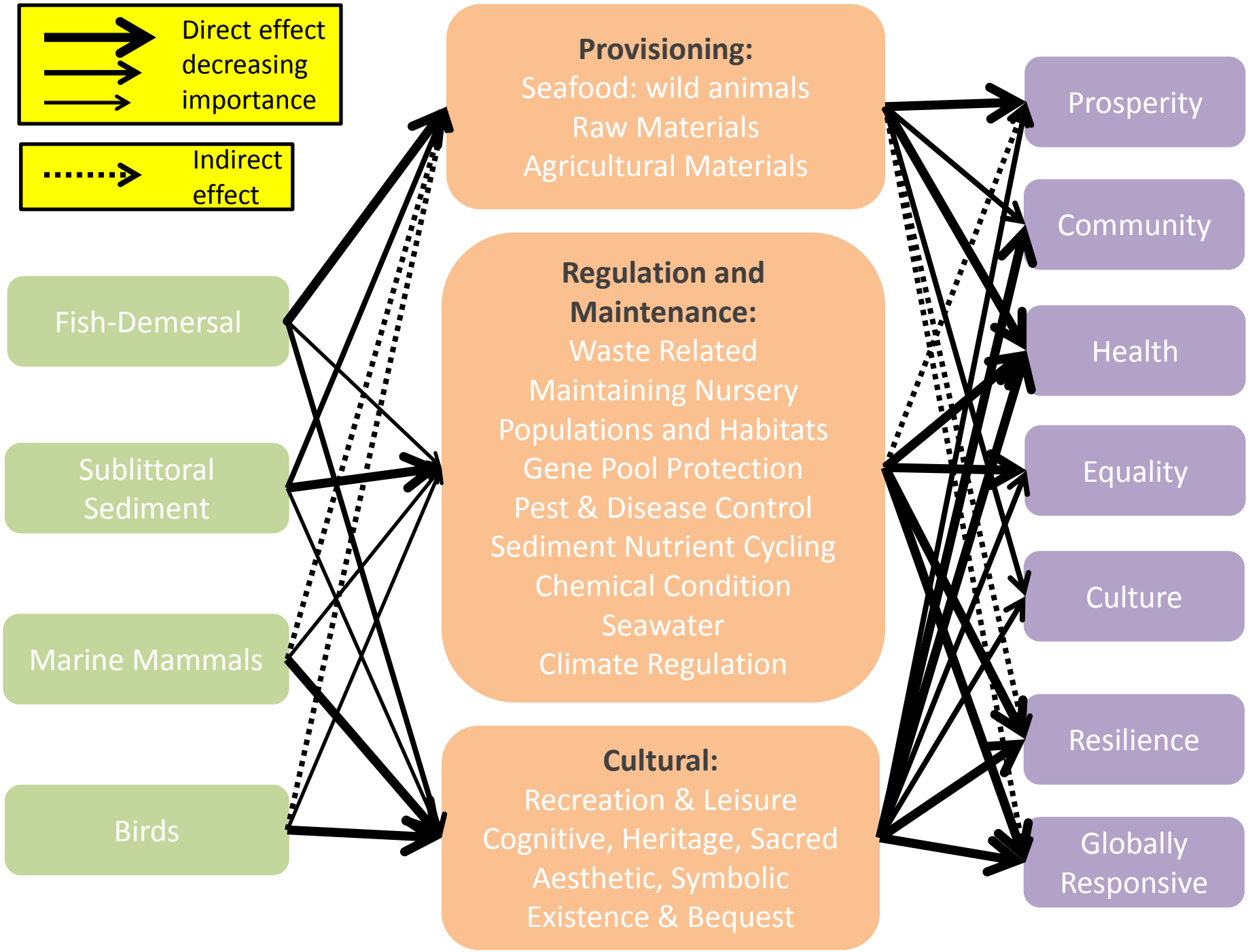
Biodiversity Strategy	Policy Details	Indicators and reference values
Target 1: Fully implement the Birds and Habitats Directives		
Target 2: Maintain and restore ecosystems and their services		
Target 4: Ensure the sustainable use of fisheries resources	Marine Strategy Framework Directive: Populations of all commercially exploited fish and shellfish are in GES if: • Exploited sustainably consistent with high long-term yields, • have full reproductive capacity	• Fishing pressure should be at or below the **target** value expected to produce the high long-term sustainable yield • Fish stock biomass should above a **limit** biomass safeguard capable of producing maximum sustainable yield
Target 6: Help avert global biodiversity loss.		


Metrics relative to GES threshold
3
2.5
2
1.5
1
0.5
0
1947
1952
1957
1962
1967
1972
1977
1982
1987
1992
1997
2002
2007
2012
Fishing pressure
Status Fish

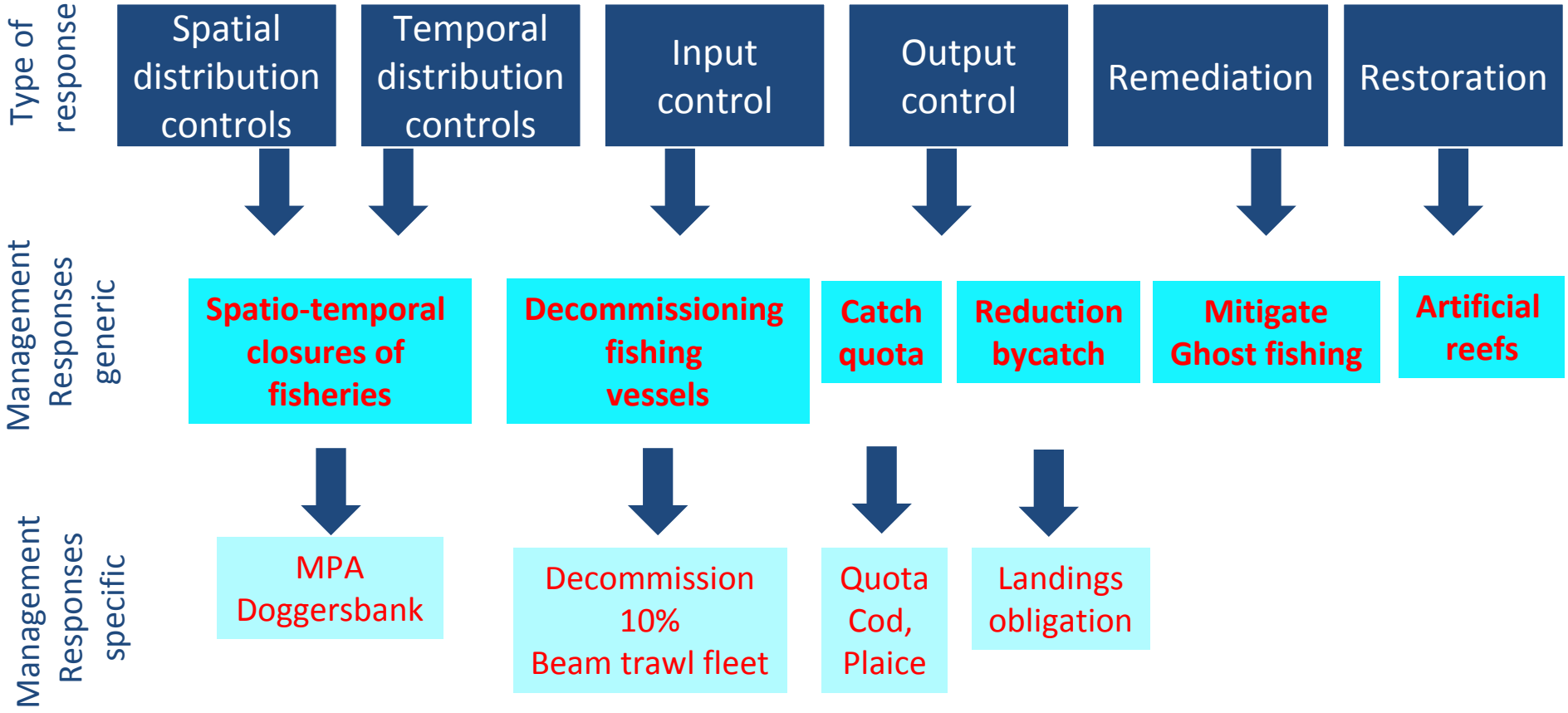
Structure of the EU 2020 Biodiversity Strategy

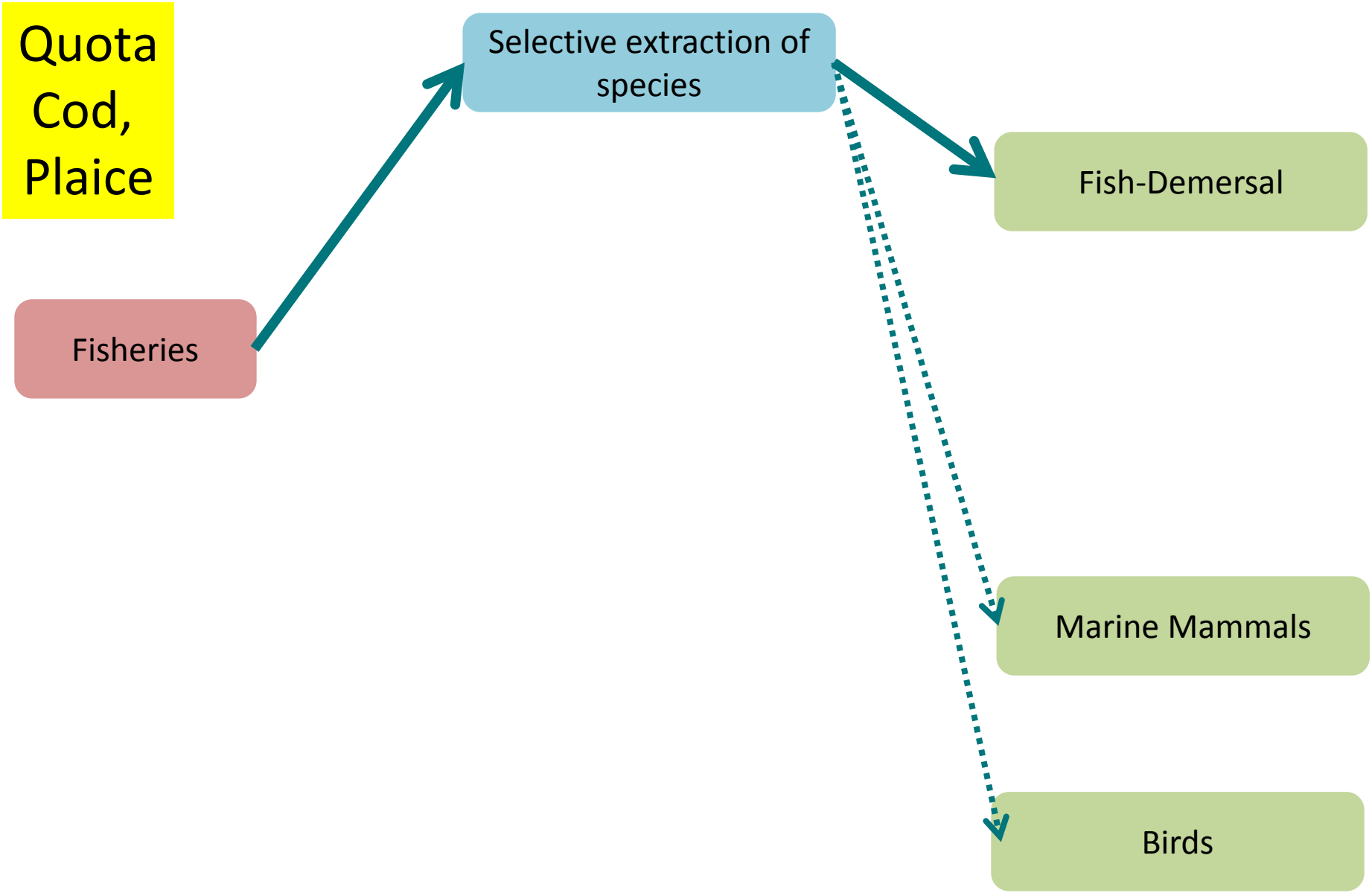


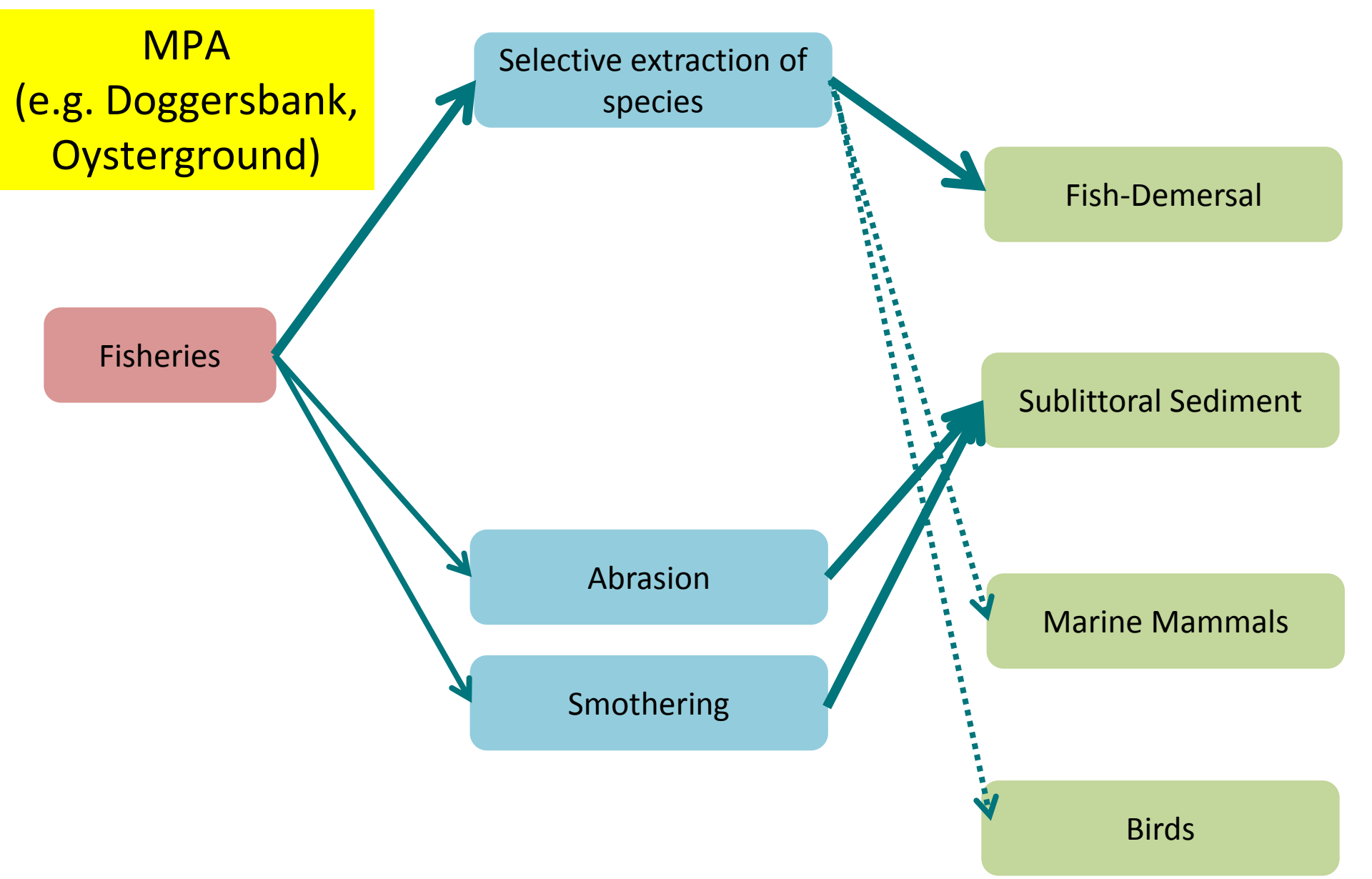

Direct effect decreasing importance
Indirect effect
Fisheries
Renewables
Selective extraction of species
Input of organic matter
Marine Litter
Death or injury by collision
Abrasion
Smothering
Sealing
Underwater noise
Fish-Demersal
Sublittoral Sediment
Marine Mammals
Birds

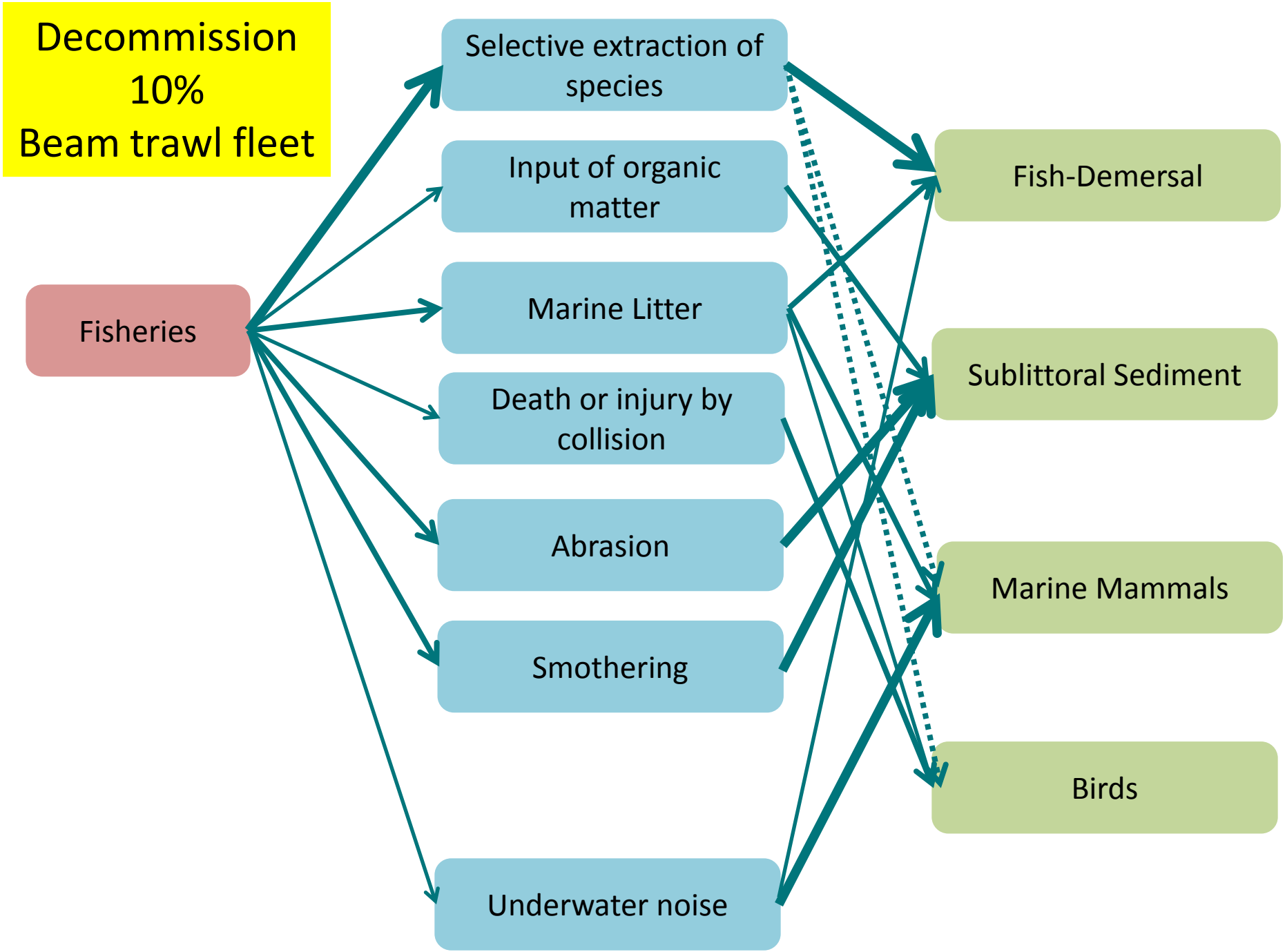

Direct effect decreasing importance
Indirect effect
Fish-Demersal
Sublittoral Sediment
Marine Mammals
Birds
Provisioning:
Seafood: wild animals
Raw Materials
Agricultural Materials
Regulation and Maintenance:
Waste Related
Maintaining Nursery Populations and Habitats
Gene Pool Protection
Pest & Disease Control
Sediment Nutrient Cycling
Chemical Condition
Seawater
Climate Regulation
Cultural:
Recreation & Leisure
Cognitive, Heritage, Sacred
Aesthetic, Symbolic
Existence & Bequest
Prosperity
Community
Health
Equality
Culture
Resilience
Globally Responsive

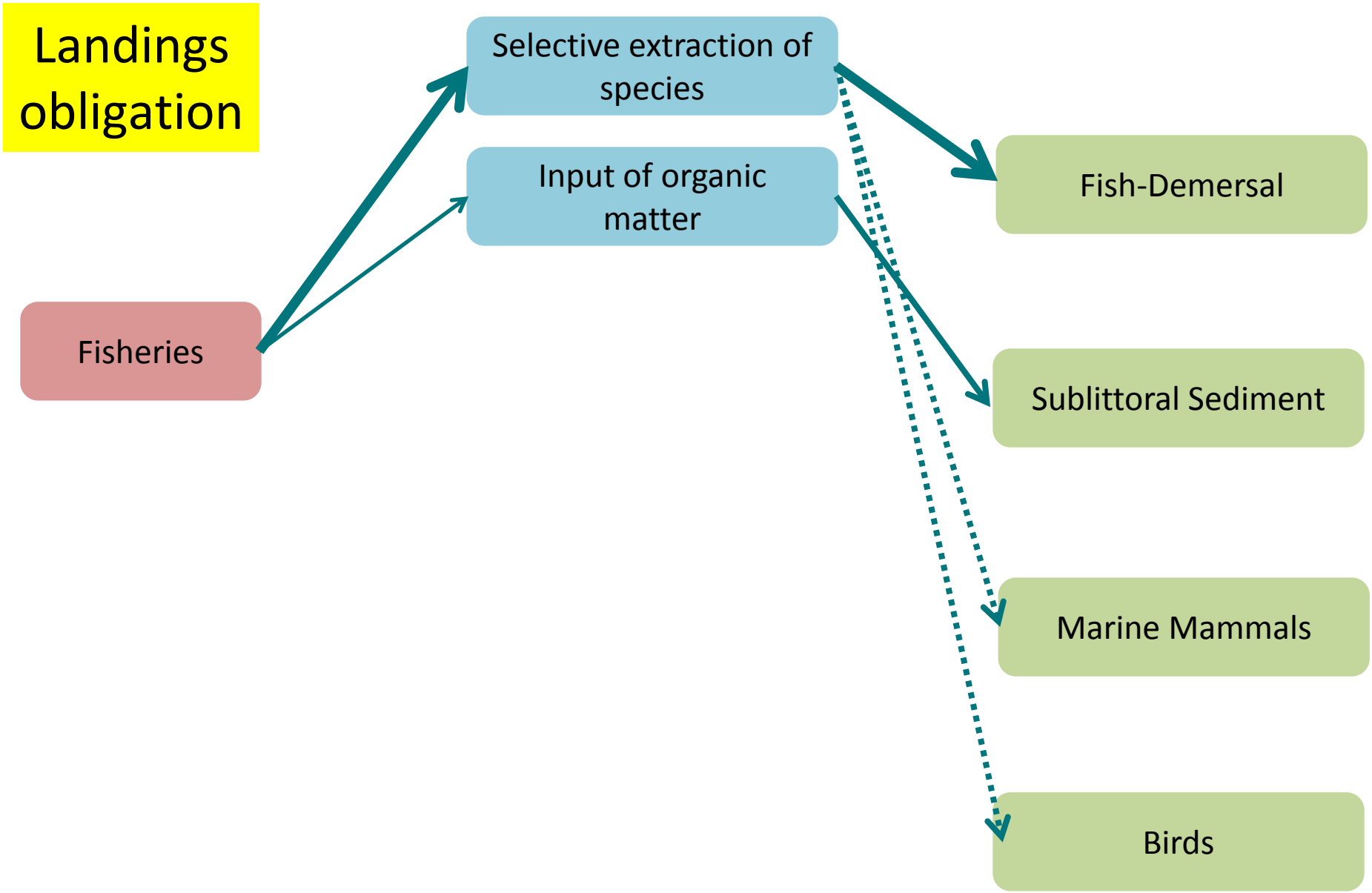
Typology of management responses: Fishing




Quota
Cod,
Plaice
Selective extraction of species
Fisheries
Fish-Demersal
Marine Mammals
Birds


MPA
(e.g. Doggersbank, Oysterground)
Fisheries
Selective extraction of species
Abrasion
Smothering
Fish-Demersal
Sublittoral Sediment
Marine Mammals
Birds

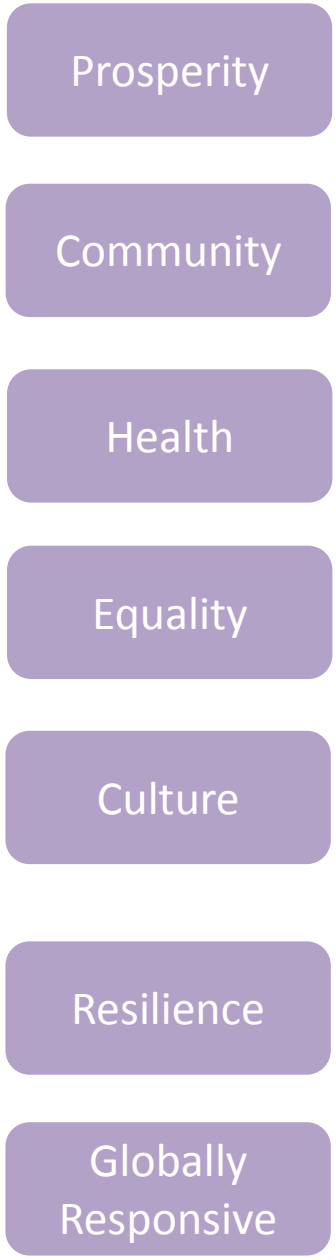

Decommission
10%
Beam trawl fleet
Fisheries
Selective extraction of species
Input of organic matter
Marine Litter
Death or injury by collision
Abrasion
Smothering
Underwater noise
Fish-Demersal
Sublittoral Sediment
Marine Mammals
Birds

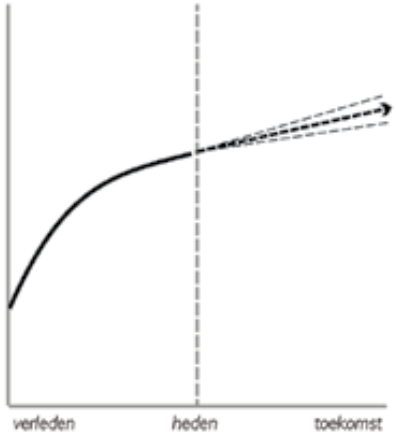

Landings obligation
Selective extraction of species
Input of organic matter
Fisheries
Fish-Demersal
Sublittoral Sediment
Marine Mammals
Birds


Questions?

Human well-being

- effectiveness,
- efficiency,
- equity and fairness,
- policy implementability

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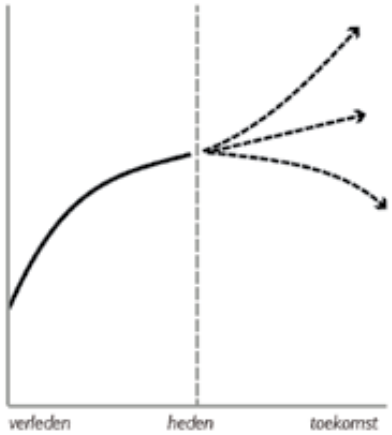
heden
toekomst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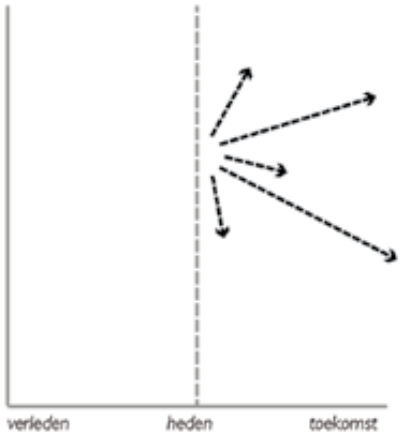
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