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Baltic Sea Maritime Spatial Planning for Sustainable Ecosystem Services

Ecosystem Service Assessments for Maritime Spatial Planning

ESA4MSP

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Science for a better future of the Baltic Sea region

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Ecosystem Services

The ‘merit [*of the ecosystem services concept and approach*] rests on making explicit the direct and indirect benefits that people derive from natural capital’

(Potschin & Haines-Young 2011)

Applying the concept in practice...

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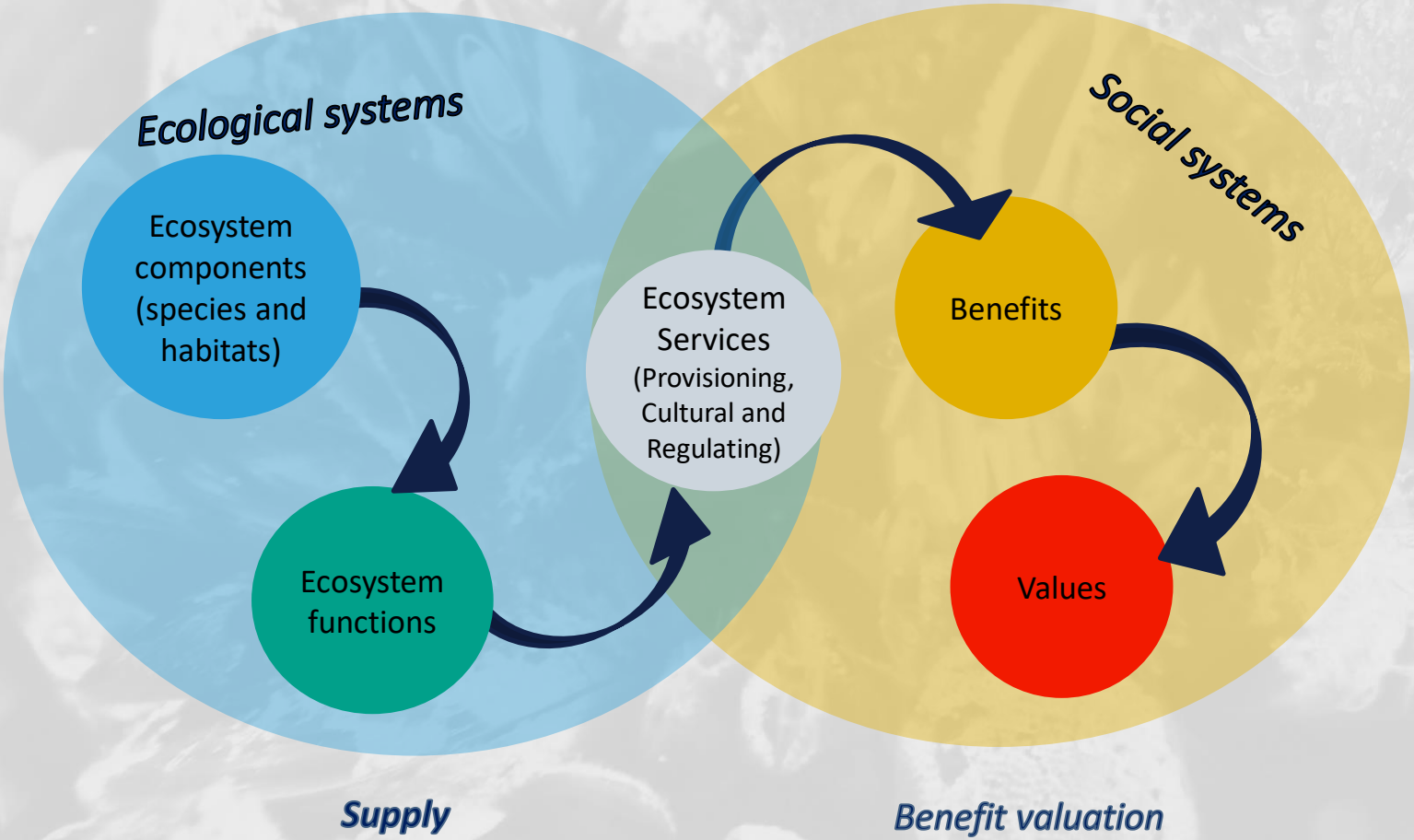

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ESA4MSP is used to quantitatively assess marine ecosystem service supply using the matrix approach and expert knowledge

Outputs:

I. Quantitative description of the contribution of species, habitats and functions in service supply

II. Visual representations

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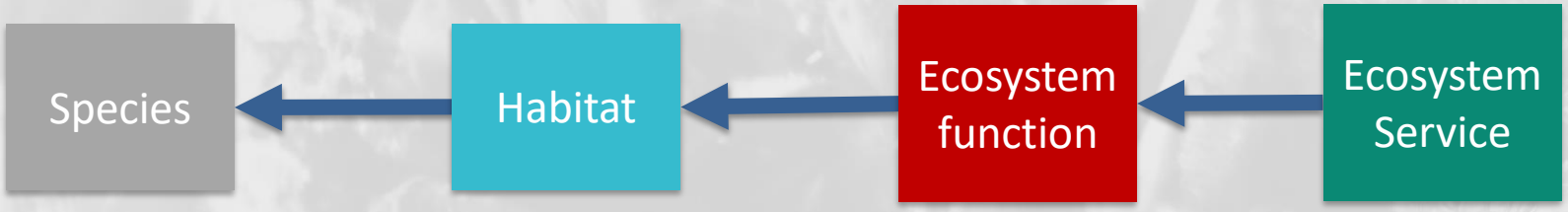
How does it work?

1. Matrix compiled and filled out by experts

	Habitats		Functions		Services	
Species						
Habitats						
Functions						
Total (%)	100	100	100	100	100	100

2. Create linkage chains



3. Work out contribution of species in service supply

4. Develop Sankey diagrams using the Python Plotly library

Latvian case study example

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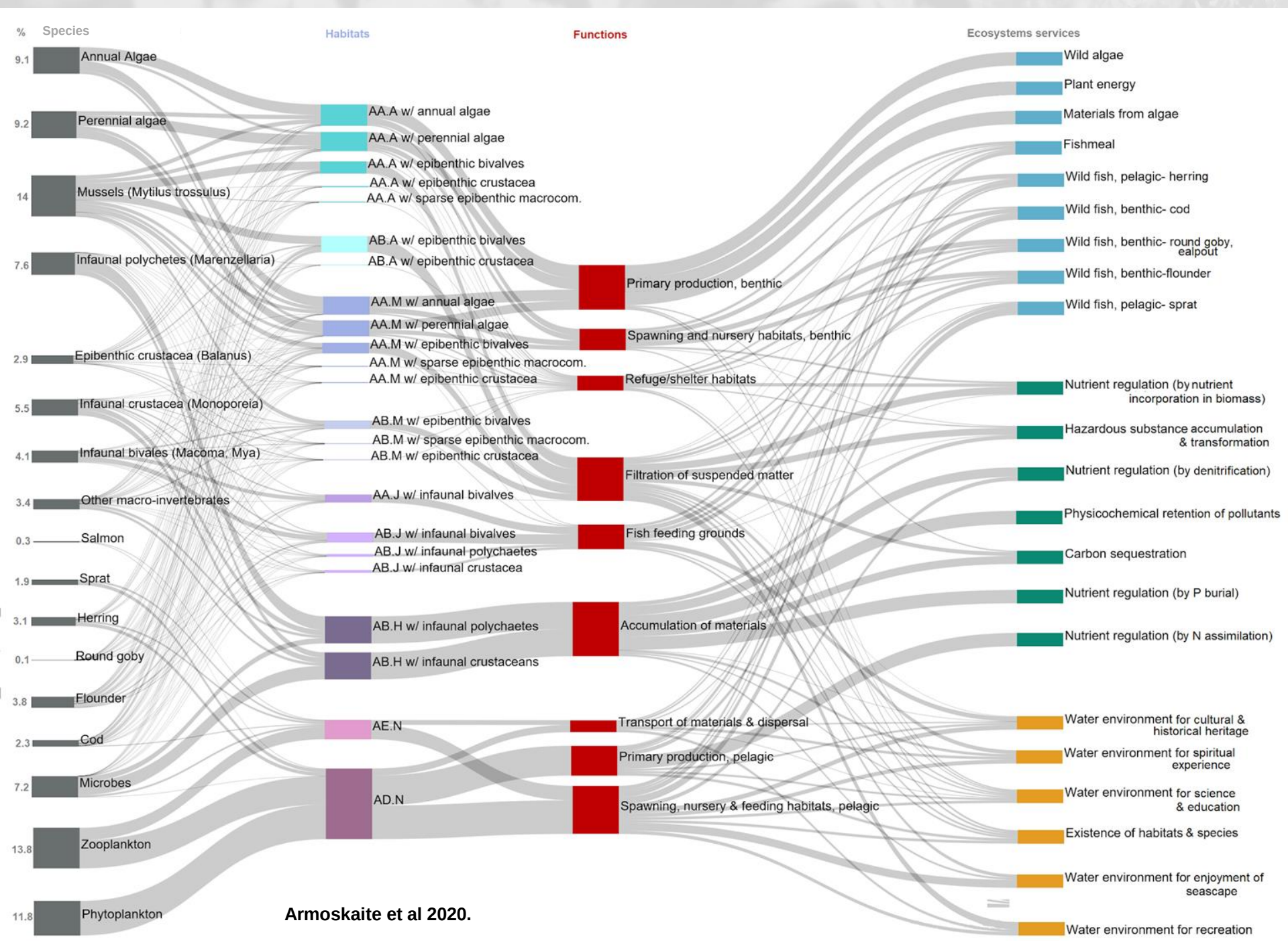
5 mixed background experts

Focus group setting

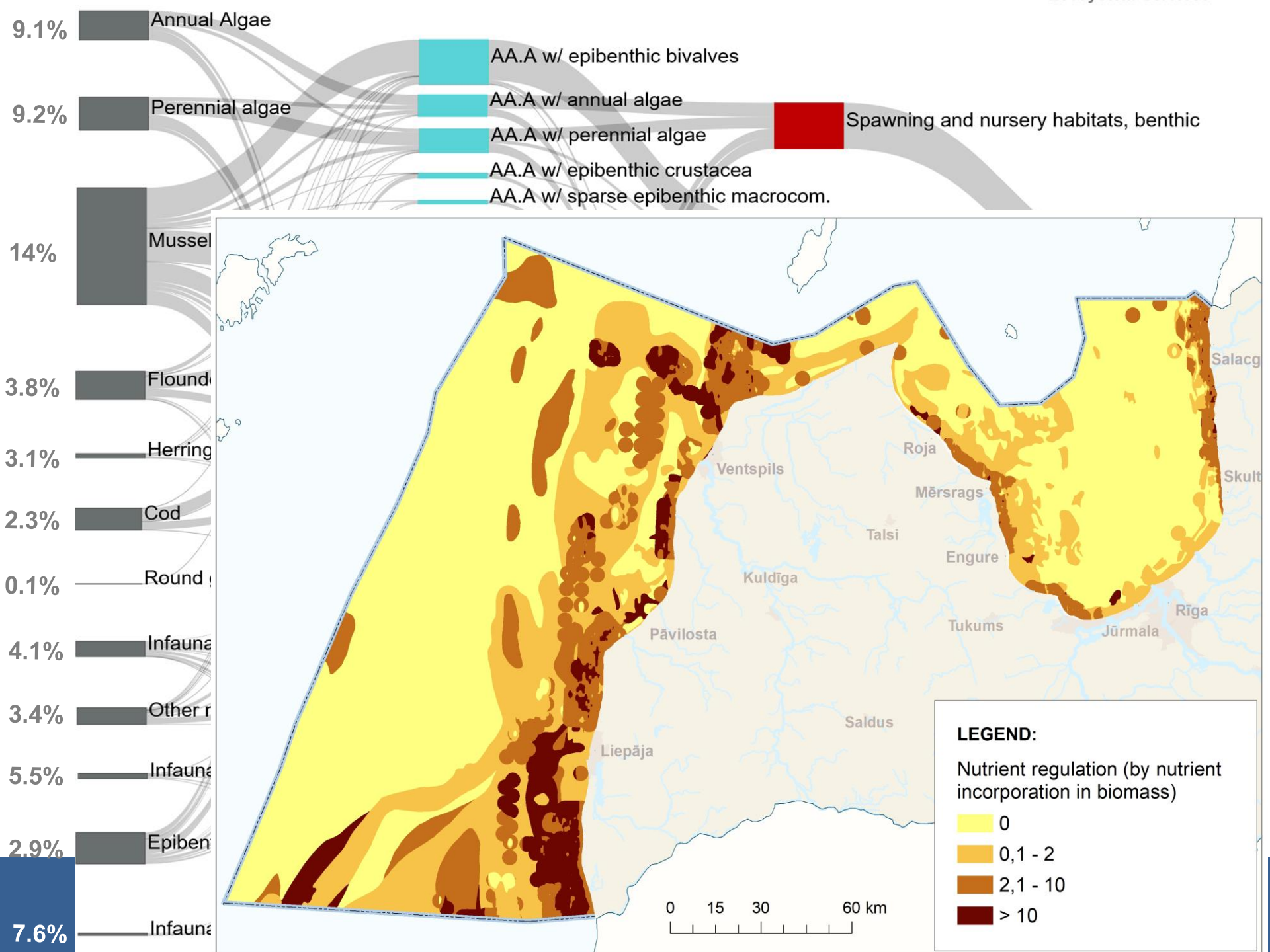
Confidence rating

	Regulation and Maintenance Ecosystem services						
	Nutrient regulation (by denitrification)	Nutrient regulation (by N, P burial)	Nutrient regulation (by nutrient incorporation in biomass)	Nutrient regulation (by N_2 assimilation)	Hazardous substances accumulation and transformation	Physicochemical retention of pollutants	Carbon sequestration
Ecosystem Functions							
Spawning and nursery habitats, benthic							
Spawning, nursery and feeding habitats, pelagic			10				
Refuge/shelter habitats							
Primary production, benthic			15		5		10
Primary production, pelagic				100			
Fish feeding grounds			5				
Filtration of suspended matter			70		55		30
Transport of materials and dispersal							
Accumulation of materials		100			30	100	50
Microbial transformations	100				10		10
%	100	100	100	100	100	100	100
Confidence	3	3	4	3	4	3	3

Armoskaite et al 2020.



Armoskaite et al 2020.


9.1%
Annual Algae
9.2%
Perennial algae
14%
Mussel
3.8%
Flound
3.1%
Herring
2.3%
Cod
0.1%
Round
4.1%
Infauna
3.4%
Other
5.5%
Infauna
2.9%
Epiben
7.6%
Infauna
AA.A w/ epibenthic bivalves
AA.A w/ annual algae
AA.A w/ perennial algae
AA.A w/ epibenthic crustacea
AA.A w/ sparse epibenthic macrocom.
Spawning and nursery habitats, benthic
Salacg
Roja
Ventspils
Skult
Mērsrags
Talsi
Engure
Kuldīga
Rīga
Tukums
Jūrmala
Pāvilosta
Saldus
Liepāja
0 15 30 60 km
LEGEND:
Nutrient regulation (by nutrient incorporation in biomass)
0
0,1 - 2
2,1 - 10
> 10

Change in Ecosystem service supply

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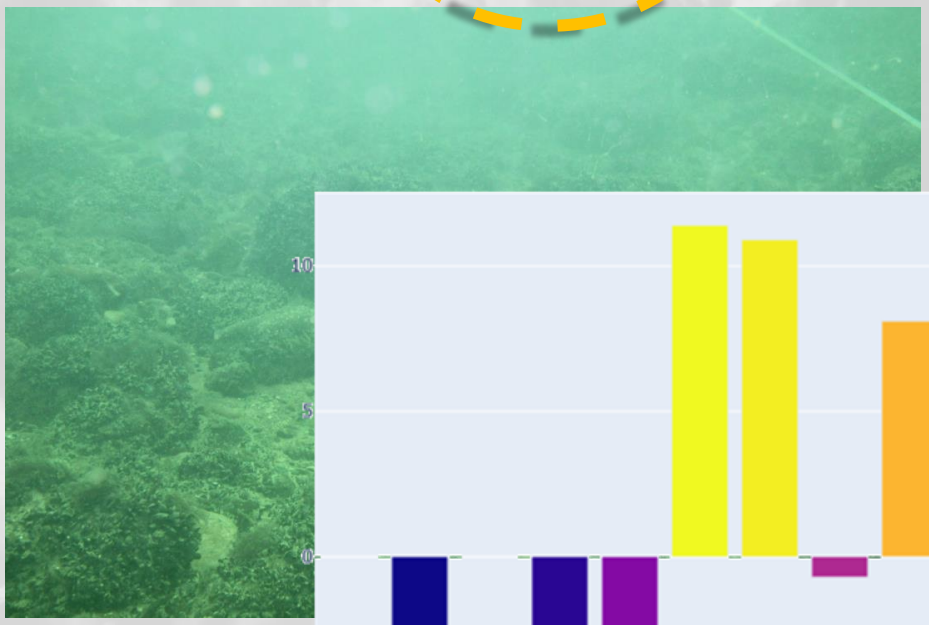
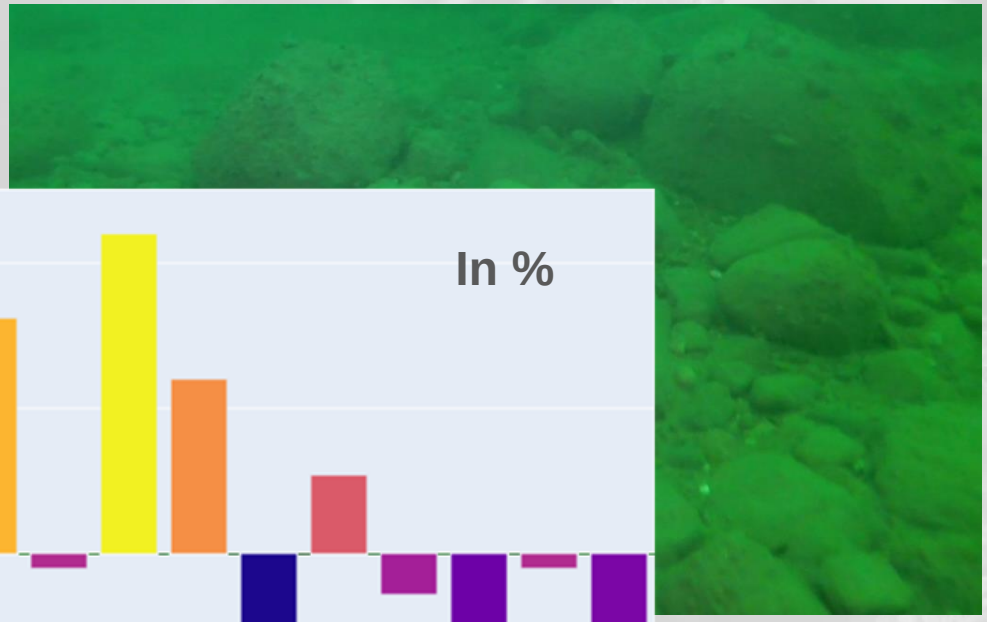
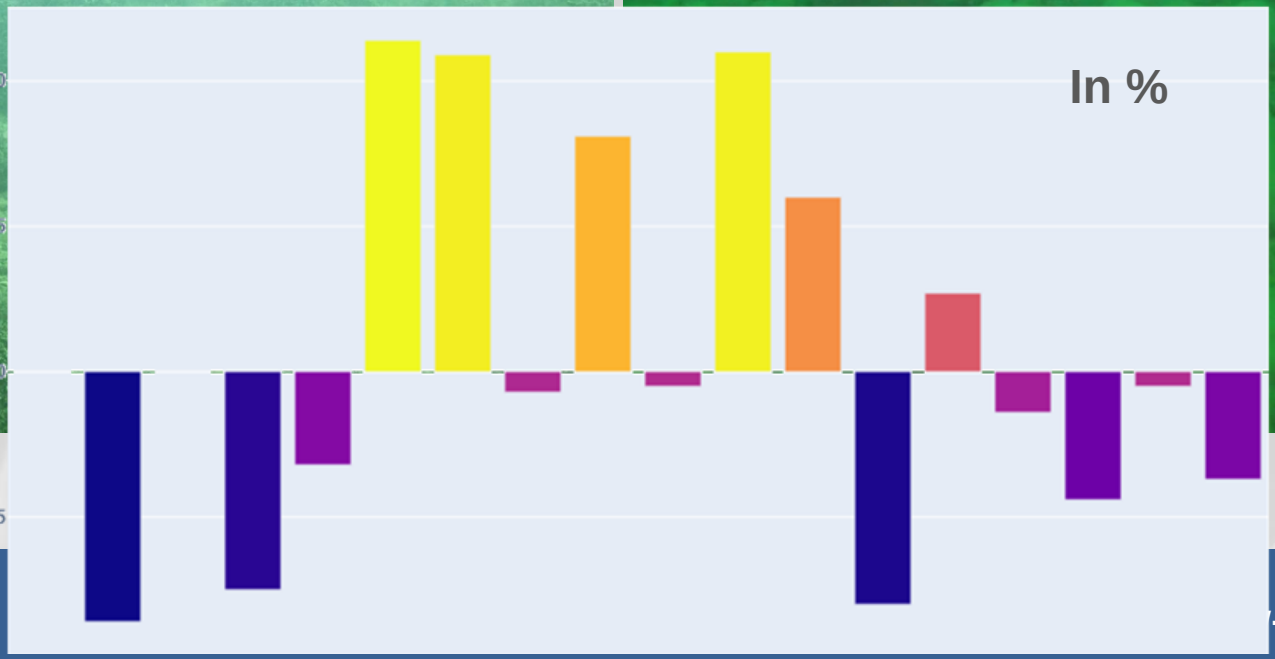
Species → **Habitat** → Ecosystem function → Ecosystem Service







To sum up....

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ESA4MSP is a service supply quantification tool which estimates species and habitat contribution towards service supply

Assessment results can be used to:

- See what happens to the service supply if the ecosystem changes.
- Map locations of service supply
- Support socio-economic valuation studies & help conduct of integrated ESA

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Thank you!

☺

Further resources

Armoškaitė A, Puriņa I, Aigars J, Strāķe S, Pakalniete K, Frederiksen P, Schrøder L, Hansen HS 2020. Establishing the links between marine ecosystem components, functions and services: An ecosystem service assessment tool. Ocean and Coastal Management 193, 105229. Available at: https://doi.org/10.1016/j.ocecoaman.2020.105229

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