

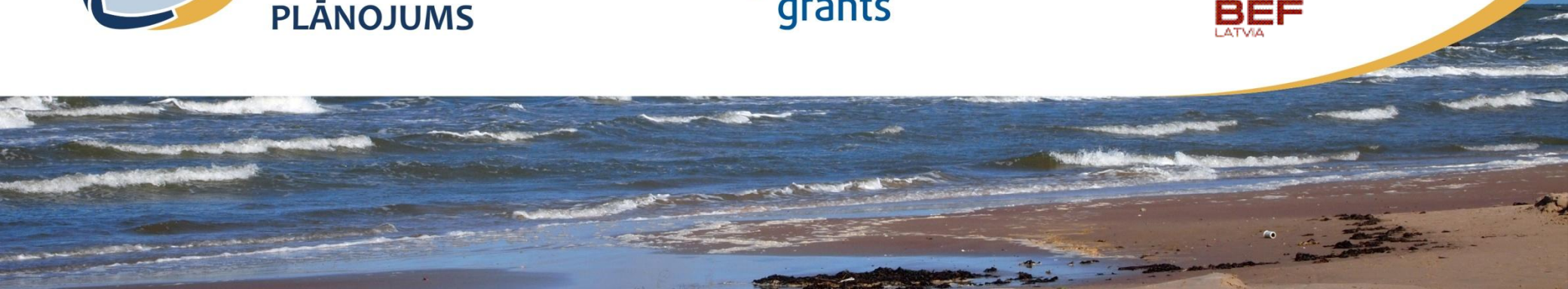
MARITIME SPATIAL PLAN FOR TERRITORIAL WATERS AND EXCLUSIVE ECONOMIC ZONE OF LATVIA

Ecosystem based approach in MSP - Latvian case

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Oslo, 06.10.2015



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Conceptual framework

- EU policy establishes ecosystem based approach (EBA) as an interlink between implementation of :
 - MSFD aiming at Good Environmental Status of marine waters
 - MSP aiming at encouraging «Blue growth»

MSFD: «Marine strategies shall apply an EBA to the management of human activities, ensuring that the collective pressure of such activities is kept within levels compatible with the achievement of GES and that the capacity of marine ecosystems to respond to human-induced changes is not compromised, while enabling the sustainable use of marine goods and services by present and future generations».

- EBA shall be based on following key elements (HELCOM- VASAB guidelines):
 - best available knowledge on marine ecosystem, its structure, functions
 - identification of ecosystem services
 - Relational understanding of interactions between ecosystem and human activities
 - precautionary principle and adaptive approach.
 - alternative planning solutions
 - participation and communication

Key elements in application of EBA in Latvian MSP

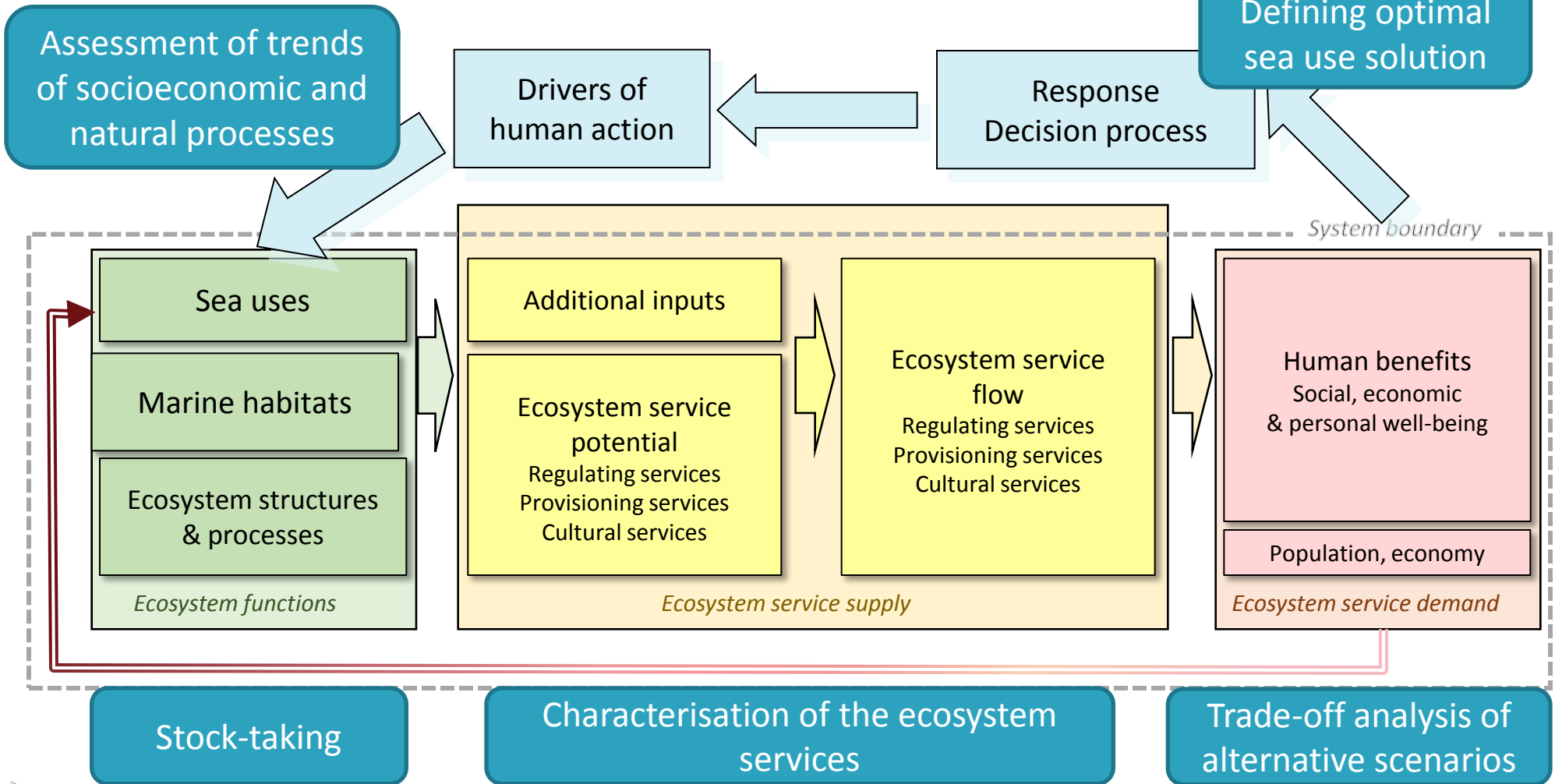


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- Mapping of benthic habitats and ecosystem services
- Assessing sensitivity of marine habitat types to different sea uses
- Assessment of ecological impacts of alternative sea use scenarios and optimal sea use solutions

Mapping of benthic habitats, ecosystem service and ecologically valuable areas

Conceptual model of ecosystem functions, services and benefits relations (after Burkhard et al., 2014)



Burkhard, B., M. Kandziora, Y. Hou & F. Müller (2014): Ecosystem Service Potentials, Flows and Demands - Concepts for Spatial Localisation, Indication and Quantification. Landscape online 34: 1-32.

Steps for mapping of ecosystem service

Selection of spatial units for assessment – habitat types

Acquisition of spatial and biophysical data

Development of base map for assessment

Identification of ES to be assessed

Selection of relevant ES indicators

Development of ES assessment matrix

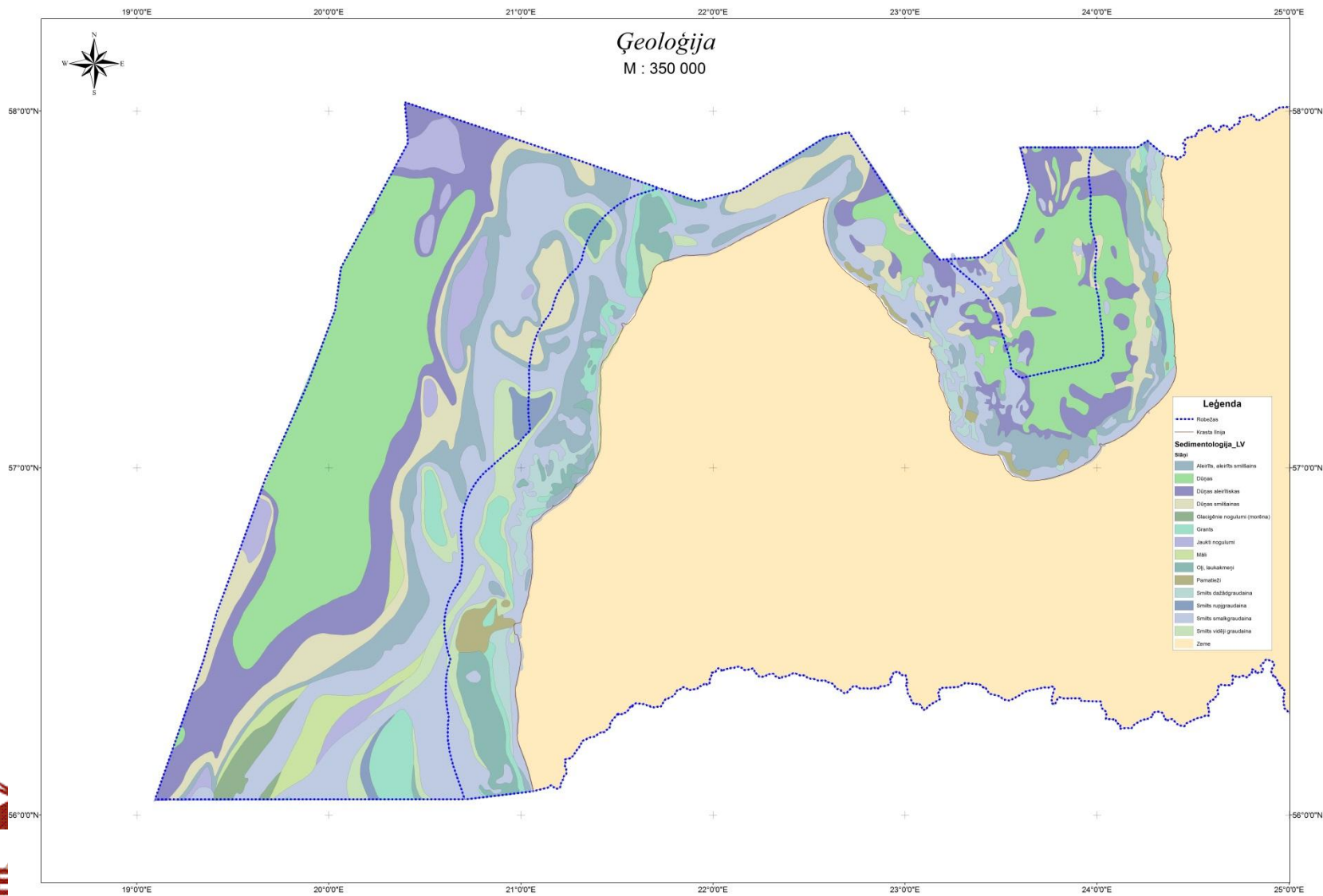
Expert judgement on capacity of ES supply in particular habitat types/evidence based assessment based on literature or field data

Mapping of ES by linking the assessment values to the spatial units of habitat types

Development of habitat map

- Habitat classification using HELCOM HUB, 2013 – level 3-5
- Spatial and biophysical data applied :
 - Sea bottom sediment map
 - Secchi depth/bathymetry data
 - Benthic biology data (field observations)

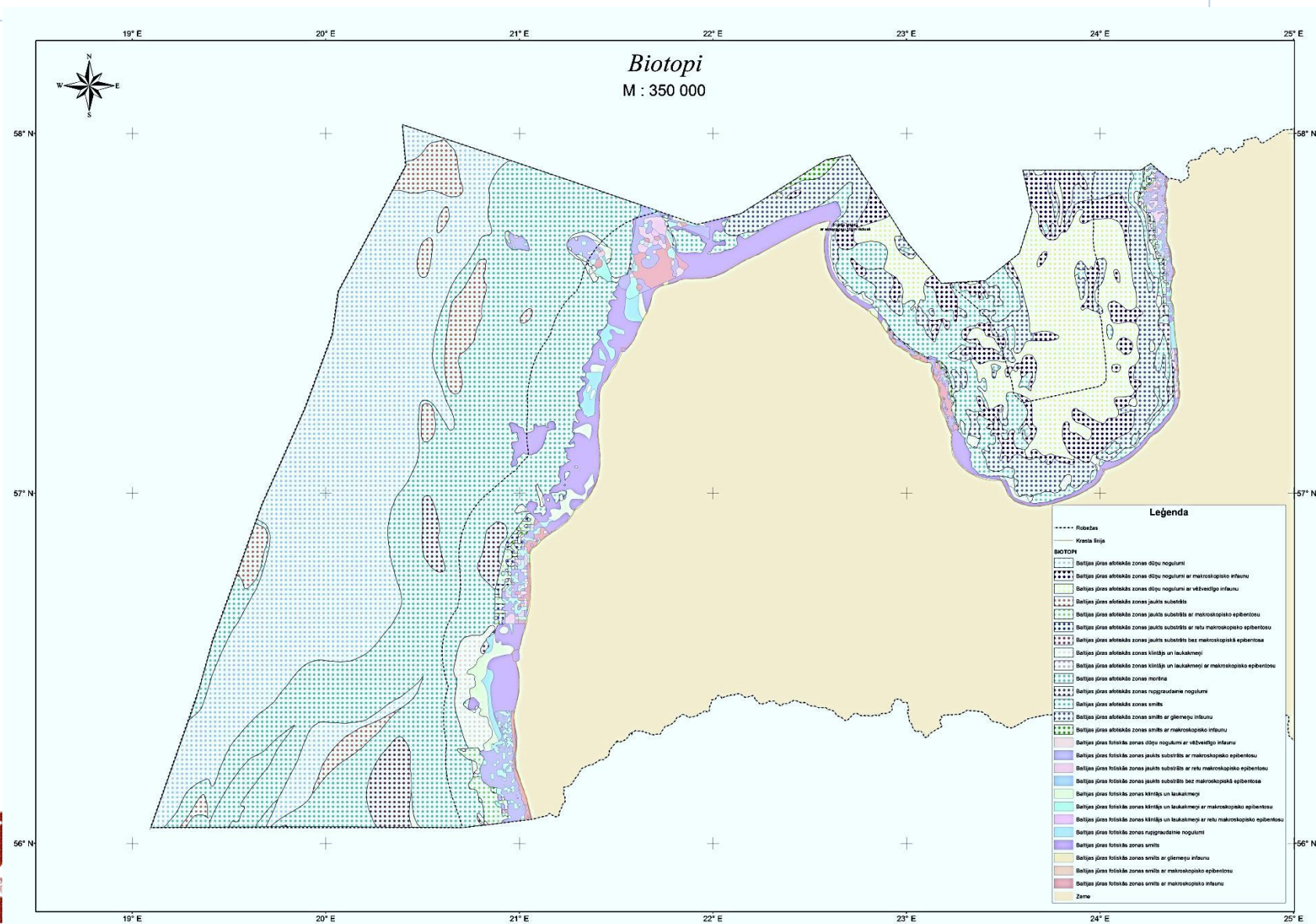
Map of sea bottom sediments



Map of benthic habitats (n=26)



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Assessment of ES that depends on benthic habitats

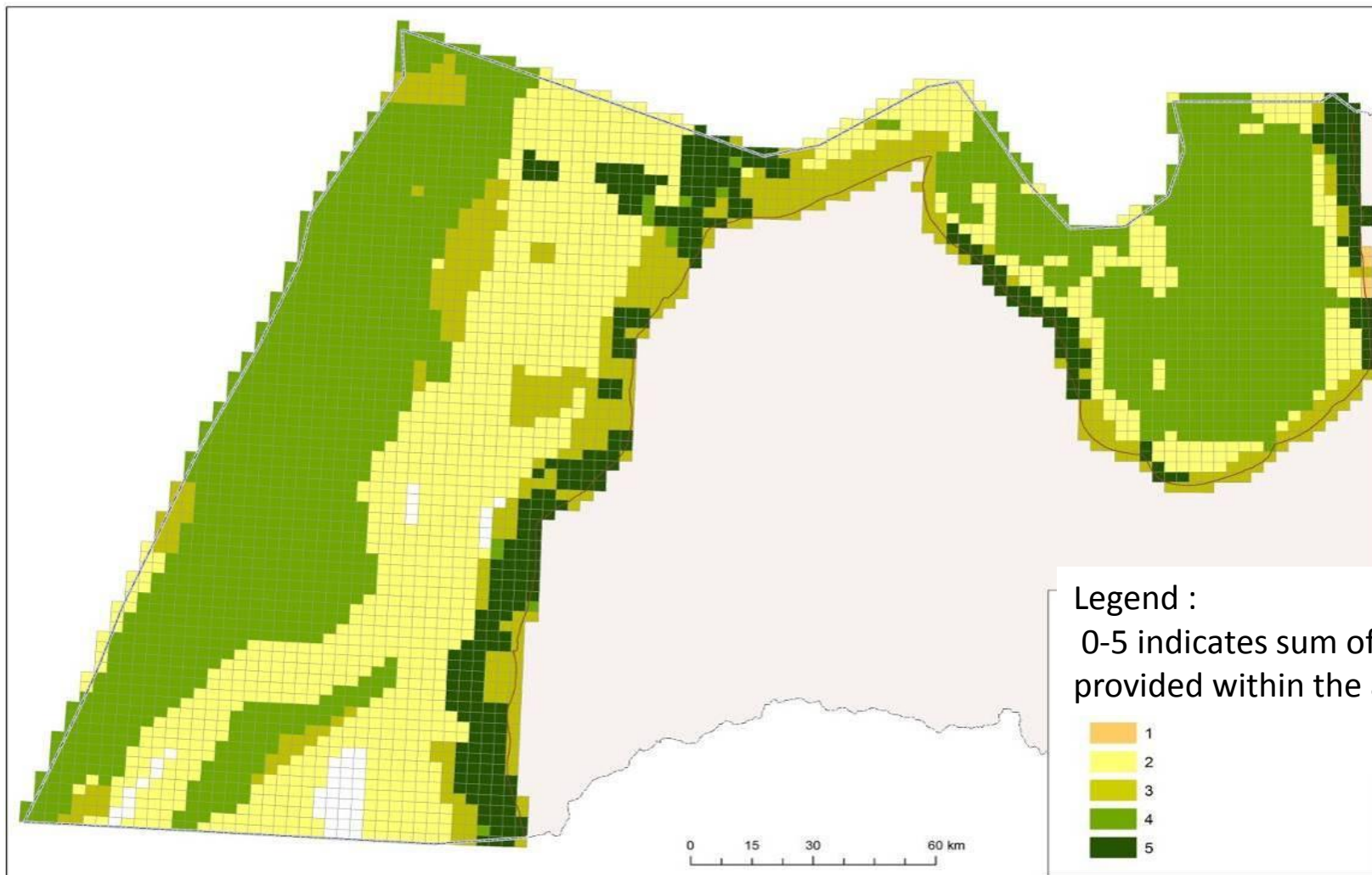
ES selection based on CICES – Common International Classification of Ecosystem Services

	Provisioning	Regulation & Maintenance							
	Wild plants, algae:	Bio-remediation by biota			Filtration by biota	Mass stabilisation and erosion control	Maintenance of physical, chemical, biological conditions		
	area covered by red algae <i>Furcellaria lumbricalis</i> beds	eutrophication control through denitrification	eutrophication control through storage of nutrients	storage of pollutants	filtration of nutrients by mussels	erosion protection of coasts and sediments	nursery sites for fish species	carbon storage	
Habitat type 1 (e.g. reefs)	X				X	X	X	X	
Habitat type 2									
Habitat type N									

Diversity of benthic habitat related ecosystem services in Latvian marine waters.

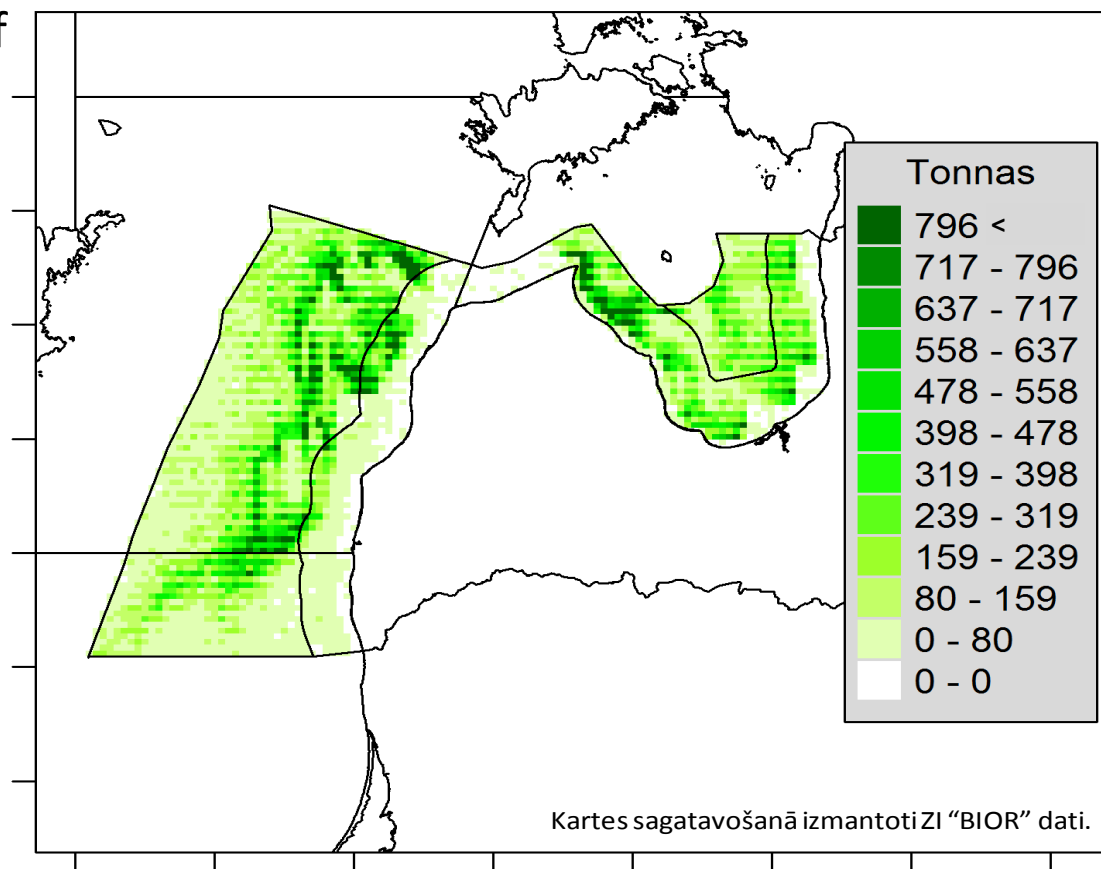


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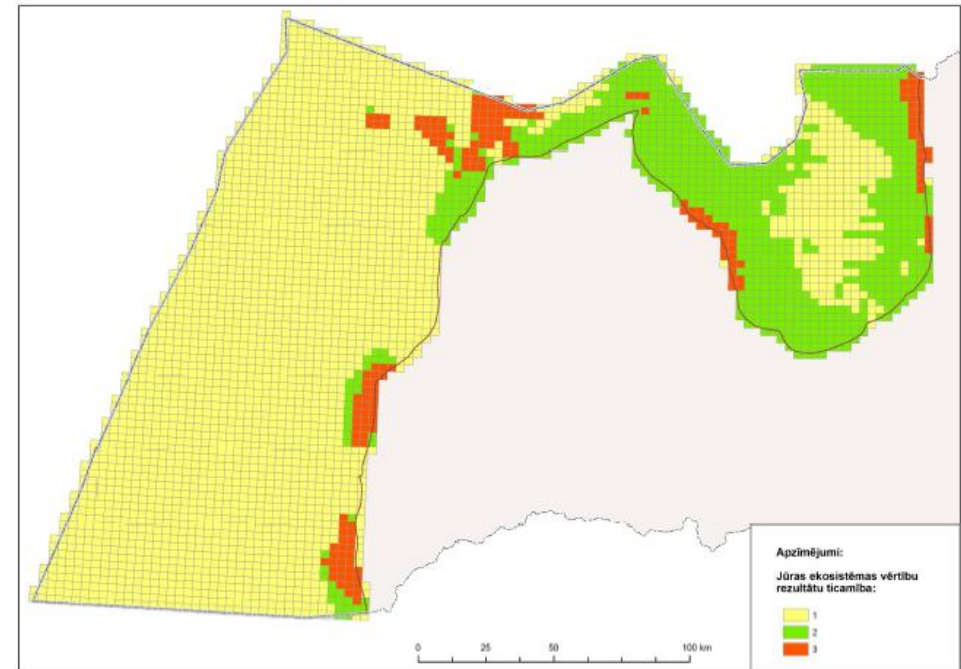
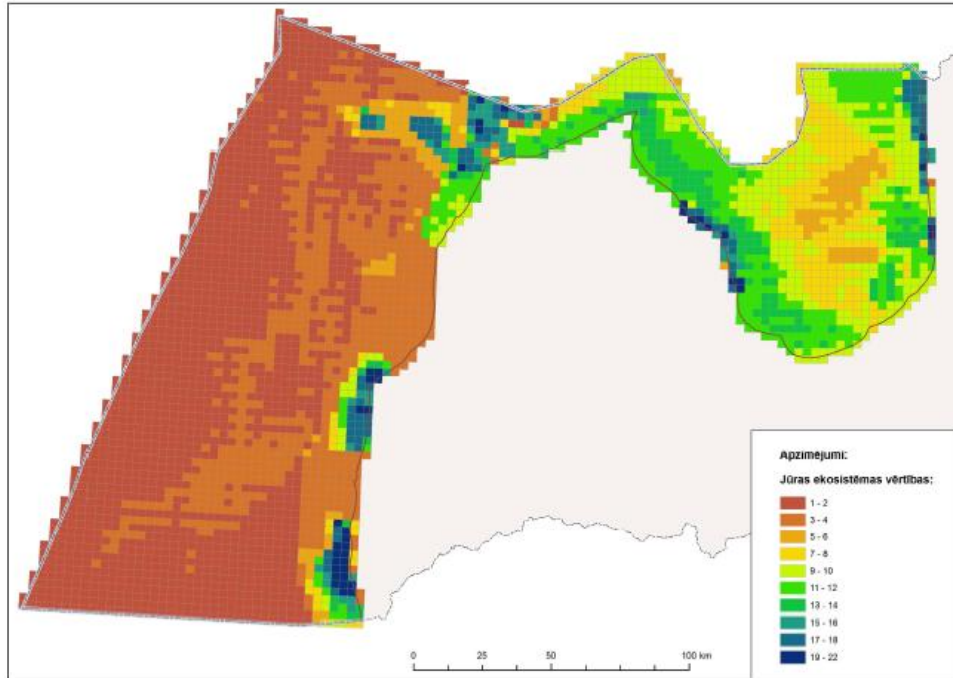


Challenges in marine ES mapping

- Limitations in knowledge and data on marine ecosystems
- Three dimensional character of marine ecosystem
 - Not all ES provision depend on benthic habitat types (e.g. commercial fish)
- Solution: mapping of



Identification of areas of high ecological value

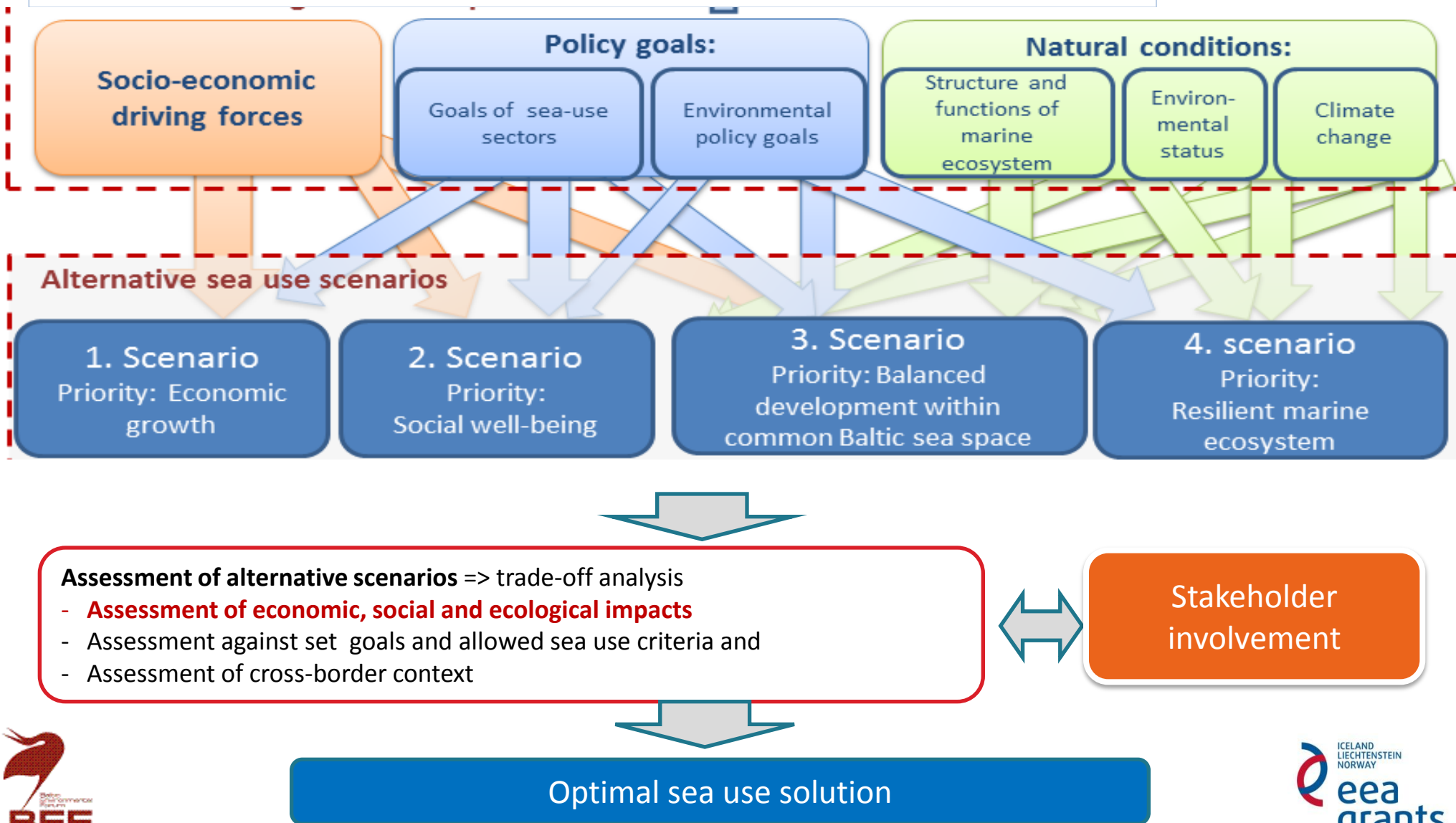


Sum of ecosystem values assessed by different criteria

Certainty of assessment results

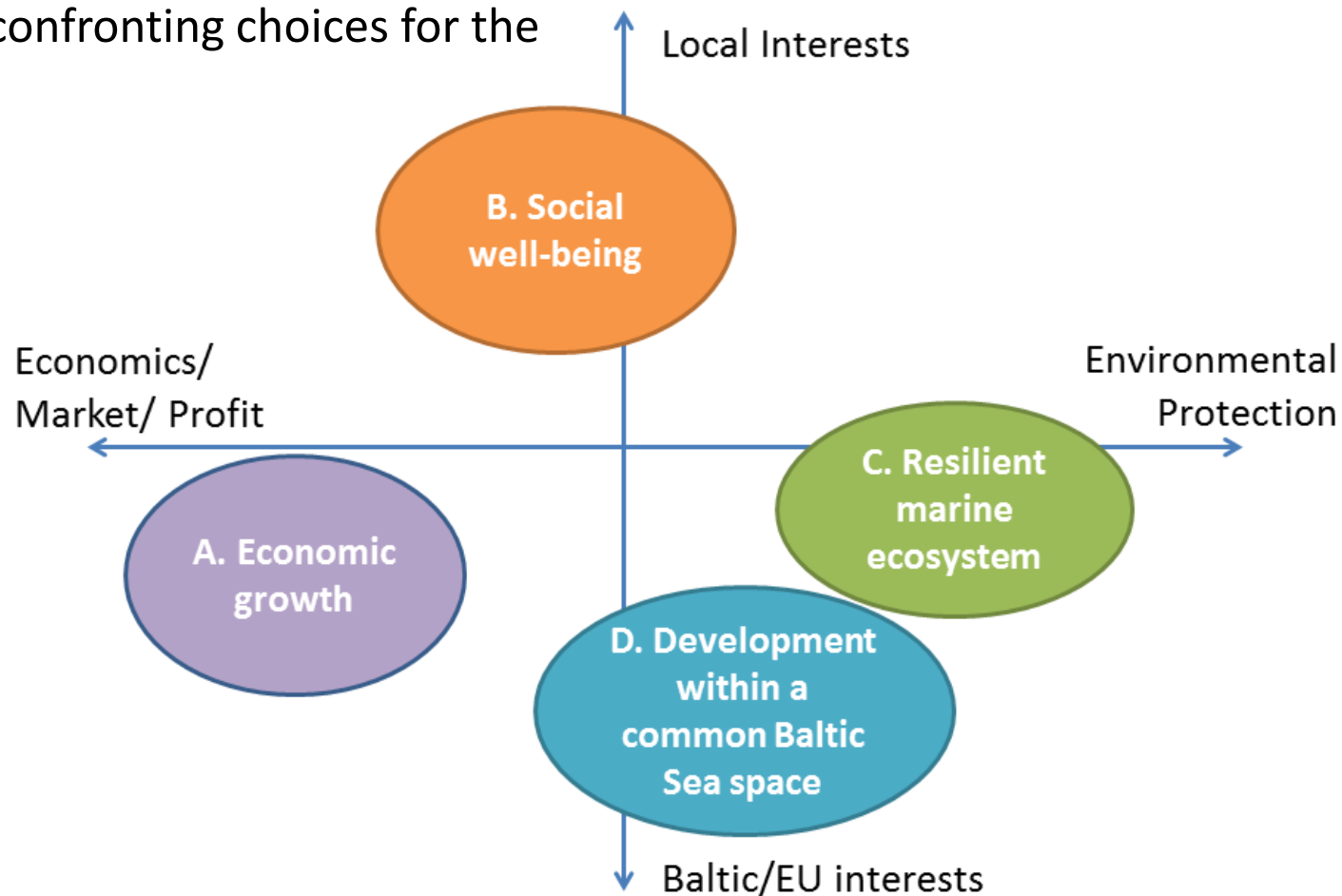
Assessment of ecological impacts of alternative sea use scenarios

Development and assessment of alternative scenarios



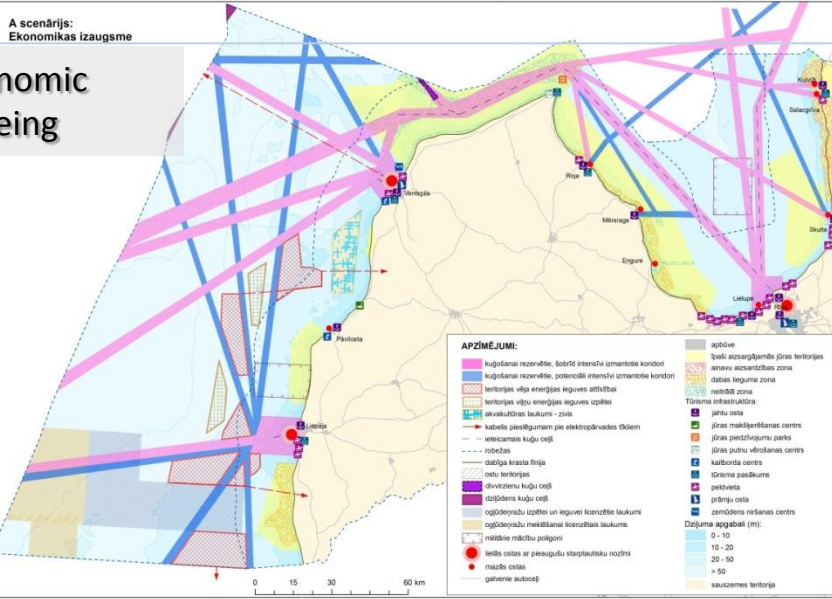
Our approach of scenario building

- Scenarios are based on different policy and societal priorities as confronting choices for the development

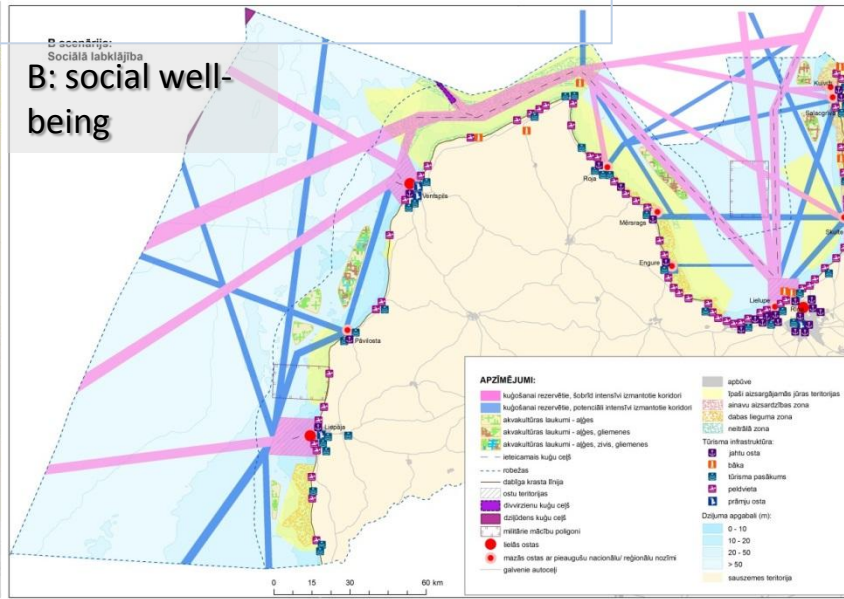


Spatial sea use solutions of the four scenarios

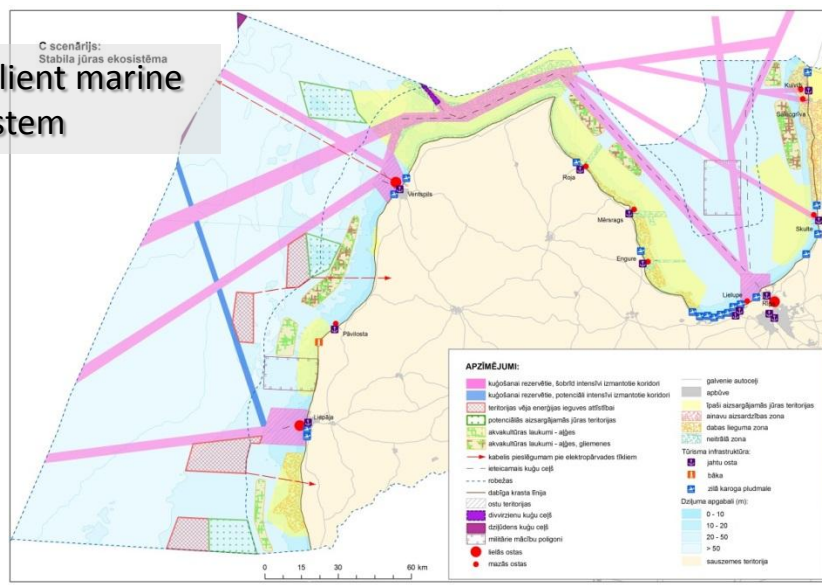
A: economic well-being



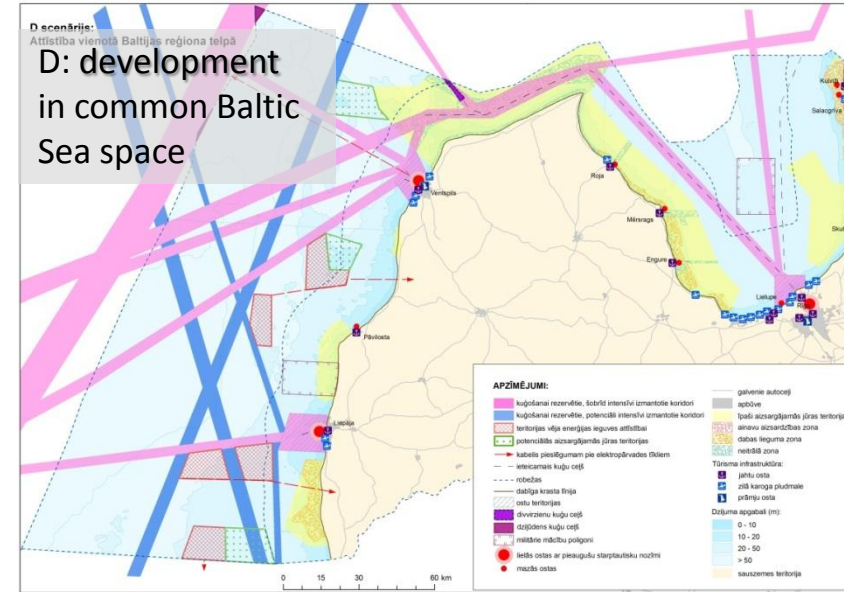
B: social well-being



C: resilient marine ecosystem



D: development in common Baltic Sea space



Assessment of ecological impacts

- **Spatial assessment of impacts:**
 - Impacts on benthic habitats and provision of ecosystem services
 - Impact to ecologically significant areas;
- **Assessment of impacts against selected set of criteria and indicators:**
 - Impact to good environmental status - applying MSFD indicators

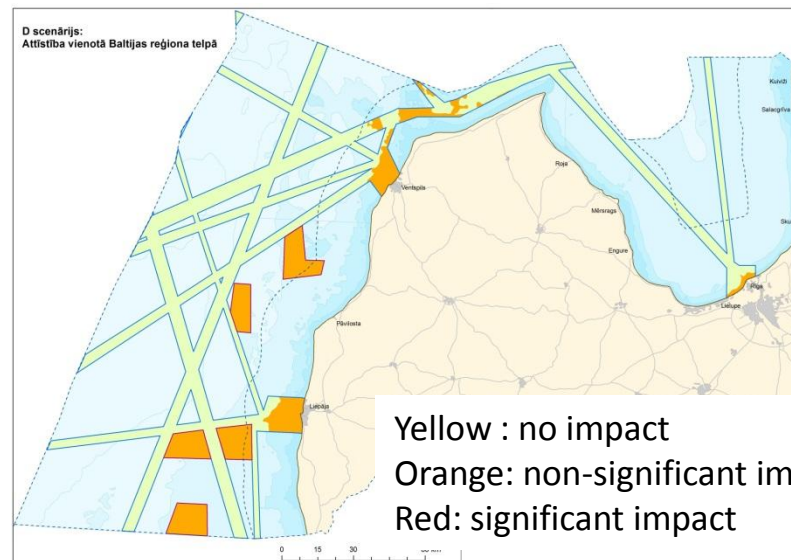
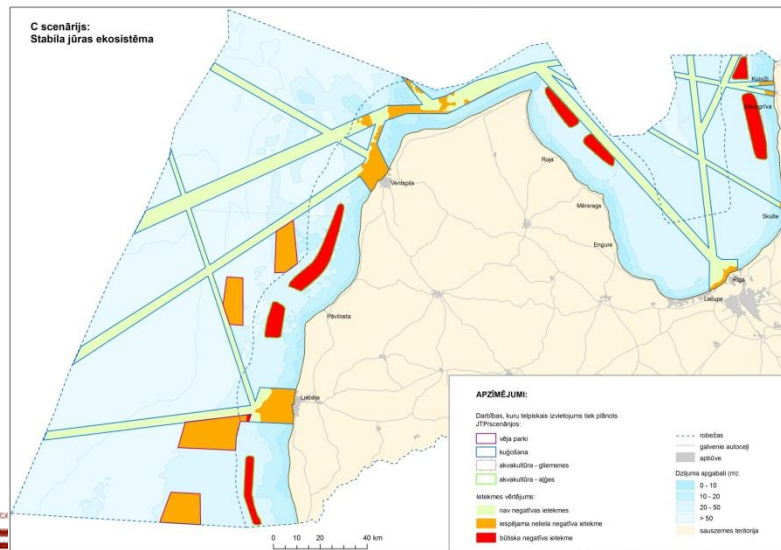
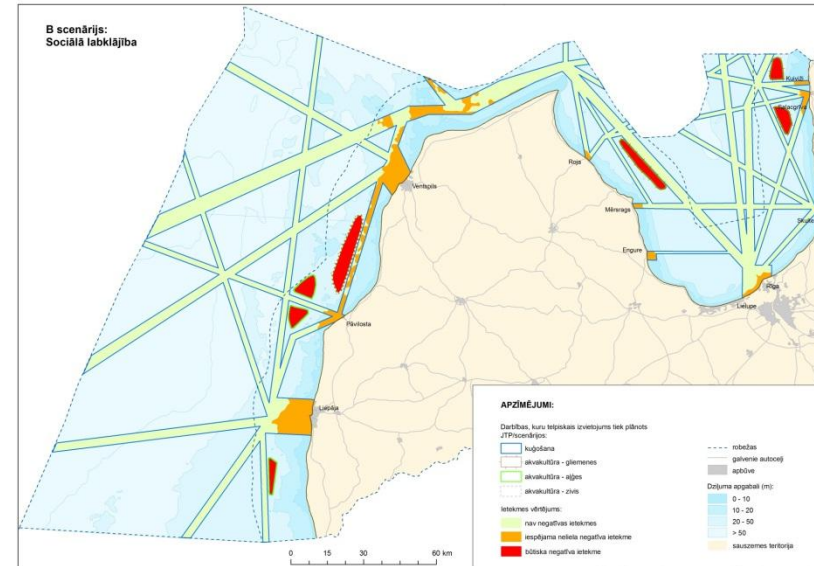
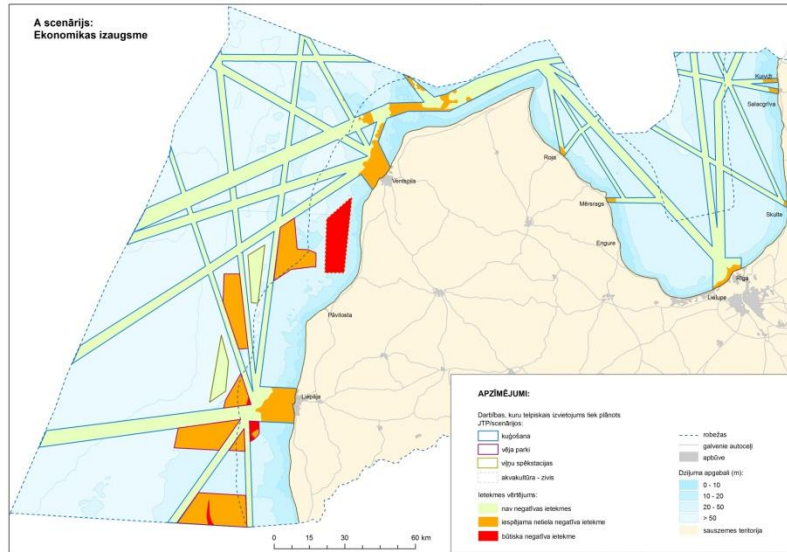
Sea use impact matrix (draft version)

Sea uses that are planned by MSP

Benthic habitats

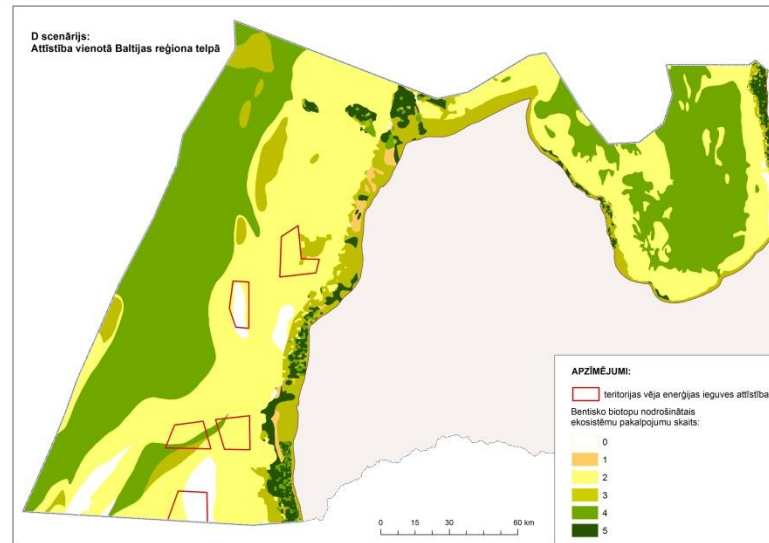
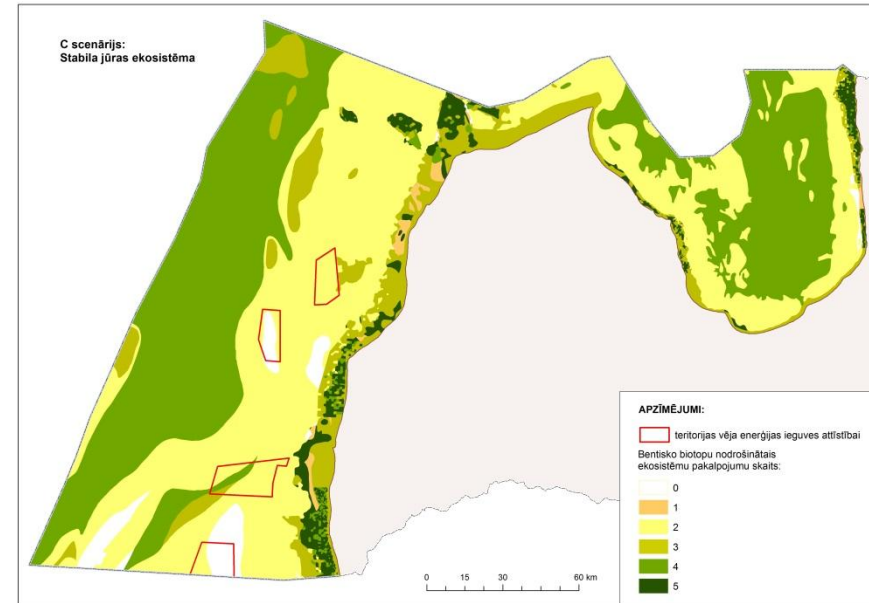
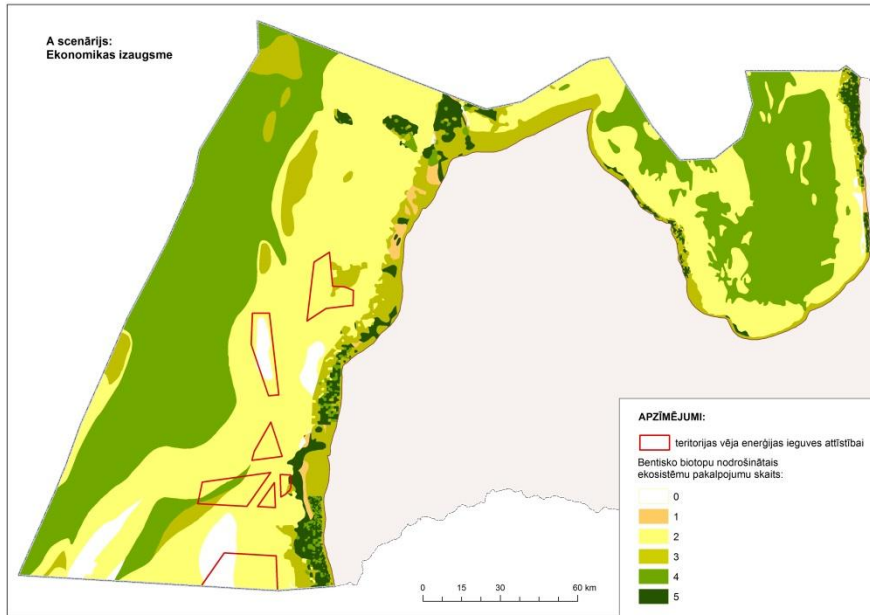
	Shipping	Encourage areas	Dredging	Dumping sites	Off-shore wind energy	Wave energy	Cables	Oil extraction	Aquaculture -fish	Aquaculture - algae	Aquaculture -mussels	Bathing sites	Kite-board	Angling	Diving	Motorboats	Coastal fishery	Open sea fishery with net/air trawl	Open sea fishery with henthic trawl	Open sea fishery with massive sears	Military training areas	Coastline protection-beach nourishment
AA.A: Baltijas jūras fotiskās zonas klintājs un laukakmeņi	1	1	1	2	2	1	1	1	2	2	1	0	0	0	1	1	1	2	2	2	1	2
AA.A1: Baltijas jūras fotiskās zonas klintājs un laukakmeņi ar makroskopisko epibentosu	1	1	1	2	2	1	1	1	2	2	1	0	0	0	1	1	1	2	2	2	1	2
AA.A2: Baltijas jūras fotiskās zonas klintājs un laukakmeņi ar retu makroskopisko epibentosu	1	1	1	2	2	1	1	1	2	2	1	0	0	0	1	1	1	2	2	2	1	2
AA.H3N: Baltijas jūras fotiskās zonas dūņu nogulumu ar vēžveidīgo infaunu	1	1	1	1	1	0	1	1	2	2	1	0	0	0	0	1	1	1	2	1	1	1
AA.I: Baltijas jūras fotiskās zonas rupjgraudainie nogulumi	1	1	1	1	1	0	1	1	2	2	1	0	0	0	0	1	1	1	2	1	1	1
AA.J: Baltijas jūras fotiskās zonas smilts	1	1	1	1	1	0	1	1	2	2	1	0	0	0	0	1	1	1	2	1	1	1
AA.J1: Baltijas jūras fotiskās zonas smilts ar makroskopisko epibentosu	1	1	1	2	1	0	1	1	2	2	1	0	0	0	1	1	1	1	2	1	1	1
AA.J3: Baltijas jūras fotiskās zonas smilts ar makroskopisko infaunu	1	1	1	1	1	0	1	1	2	2	1	0	0	0	0	1	1	1	2	1	1	1
AA.J3L: Baltijas jūras fotiskās zonas smilts ar gliemeņu infaunu	1	1	1	1	1	0	1	1	2	2	1	0	0	0	0	1	1	1	2	1	1	1
AA.M1: Baltijas jūras fotiskās zonas jaukts substrāts ar makroskopisko epibentosu	1	1	1	2	2	1	1	1	2	2	1	0	0	0	1	1	1	2	2	2	1	2
AA.M2: Baltijas jūras fotiskās zonas jaukts substrāts ar retu makroskopisko epibentosu	1	1	1	2	2	1	1	1	2	2	1	0	0	0	1	1	1	2	2	2	1	2
AA.M4: Baltijas jūras fotiskās zonas jaukts substrāts bez makrobentosa	1	1	1	1	2	1	1	1	2	2	1	0	0	0	0	1	1	2	2	2	1	2
AB.A: Baltijas jūras afotiskās zonas klintājs un laukakmeņi	0	1	1	2	2	1	1	1	2	2	1	0	0	0	1	0	0	2	2	2	1	2
AB.A1: Baltijas jūras afotiskās zonas klintājs un laukakmeņi ar makroskopisko epibentosu	0	1	1	2	2	1	1	1	2	2	1	0	0	0	1	0	0	2	2	2	1	2
AB.B: Baltijas jūras afotiskās zonas morēna	0	1	1	1	2	1	1	1	2	2	1	0	0	0	0	0	0	2	2	2	1	2
AB.H: Baltijas jūras afotiskās zonas dūņu nogulumu	0	0	1	1	1	0	1	1	2	2	1	0	0	0	0	0	0	1	2	1	1	1
AB.H3: Baltijas jūras afotiskās zonas dūņu nogulumu ar makroskopisko infaunu	0	0	1	1	1	0	1	1	2	2	1	0	0	0	0	0	0	1	2	1	1	1
AB.H3N: Baltijas jūras afotiskās zonas dūņu nogulumu ar vēžveidīgo infaunu	0	0	1	1	1	0	1	1	2	2	1	0	0	0	0	0	0	1	2	1	1	1
AB.I: Baltijas jūras afotiskās zonas rupjgraudainie nogulumi	0	0	1	1	1	0	1	1	2	2	1	0	0	0	0	0	0	1	2	1	1	1
AB.J: Baltijas jūras afotiskās zonas smilts	0	0	1	1	1	0	1	1	2	2	1	0	0	0	0	0	0	1	2	1	1	1
AB.J3: Baltijas jūras afotiskās zonas smilts ar makroskopisko infaunu	0	0	1	1	1	0	1	1	2	2	1	0	0	0	0	0	0	1	2	1	1	1
AB.J3L: Baltijas jūras afotiskās zonas smilts ar gliemeņu infaunu	0	0	1	1	1	0	1	1	2	2	1	0	0	0	0	0	0	1	2	1	1	1
AB.M: Baltijas jūras afotiskās zonas jaukts substrāts	0	0	1	2	1	0	1	1	2	2	1	0	0	0	0	0	0	1	2	1	1	1
AB.M1: Baltijas jūras afotiskās zonas jaukts substrāts ar makroskopisko epibentosu	0	0	1	2	1	0	1	1	2	2	1	0	0	0	1	0	0	1	2	1	1	1
AB.M2: Baltijas jūras afotiskās zonas jaukts substrāts ar retu makroskopisko epibentosu	0	0	1	2	1	0	1	1	2	2	1	0	0	0	1	0	0	1	2	1	1	1
AB.M4: Baltijas jūras afotiskās zonas jaukts substrāts bez makrobentosa	0	0	1	2	1	0	1	1	2	2	1	0	0	0	0	0	0	1	2	1	1	1

Impacts of sea uses planned in the four scenarios



Yellow : no impact
Orange: non-significant impact
Red: significant impact

Impacts of windparks on ecosystem service provision (A, C, D scenarios)



Indicators for impact on achievement of good environmental status

Descriptors	2004	2008	2014	Trend	Target value
Biodiversity (D1) Benthic Quality Index: Gulf of Riga and open Baltic Sea	3,31 (GOR) 3,72 (BS)	3,24 (GOR) 4,12 (BS)	3,55 (GOR) 3,80 (BS)	→	Reference value 5,4 (GOR) 7,0 (BS)
Eutrophication (D5) Summer chlorophyll a concentration: Gulf of Riga and open Baltic Sea	6,1 (GOR) 3,89 (BS)	5,8 (GOR) 3,67 (BS)	3,90 (GOR) 2,46 (BS)	↘	Reference value 1,8 (GOR) 1,2 (BS)
Eutrophication (D5) Depth distribution of <i>Fucus vesiculosus</i> in the Gulf of Riga and <i>Furcellaria lumbricalis</i> open Baltic Sea	No data	14,8 (GOR) 5,0 (BS)	14,8 (GOR) 4,7 (BS)	→	Reference value 7 (GOR) 20 (BS)

Assessment of scenarios against selected criteria and indicators



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- 2 Significant negative impact
- 1 Slightly negative impact
- 0 No impact
- 1 Slightly positive impact
- 2 Significant positive impact

	A	B	C	D
Economic impact	1.2	1.0	0.8	1.0
Social impact	0.8	1.5	0.3	0.8
Environmental impact	-0.3	-0.3	1.0	1.0
Transboundary impact	0.6	-0.2	1.0	1.0
Average value	0.6	0.5	0.8	0.9

Thank you!

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