BONUS BASMATI

Baltic Sea Maritime Spatial Planning for Sustainable Ecosystem Services

Assessment of Ecosystem Services and Values of Marine Protected Areas

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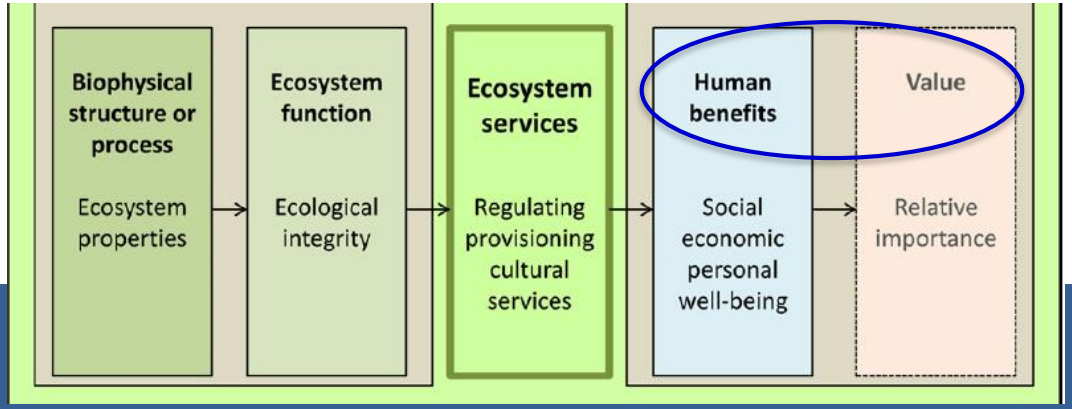
BONUS
Science for a better future of the Baltic Sea region

Research work as part of the Latvian case study

related to socioeconomic aspects of the ecosystem services (ES)

- quantitative and monetary assessments of Benefits and Values of the marine ES using **indicators**
- analysis of **spatial distribution** of the Benefits and Values
- assessment of **changes** in the ES Benefits and Values in **policy scenarios** (linked to MPAs and MSP)

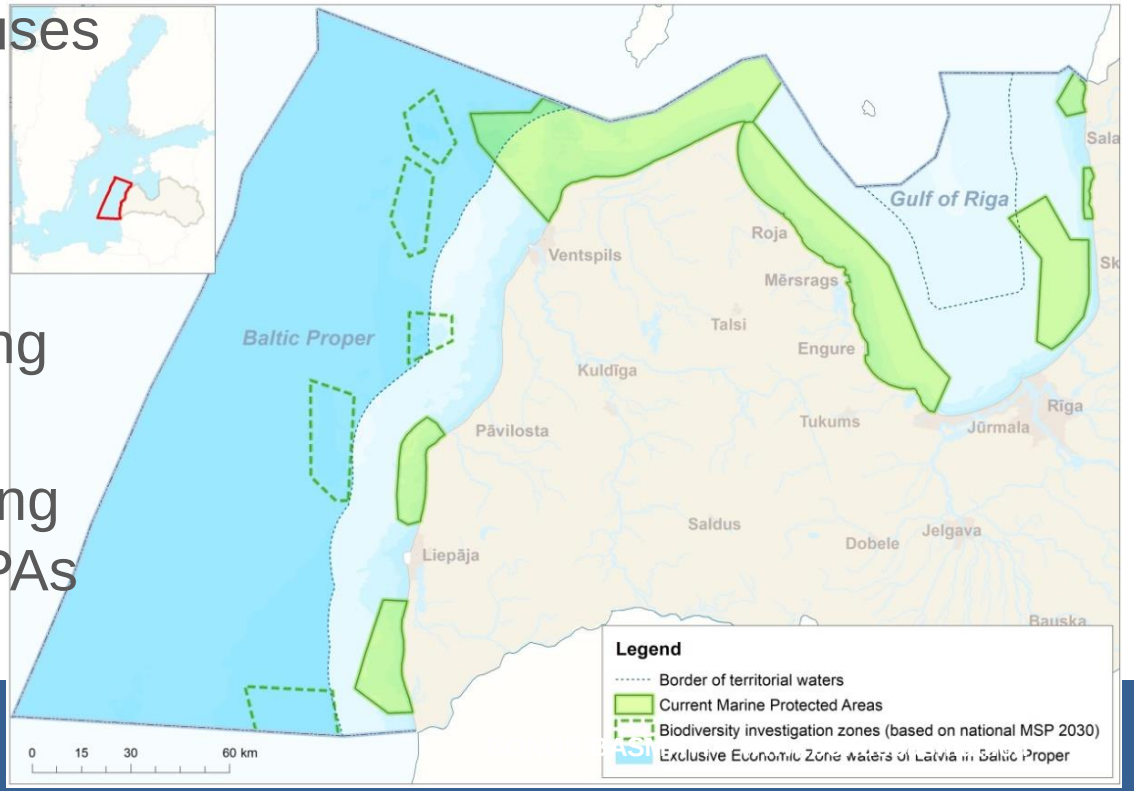


Valuation of ecosystem service benefits and welfare impacts of new offshore marine protected areas

I- ES and welfare impacts of Marine Protected Areas

Study area and policy context

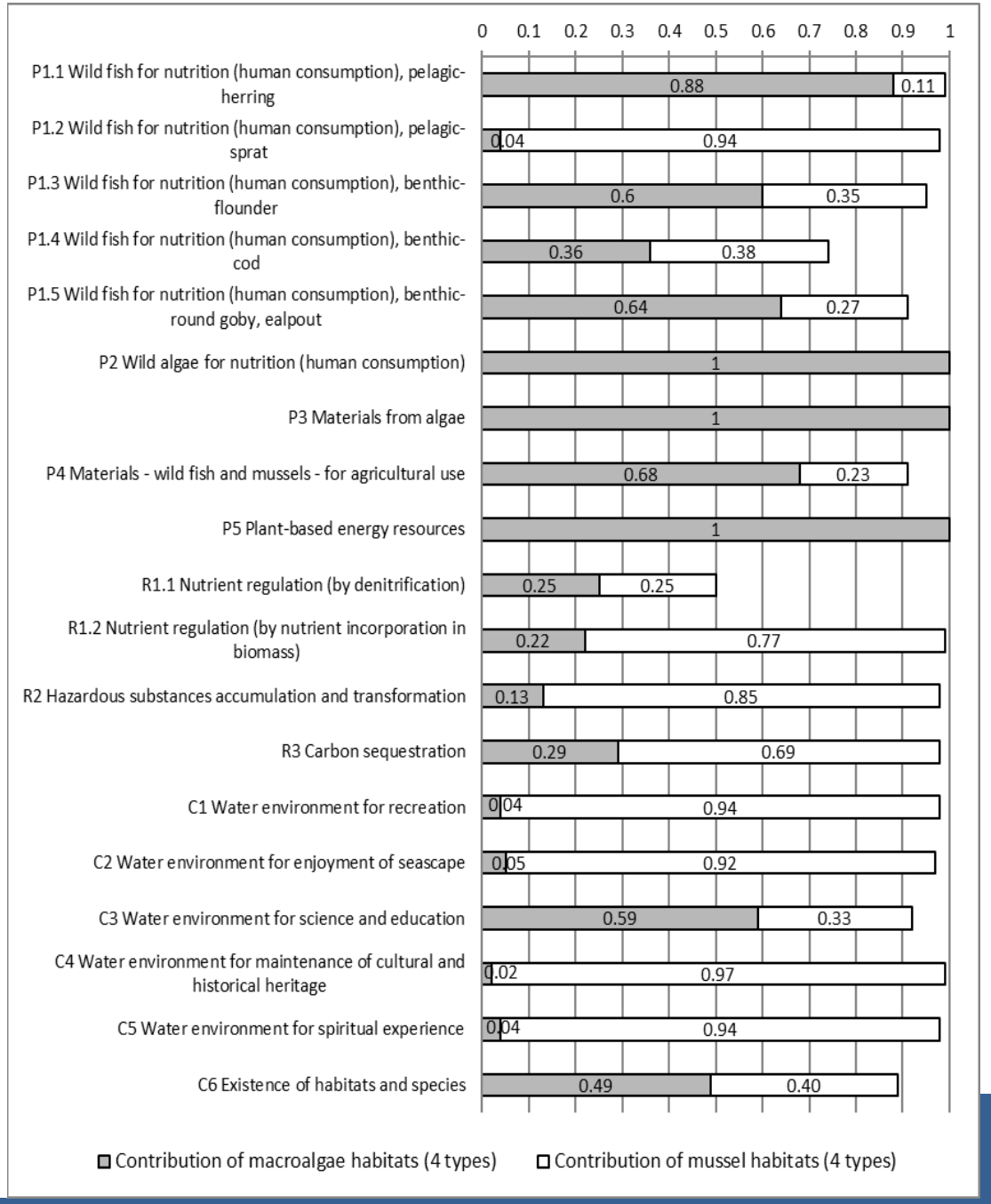
- expected future development of the sea use (new sea uses in EEZ)
- protected habitats – reef habitats (15 types)
- policy debate on increasing MPA size target (30%)
- Current MPAs, investigating potential new offshore MPAs in EEZ



Approach – an integrated assessment with ES approach

(1) Supply of ES from the protected (reef) habitats

- links between the habitats and ES supply, an ES assessment tool (ESA4MSP)
- a wide array of ES (14), the largest contribution by the reef habitats with macroalgae and mussel
- **scenarios** – changes in ES supply depending on protection extent of various reef habitat types (0%, 30%, 60%)



I- ES and welfare impacts of Marine Protected Areas

Approach – the integrated assessment

1. ES supply, scenarios
2. Economic valuation of the welfare impacts of the scenarios

- an **economic valuation study** (applying a choice experiment method) as part of a national research project (financed by the EMFF)

NACIONĀLAIS ATTĪSTĪBAS PLĀNS 2020

EIROPAS SAVIENĪBA

Eiropas Jūrlietu un zivsaimniecības fonds

- **positive and negative welfare impacts** from establishing new offshore MPAs
- data collection based on a national survey (representative sample) in Oct-Nov.2019

„Services" of macro-algae groves	Possible states of „services" in 2030 depending on protection option		
	Poor	**Rather good**	**Very good**
☺ **[FISH]** Provides environment for fish spawning and growth.	Macro-algae groves are not protected.	30 % of macro-algae groves protected.	60 % of macro-algae groves protected.
☺ **[MATERIALS]** Can be used as raw material for various human needs.	Decreased amount of macro-algae, declined quality of fish spawning and growth areas, reduced catch of herring.	Improved state of all "services", improved quality of fish spawning and growth areas, increased populations of herring and other fish for fisheries and human consumption.	Considerably improved state of all "services", considerably increased populations of fish (herring, cod), considerably increased amount of macro-algae for human uses.
☺ **[AIR]** Fix carbon reducing carbon dioxide in the atmosphere.			
☺ **[KNOWLEDGE]** Provides knowledge and new information.			
☺ **[PRESERVATION]** Existence and preservation for future generations.			

I- ES and welfare impacts of Marine Protected Areas

Results

- Welfare (socioeconomic) impacts (i) of protecting various reef habitats types, (ii) of various scenarios of new MPA size; …

More information

- Pakalniete K, Ahtiainen H, Aigars J, Puriņa I, Armoskaite A, Hansen SH, Strāķe S (In review) Economic valuation of ecosystem service benefits and welfare impacts of offshore marine protected areas: a study from the Baltic Sea. Ecosystem Services

II- Benefits and Values of ES using indicators

Investigating applicable approach for quantitative and monetary assessments of Benefits and Values

- ES provided by the reef habitats (ES list, specifications)
- Specifying types of Benefits and Values for each ES (definitions in the ES cascade)
- Developing indicators, taking into account also data availability
- Collecting available data and preparing estimates

Illustration – RM1 Nutrient regulation

Types of BENEFITS	No	BENEFIT indicators	Estimates	Comments
Quality of the water environment by assimilation of nutrient excess from human activities	B7	* Amount of nitrogen and phosphorus assimilated by the reef habitats by incorporating in biomass (kg/km2/y) (which is discharged from human activities).	757 kg of N / km^2 / year 52 kg of P / km^2 / year Confidence: Moderate	National monitoring data and estimates on (i) nutrient concentration in biomass and (ii) biomass per km^2 for all relevant reef habitat types, which incorporate nutrients in biomass (estimates from LHEI, for Baltic Proper). Estimate as sum for 1 km^2 of all reef habitat types. Nutrient assimilation and burial processes (performed by other habitat types) are not accounted to avoid double-counting of the same nutrient amount in the ecosystem.
		* Share of national population, attaching significance to the benefits of this ES	97% Confidence: High	Data from a national survey (LV MoE, 2019), representative sample (N=701). Share of respondents who assigned at least the score 5 for the personal importance of the benefit from this ES (where the score 5 means "moderate importance" and 10 – "very important").
		* No of persons benefitting from this ES.	1.862 mil [calculated 1919968 x 0.97] Confidence: High	Estimate, calculated by applying the share of population attaching significance to the benefits of this ES to the total population (CSB data on the national resident population for 01.2019).

Illustration – RM1 Nutrient regulation

Types of VALUES	VALUE indicators	Estimates	Comments
Physical welfare and health (sanitation)	* Saved costs for nutrient treatment from human activities (EUR/y).	1375 (863-1888) EUR on average per 1 km^2 per year (4-7000 EUR for various reef habitat types). In total, 2.05 mil EUR (1.3-2.8 mil EUR) per year for Baltic Proper. Confidence: Moderate (for BP) Not estimated for GoR	Calculated based on (i) P and N amount kg/km^2/y (from Table 3.4), (ii) nutrient "price" EUR/kg from the data sources [1]) and (iii) area (km^2) of each habitat type in Baltic Proper (data from LHEI). The estimate EUR/y accounts only the value from Baltic Proper (BP), the value from Gulf of Riga (GoR) is not estimated.
	* Degree of significance attached by people to the benefits of this ES.	8.3 (where 10 is "very important") Confidence: High	Data from a national survey (LV MoE, 2019), representative sample (N=701).
	* Relative importance of the benefits from this ES for people.	12.2 (out of 100 points) Confidence: High	Data from a national survey (LV MoE, 2019), representative sample (N=701).

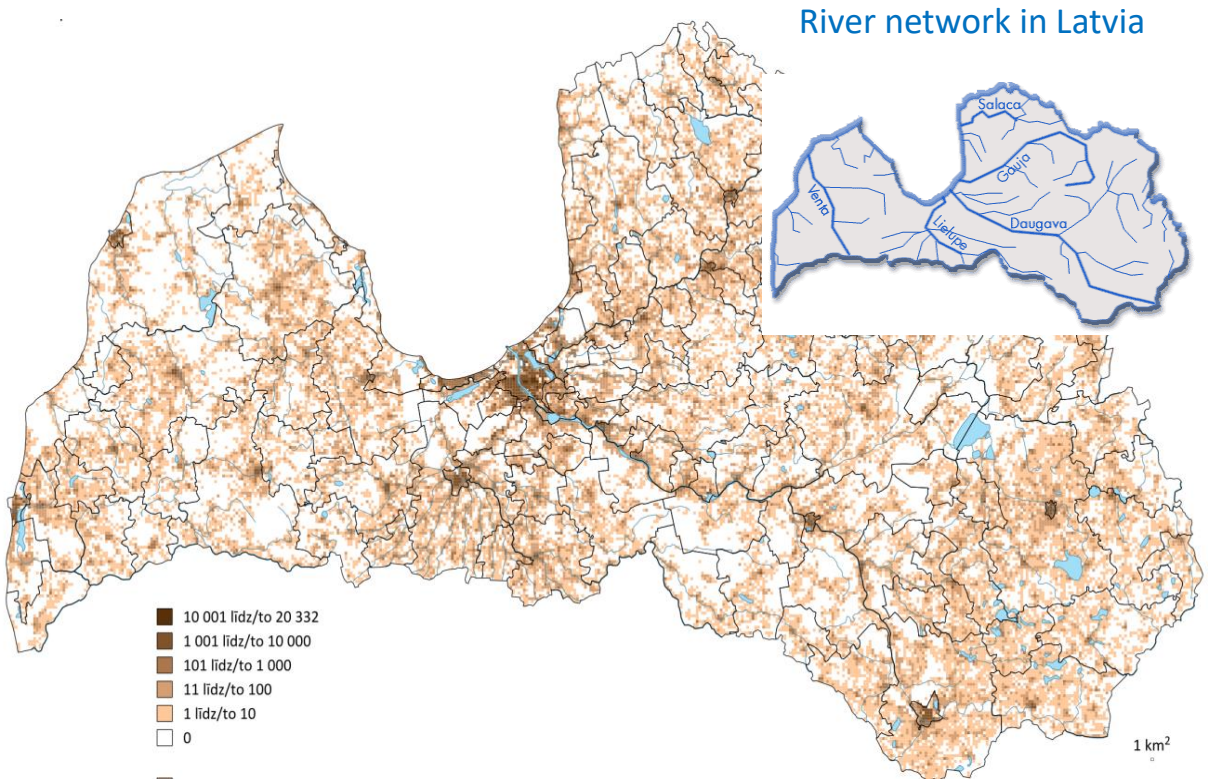
III- Spatial distribution of Benefits and Values

Investigating applicable approach for assessing the spatial distribution

Collecting data, preparing assessments and maps as illustrations for

- Benefits – spatial distribution of benefiting population, ES consumptions, Benefit indicators
- Values – spatial distribution of the monetary Value indicators

Illustration – RM1 Nutrient regulation

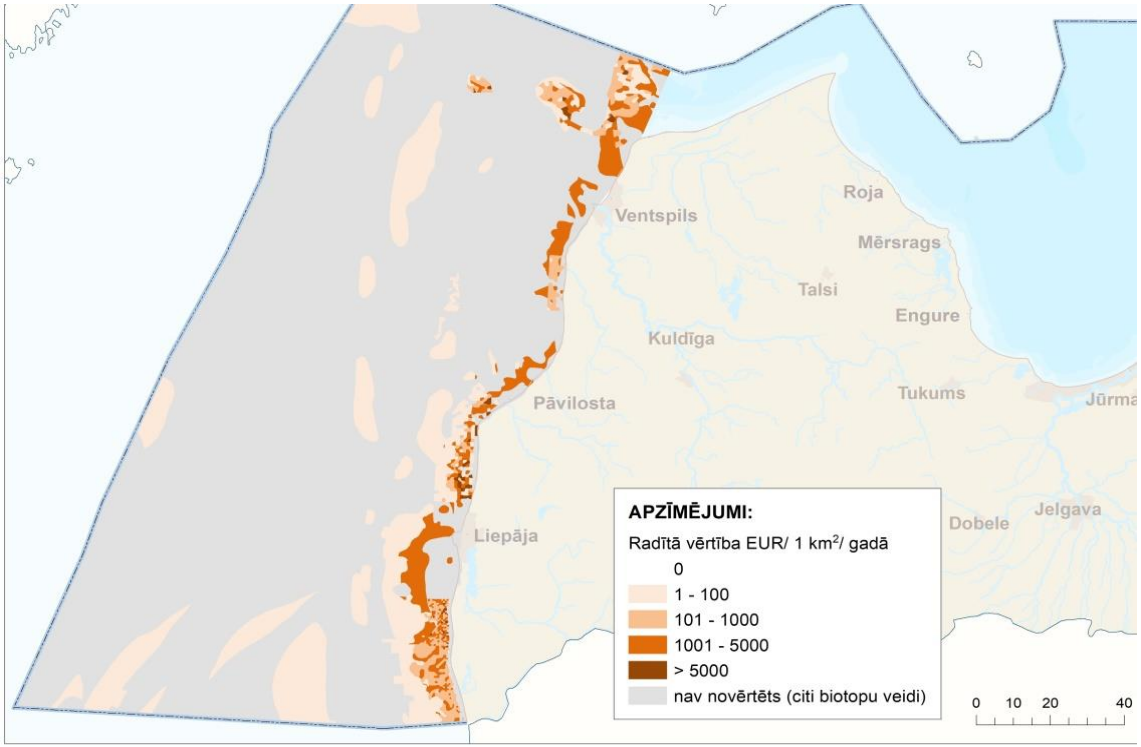


Spatial distribution of the benefiting population (and ES consumption)

Illustration – RM1 Nutrient regulation

Input data

- Value per area unit (EUR/1 km2), for each habitat type
- GIS data on distribution of the reef habitat types



Spatial distribution of the socioeconomic value (EUR/km2/y), based on saved costs for nutrient treatment from human activities

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