BONUS
SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION

Understanding the drivers of change in the Baltic Sea system –

An overview of the BONUS contribution

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BONUS Acting Executive Director

Baltic Earth workshop **Multiple drivers for Earth system changes in the Baltic Sea region**, Tallinn 26. November 2018

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BONUS portfolio:

- extremely broad research agenda: five objectives, 19 themes,
- 64 projects completed or ongoing (incl. BONUS+)

In this brief overview:

Focus on interactions and interdependencies different drivers of the Earth System in the Baltic Sea

To date BONUS has funded 48 projects close to a total value of EUR 100 mill

The BONUS strategic research agenda themes as covered by BONUS-funded projects. Project name shows the key theme, coloured circles are for sub-themes.

'BONUS call 2012: Viable ecosystem' (green), implementation of the projects 2014–2018

'BONUS call 2012: Innovation' (red), implementation of the projects 2014–2017

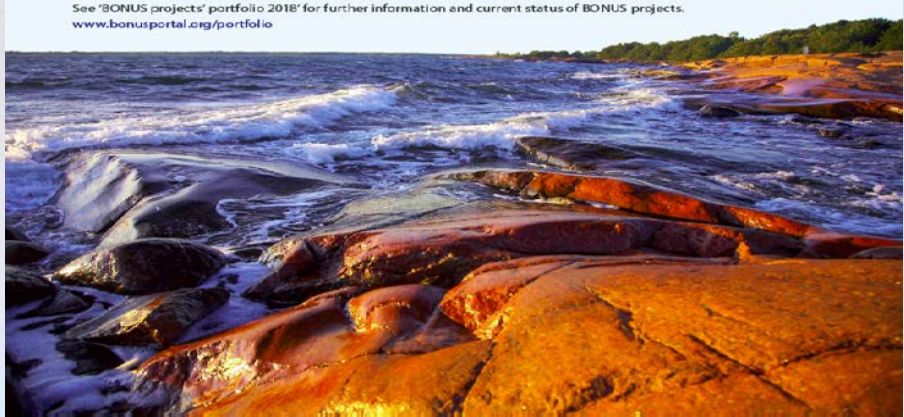
'BONUS call 2014: Sustainable ecosystem services' (orange), implementation of the projects 2015–2018, and

'BONUS call 2015: Blue Baltic' (blue), implementation of the projects 2017–2020.

'BONUS call 2017: Synthesis' (purple), implementation of the projects 2018–2020.

RESEARCH THEMES (ABBREVIATED TITLES)	THE SRA THEMES' COVERAGE
1.1 Dynamics of biogeochemical processes	
1.2 Changing biodiversity	BAMBI, BIO-C3
1.3 Food web structure and dynamics	BLUEWEBS, XWEBS
1.4 Impacts of hazardous substances	BALTHEALTH, MICROPOLL
2.1 Changes in catchment land cover patterns	SOILS2SEA
2.2 The role of the coastal systems	COCOA
2.3 Integrated coastal management	BALTCOAST
2.4 Eco-technological approaches	MICROALGAE, OPTITREAT, PROMISE, SWERA, ZEB, CLEANWATER, RETURN
3.1 Maritime risk analysis and management	STORMWINDS, BALTIMARI
3.2 Effects of air and water pollution by shipping	SHEBA
3.3 Improving stock assessments, spatial heterogeneity of stocks	INSPIRE
3.4 Evaluation framework for fisheries management	
3.5 Sustainable aquaculture in the Baltic Sea	CLEANAQ, FLAVOPHAGE, OPTIMUS
4.1 Governance structures, performance and policy instruments	CHANGE, GO4BALTIC, GOHERR, MIRACLE, TOOLS2SEA, DESTONY
4.2 Linking ecosystem goods and services to human lifestyles and well-being	BALTICAPP, ROSEMARIE, MARES
4.3 Maritime spatial planning	BALTSPACE, BASMATI
5.1 Integrated monitoring programmes	BLUEPRINT, INTEGRAL, SEAM, FUMARI
5.2 Innovative measurement techniques	AFISMON, FERRYSCOPE, FISHVIEW, HARDCORE, PINBAL, ECOMAP, SEAMOUNT
5.3 User-driven ICT services	ANCHOR, ESABALT, GEOILWATCH

See 'BONUS projects' portfolio 2018' for further information and current status of BONUS projects.
www.bonusportal.org/portfolio



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Is ecosystem a part of an earth system? YES!

Are human pressures regarded as ES drivers? YES!

Which drivers to focus on?

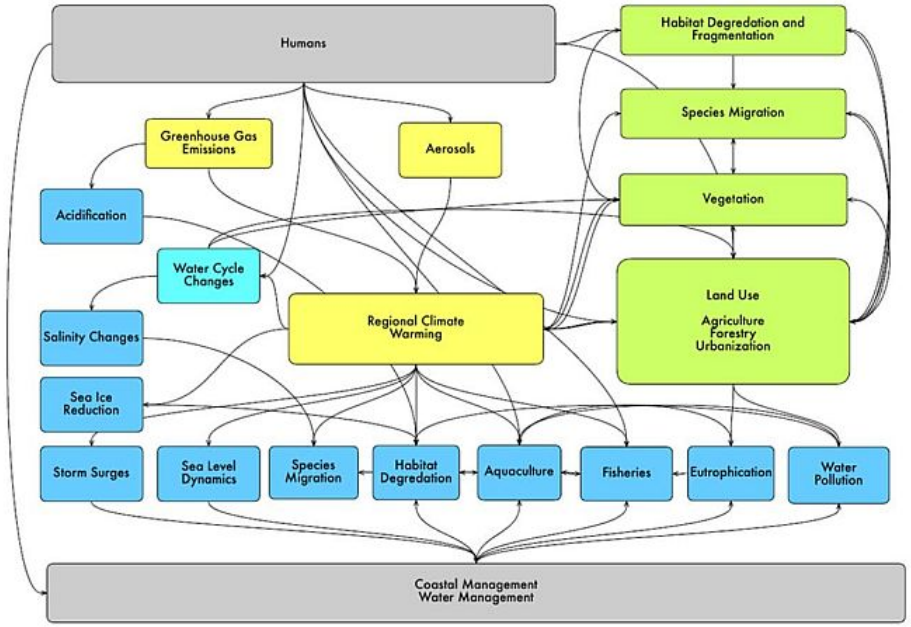
Earth System definition by IGBP:

The system consists of the land, oceans, atmosphere and poles. It includes the planet's natural cycles — the carbon, water, nitrogen, phosphorus, sulphur and other cycles — and deep Earth processes.

Life too is an integral part of the Earth system. Life affects the carbon, nitrogen, water, oxygen and many other cycles and processes.

The Earth system now includes human society. Our social and economic systems are now embedded within the Earth system. In many cases, the human systems are now the main drivers of change in the Earth system.

http://www.igbp.net/globalchange/earthsystemdefinitions.4.d8b4c3c12bf3be638a80001040.html



https://www.baltic-earth.eu/multipledrivers2018/index.html

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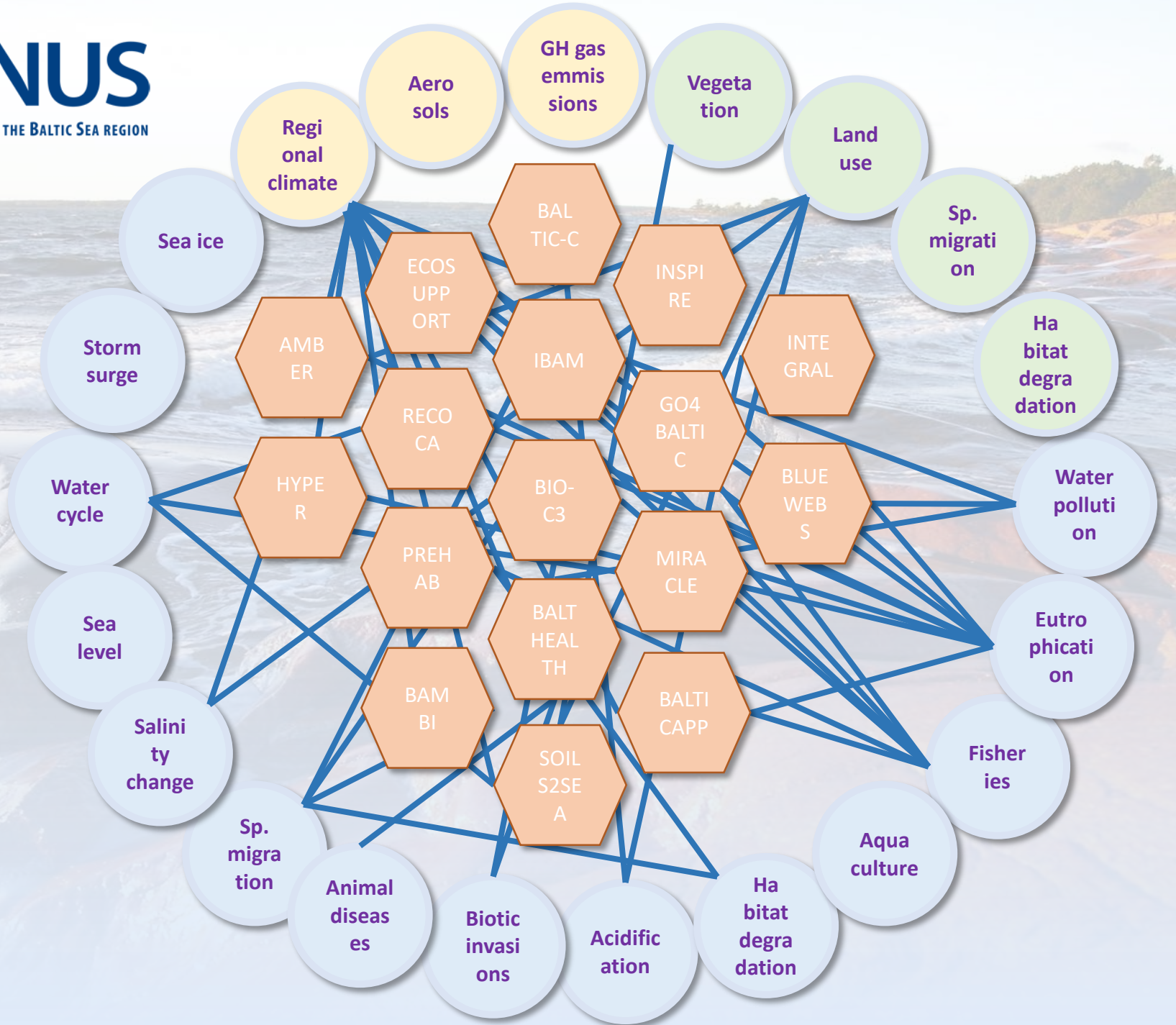
At least 17 BONUS projects Looking into co- and inter-action among multiple ES drivers.



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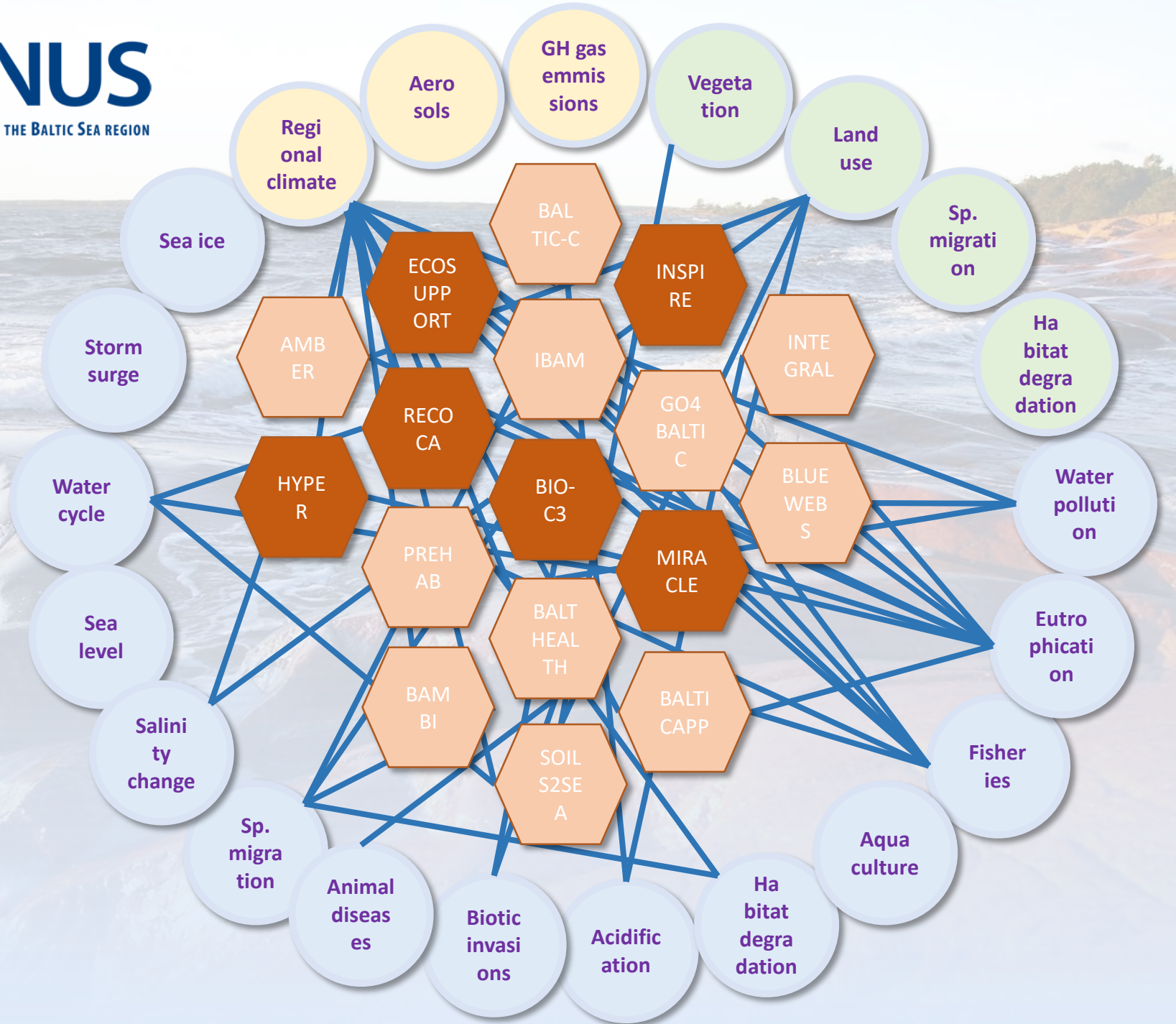

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BONUS+ AMBER (2008-2011): The first comprehensive analysis of complex interactions and effects of regional CC, changes in land use and agriculture and the Baltic Sea eutrophication.

BONUS+ PREHAB (2008-2011): Developed methodology for underwater habitat prediction and introduced scenario modelling as a tool for projecting ecosystem response to different pressures and management measures.

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BONUS BAMBI (2014-2017) and its predecessor **BONUS+ BALTGENE** (2008-2011): Effects of regional CC and various other drivers on intraspecific diversity in the Baltic Sea biota.

BONUS+ IBAM (2008-2011): Analysis of complex interaction of herring fisheries, coastal eutrophication, and effects of some management measures in the Gulf of Finland.

BONUS+ BALTIC-C (2008-2011): The first attempt to model the combined effects of ocean acidification and eutrophication in the Baltic Sea.

BONUS INTEGRAL (2017-2020): Complex approach observation of dynamic of the Baltic Sea carbon system in the context of regional CC, greenhouse gas emissions and eutrophication.

BONUS BLUEWEBS (2017-2020): The future food webs in the Baltic Sea.

BONUS BALTHEALTH (2017-2020): Complex approach to drivers impacting the Baltic Sea 'ecosystem health'. Focus on food-web structure and dynamics and anthropogenic hazardous substances.

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BONUS SOILS2SEA (2014-2018) Land use, agriculture, regional CC, nutrient leakage, water cycle and terrestrial biogeochemistry.

BONUS GO4BALTIC and **BALTICAPP** (both 2015-2018) Analysis of the regional socio-economic scenarios in the context of the regional CC.

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Ministry of Science Technology and Innovation
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Narodowe Centrum Badań i Rozwoju
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