# A Tale of Two Ecos: An adventure between economists and ecologists

PROJECT NEWSLETTER 2/2019

BONUS MARES (Multi-method Assessment for Resilient Ecosystem Services and Human Nature System Integration) is an EU-funded research project that studies how ecosystems and the benefits they provide (goods and services) link to human lifestyles and well-being.

BONUS MARES realises a robust analysis of knowledge transfer and interaction between science and policy about the goods and services provided by the Baltic Sea ecosystems.

**Research partners:**

Pellervo Economic Research

GEOMAR Helmholtz Centre for Ocean Research Kiel

University of Tartu Estonian Marine Institute

e2 Research

## A cross-disciplinary brainstorm


"An adventure between economists and ecologists – both 'eco' but in a different setting and fashion. A lot to experience and learn from such an approach"

This is a comment of an expert taking part in the BONUS MARES participatory expert meeting organized in December 2019. The expert also manifested high interest to attend again the workshop of 13th and 14th of February 2020. After having received a presentation of the first findings of the MARES project, the ecologists and economists brainstormed and performed a participatory and cross-disciplinary exercise on the identification of Baltic Sea ecosystem services and qualitative assessment of their valuation methods.

In a first phase, the ecologists were asked to comment on and complement the identified ecosystem services (ESS) provided by the BONUS MARES focus habitats: mussel beds, macroalgae and seagrass. In a second phase, the valuation methods and their integrated use were assessed by the Eco-GAME

**MARES:** Multi-method assessment for resilient ecosystem services and human-nature system integration. https://mares.ut.ee
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meta-evaluation matrix (see Figure 1), also with the aim to improve the level of knowledge.

The Eco-GAME matrix assesses the level of knowledge by assigning the methods with qualitative attributes, regardless of the purpose of their use. The attribute levels describe: 0 = no knowledge; 1 = limited knowledge (existence); 2 = static qualitative; 3 = static quantitative; 4 = dynamic (impact valuation) unidimensional; 5 = dynamic multi-dimensional across natural, human, social dimensions; 6 = foresight; 7 = representation of the Agenda 2030 Sustainable Development Goals (SDGs).

## Ecologists look at complexity - economists need simplification

The actual assessment started after a vivid discussion which revealed some fundamental issues and diverging perspectives related to the valuation of ESS in the Baltic Sea. While for economists the valuation methods focus on the value of the final ESS and related benefits for users, ecologists claim that habitats, intermediate ESSs as well as their interactions should also be represented and considered in the valuation of the final ESS.

For economists, the share of one ecosystem in the value produced is difficult and unnecessary to distinct, as the ESSs typically result from several habitats and complex ecological processes.However, ecologists claimed that this way the final ESS would no more be present and could not be valued, and thereby the only option is to consider and value the habitat that provides the final ESS.

**Eco-GAME levels of scientific knowledge quality in support of decision-making**

| Level of knowledge relevance | | Example | Score Xi | $xi^2$ |
|---|---|---|---|---|
| **Human-nature system integration: analysis effectiveness for policy purposes according to SDGs** | The analysis produces metrics to practically and effectively assess performances in terms of UN Sustainable Development Goals (SDGs) | The analysis can effectively provide metrics local employment, gender equality, health, well-being or environmental health deriving from fisheries activities, directly referred to SDGs | **7** | 49 |
| **Forecasting** | The analysis can forecast future systemic impacts of ecosystem services | The analysis can forecast the state of health of the ecosystem in terms of fish population and/or the generated well-being (e.g. increased employment) in the long run | **6** | 36 |
| **Dynamic multi-dimensional interactions** | The analysis can valuate systemic impacts of ecosystem services across economic, human, social and natural dimensions | The analysis can assess the revenue generated by fish markets and the improvements in population health, security or well-being (measurable impact). | **5** | 25 |
| **Dynamic uni-dimensional interaction** | The analysis can valuate systemic impacts of ecosystem services within one dimension | The analysis can assess the revenue generated in the fish market. | **4** | 16 |
| **Static quantitative** | The analysis can assess quantitative aspects of ecosystem services | The analysis can give fish a value, for instance through price | **3** | 9 |
| **Static qualitative** | The analysis can assess qualitative aspects of ecosystem services | The analysis can discover the species of fishes or provide uncountable valuations (high or low value) | **2** | 4 |
| **Limited knowledge** | The analysis is able to discover knowledge | A method can discover the presence of fish | **1** | 1 |
| **No knowledge** | The methodology is unable to discover knowledge | A method cannot discover whether there are fishes or not in the sea | **0** | 0 |

Figure 1: The Eco-GAME Matrix

One of the economists also considered that whenever an ecosystem would be highly valuated for the various services it provides, its increased use will generate pressure which may be unsustainable and rapidly drain its resources. Which is a contradiction of the valuation systems themselves.

Clearly, the two disciplines work to some extent with different scales and for different purposes. Therefore, more cross-disciplinary activities such as this expert meeting are needed. The meeting showed indeed the different foci of different scientific purposes: while ecologists look at the complexity and relevance of both services and functions, regardless of their final use, economists need simplification, such as the relevance of the final services, in pursuit of decision making. For

economists, the purpose of the valuation determines the valuation process and the methods used.  However, as it was concluded at the meeting, two-direction science-policy knowledge exchange is needed. In order to inform decision-making, it is important to communicate the intrinsic capacity of the method to adequately represent and serve the possible policy objectives, vis-à-vis the type of knowledge needed. For instance, SDGs, as it was discovered, represent a challenge for valuation methods.

Moreover, the economists considered the possibility to provide future valuations easier than the possibility for valuation methods to deliver multi-dimensional valuations. Therefore, the Eco-GAME matrix could be revised accordingly.

In order to start the practical exercise, the complexity inherent in ecological interactions had to be simplified in order to allow economic valuations. Once this was done, the exercise smoothly produced the results. The results of the expert meeting exercise are under analysis and will be disseminated later in more detail.

## MARES Geo-Portal combines knowledge

UTARTU and PTT collaborated and created a geo-spatial web portal where all the data underlying MARES project were combined together. By applying specific filters to data, it's possible for the user to easily display and visualize information of interest and the origin of that information in the Baltic Sea scale. For example, the user could specify the type of ecosystem service (cultural, provisioning or regulating & maintenance) of mussel beds and view available information for that service in Gdansk Basin or any other HELCOM basin.

Based on the user-defined selection, the portal calculates summary statistics on the known ecosystem services and provides an overview in that pre-defined context. Results can be saved either as a tabular or graphic format.

Moreover, the web portal allows to conceptually link ecological and socio-economic systems and evaluate the current level of knowledge within and between these systems in four dimensions - natural, economic, human and social. This is done by applying a novel tool based on expert opinions that evaluate

how studied ecological processes translate into ecosystems services. As a result we can better inform stakeholders and reveal knowledge gaps that need further attention from the perspective of evidence-based decision-making.

**Questionnaires as a tool to increase robustness**

MARES geo-spatial web portal also has a built-in function of questionnaires that aims to further capture expert opinions on ecosystem services that are often not reflected in scientific publications.

Here, invited experts may choose habitats, methods and ecosystem services on which they would like to provide an assessment for and thereby increase the robustness of our analysis. Depending on the expertise of people, they may select one or many fields, specify geographic location and even include a reference for their assessment.

We assume that experts will provide an assessment for all combinations of methods and ecosystem services they have knowledge for and the unanswered fields can be collectively labelled as “Unknown”.

## Know your scientist - introducing Anneliis and Melanie

**To make our research more accessible and give further insight into the project, we asked a couple of our researchers some profound questions about their work and motivations - let’s hear their answers!**

”Why did you choose this line of work - what drives you, what do you aspire to achieve? What is your role in BONUS MARES?”

**Melanie Heckwolf**
*Postdoc researcher, PhD*
*Helmholtz Centre for Ocean Research Kiel*

I am a Postdoc in the Marine Evolutionary Ecology group at GEOMAR in Germany. Within the MARES project, I am part of the team that conducts a literature survey on the current knowledge on ecosystem services in the Baltic Sea.

In particular, we are interested in finding out which ecosystem services are provided by seagrass meadows, macroalgal forests and mussel beds. Together we scanned 3,089 papers, from which we extracted 20 known ecosystem services that are provided by these


Postdoc researcher Melanie Heckwolf

target ecosystems. Our efforts revealed that the knowledge on the species in ecology is plentiful, while the knowledge transfer into socio-economic disciplines and the monetary evaluation of these services is close to non-existent. Researches and policy makers will have to make an effort to close this gap to ultimately promote evidence-based

Junior research fellow Anneliis Peterson

decision-making for sustainable ecosystem management.

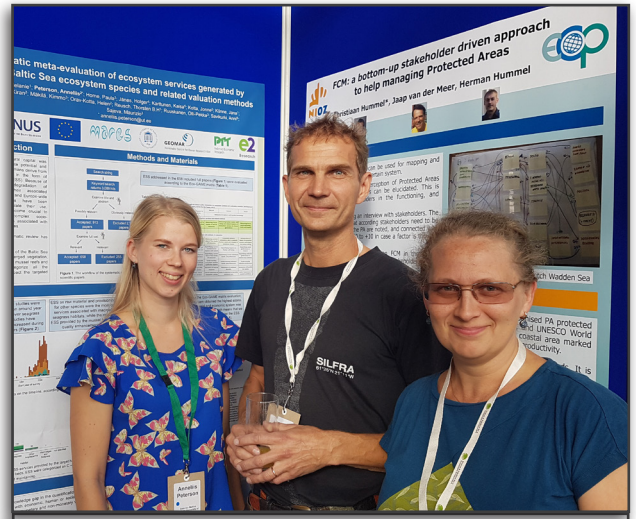
I became part of this project because I am convinced that interdisciplinary approaches like those within this project can help to protect the Baltic Sea ecosystems for a more sustainable future.

**Anneliis Peterson**
*Junior Research Fellow, PhD*
*Estonian Marine Institute*

I'm a Junior Research Fellow in marine biology in the Estonian Marine Institute, University of Tartu. Just a couple of months ago I defended my PhD thesis on benthic habitats, species and species richness distribution mapping. Nowadays I am also involved in other research topics, including ecosystem services, macroalgae cultivation perspectives in the Baltic Sea and cumulative anthropogenic pressures on ecosystems.

In MARES, I performed together with the project colleagues a structured meta-analysis of various scientific studies on ecosystem services provided by macroalgae, seagrass meadows and mussel beds in the Baltic Sea. We registered a huge knowledge gap in the quantification and mapping of most ecosystem services as well as in the applicability of valuation methods. Right now, we are composing a manuscript from the main results of the meta-analysis that will hopefully be published in 2020.

I have always loved sea and nature, and thereby the decision to choose biology and more precisely marine biology was made quite easily. For me, it is interesting to learn every day something new and to see and study the complex connections between different ecosystem components. I hope that we can manage our marine nature in a sustainable way and all species that are here right now can also be found in the future.




MARES project and the results of the meta-analysis were presented in a poster session at the 54th European Marine Biology Symposium held in 25-29 August in Dublin. Poster prepared by Anneliis Peterson and Melanie Heckwolf concluded that based on the extensive systematic literature review, there are huge knowledge gaps in quantification and mapping of ecosystem services in the Baltic Sea. More information is also needed on the applicability of monetary and non-monetary valuation methods.

(In photo: Anneliis Peterson, Jonne Kotta and Helen Orav-Kotta)

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