

EEA AND NORWAY GRANTS
FUND FOR BILATERAL RELATIONS

INITIATIVE PROPOSAL

Title of the initiative: Operationalisation of the novel assessment framework to evaluate the impact of invasive species on Baltic Sea ecosystems in the context of climate change

Implementing entity (*beneficiary state entity*):
University of Tartu (UTARTU)

Partner(s) (*minimum one donor state entity*):
Norwegian Institute for Water Research (NIVA)

Allocation (*total sum*): **255,000 EUR** (*A more detailed project budget description in the activity plan*)

Short description of the initiative:

(background, aim, participants, activity plan, budget outline, communication and dissemination)

The recently completed project "Impacts of invasive alien species and climate change on Estonian marine ecosystems" (Programme: Climate Change Mitigation and Adaptation) achieved multiple strategic outcomes aimed at supporting the prevention and management of invasive species in the Baltic Sea. A significant achievement was the development of a universal **framework for assessing the environmental impact of marine non-indigenous species (NIS)** under various data availability scenarios (see paper at <https://link.springer.com/article/10.1007/s10750-024-05619-x>). Robust information on NIS impacts is critically important in the context of several policies and legislations, such as the EU Marine Strategy Framework Directive and Ballast Water Management Convention (IMO, 2004; European Commission, 2008). Information on NIS impacts is needed to meet the objective of '**preventing the introduction of, controlling, or eradicating those alien species that threaten ecosystems, habitats, or species**' as set out in the Convention on Biological Diversity (Secretariat of the Convention on Biological Diversity, 1992). Importantly, the proposed framework not only provides guidance for managing different scenarios based on varying levels of information availability, but also recommends the use of complementary sources of information (e.g., standardized and verified datasets from monitoring and mapping inventories) and analytical approaches (e.g., spatial distribution models). These currently under-utilized resources can significantly mitigate information limitations. Furthermore, the widespread application of the proposed framework would strengthen the NIS impact evaluation of European regional seas assessments, such as the holistic assessments of the Baltic Sea performed by HELCOM (2023) and integrate NIS into ecosystem-based management (EBM) approaches. Due to the closely interlinked feedback loops between climate change impacts and the introduction and impacts of invasive species (Roy et al., 2024), it is essential to consider these processes jointly in EBM.

The aim of this proposal is to **fully operationalize and implement the proposed framework** to provide a harmonized and quantitative environmental impact assessment of non-indigenous species (NIS) **in two case study areas: the northeastern Baltic Sea region**, encompassing Estonia and adjacent regions of Latvia and Finland (Gulf of Riga and Gulf of Finland), **and Oslofjord**, Norway. Both regions are known for their significant NIS load. By deploying the framework, we effectively bridge the gap in current methodologies by integrating systematic reviews, meta-analyses, and species distribution modeling to assess NIS impacts under different data availability scenarios.

The increasing amount of data on NIS spread and associated impacts, together with availability of new analytical techniques allow **a shift from expert judgment to data-driven analysis**. Expert-opinion driven assessments have been shown to be biased, undermining the effectiveness and credibility of the decision-making processes that rely on them. Our framework recognizes that a complex but realistic assessment, which can accurately reproduce near real-world conditions, requires a robust data-driven approach. This involves handling big data, excelling in spatial modeling techniques, and effectively managing diverse sources of scientific literature and public databases. The application of proper quality-assurance and harmonization approaches conducted by NIS experts is essential. To achieve this, evidence gathered from the screening of scientific papers, regional data repositories, and national monitoring programs is integrated into our framework using state-of-the-art meta-analytical and spatial distribution modeling techniques. Reliance on expert judgment is minimized and generally reserved for cases involving very rare or low-abundance NIS. While initially more effort-demanding, the framework approach becomes increasingly efficient once operationalized due to the automation of data inclusion and routine performance of update assessments. Ultimately, an assessment **template with automated functions** will be developed to efficiently guide the collection and analysis of data and information.

After completing the data screening and compiling NIS impact information, maximizing its management value requires making the information—such as spatial maps and effect sizes—accessible and user-friendly to a wider audience through digital tools that simplify and facilitate understanding for environmental managers. We propose deploying the portal BioBlueSites (<https://gis.sea.ee/bluebiosites/>) and particularly PlanWise4Blue tool, which already has an environmental cumulative impact algorithm available. During this project, we **will integrate novel and robust methodologies, along with collected quantitative information, into the PlanWise4Blue** tool for managers to use. As the portal can accommodate information on the plausible spatial distribution of ecosystem elements under different **climate change** scenarios, users can run specific analyses of NIS impacts considering other human pressures (either present or future) and future climate change. This approach enables the identification of high-risk areas and cases, informing future management options and decisions to enhance the resilience of ecosystems to external perturbations, such as climate change and invasive species. Recommendations for developing solutions and future actions to better achieve marine environmental sustainability will also be provided. Importantly, the integration of the novel NIS Impact Framework (e.g., distribution maps of NIS species and their impacts) into the PlanWise4Blue tool will be implemented to allow **automatic exports to Estonian Environment Agency databases**.

In addition, the project will provide further **training on invasive species** for selected key stakeholders, such as small port operators, environmental licensing authorities and environmental inspectors carrying out inspections in ports or on ships. The project will also **develop information materials** for the two test areas, including the spread of selected NIS, the most affected areas and other relevant information. The project will prepare a detailed policy document on NIS, offering **strategic guidelines and policy recommendations for effective management and mitigation**, supported by the PlanWise4Blue web tool.

Activity plan:

The total budget is 255,000 EUR, with 60,000 EUR allocated to the Norwegian partner.

Activity	Time	Location	Cost	Participants
Complete operationalization of the Novel NIS Impact Framework for its implementation in Estonian and adjacent marine waters, as well as in Oslofjord, Norway, including the validation of functional cause-effect relationships.	Oct 2024–March 2025	Estonia, Norway	80% UTARTU: 156,000 EUR NIVA: 50,000 EUR UTARTU Employee salary distribution (employee count by position and total person-months): Professor 2 persons / 5 months Associate Professor 3 persons / 13 months Researcher 3 persons / 10 months	University of Tartu and Norwegian Institute for Water Research: The costs primarily cover salaries. A significant number of employees is necessary to efficiently extract information from scientific papers, harmonize and analyze extensive data on NIS impacts, and develop the missing spatial models of NIS occurrence within the short duration of the project. This involves identifying sources for GIS maps of relevant environmental variables or proxies as model inputs, collecting and integrating distribution data for the selected species, proposing and developing methods to identify potential NIS areas, and synthesizing numerical information on their distribution and ecological effects. These needs and tasks also justify the proportionally higher costs compared to other activities. Given the project's brief timeline and to minimize travel expenses, communication between partners will be conducted via e-meetings. The University of Tartu and the Norwegian Institute for Water Research have a long-standing, effective partnership, ensuring that this mode of interaction poses no risks to the project and, in fact, enhances (cost) efficiency.
Integration of the Novel NIS Impact Framework into the PlanWise4Blue Tool, enabling automatic exports to Estonian Environment Agency databases	March 2025–April 2025	Estonia, Norway	10% UTARTU: 19,500 EUR NIVA: 10,000 EUR UTARTU Employee salary distribution (employee count by position and total person-months): Associate Professor 1 persons / 3 months	University of Tartu and Norwegian Institute for Water Research: The costs primarily cover salaries. The IT development is primarily carried out by the University of Tartu, with the Norwegian Institute for Water Research supporting this effort by providing information on various data layers related to natural assets and NIS in the Oslofjord.

			Junior Researcher 1 persons / 1 months	
Training on invasive species and the assessment of their impacts in various data availability scenarios.	March 2025–April 2025	Tallinn, Estonia	5% UTARTU: 9,500 EUR UTARTU Employee salary distribution (employee count by position and total person-months): Associate Professor 1 persons / 1 months	University of Tartu: The costs include venue rental and, if necessary, travel funds for stakeholders and potential external participants.
Informational Materials on Invasive Species.	March 2025–April 2025	Estonia, Norway	5% UTARTU: 9,500 EUR UTARTU Employee salary distribution (employee count by position and total person-months): Researcher 1 persons / 1 months Junior Researcher 1 persons / 1 months Specialist 1 persons / 1 months	University of Tartu and Norwegian Institute for Water Research: The costs primarily cover salaries. All materials produced will be in electronic format and shared through various web channels.

*UTARTU and NIVA will calculate 15% of direct eligible staff costs as indirect costs (overhead).

Planned results¹

OUTPUT	INDICATOR	TARGET
Complete operationalization of the Novel NIS Impact Framework for assessing the impact of non-indigenous species in the northeastern Baltic Sea and Oslofjord.	Number of validated functional cause-effect relationships between NIS and natural assets integrated into the NIS Impact Framework.	Validation and integration of at least 100 functional cause-effect relationships by March 2025.
Integration of the Novel NIS Impact Framework into the PlanWise4Blue Tool, enhancing automated impact assessment capabilities.	Successful implementation and testing of the NIS impact assessment functionality.	At least two successful NIS impact assessments conducted, one in Estonia and one in Norway.
Training on invasive species and assessment of their impacts in various data availability scenarios.	Number of participants in the training.	10

¹ Please refer to the [Results Guideline](#)

Informational materials on invasive species.	Number of informational materials developed and distributed.	3
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Yours sincerely,

Siret Rutiku

Head of Grant Office

University of Tartu