Project idea form - small projects

Version 2.1

Registration no. (filled in by MA/JS only) _____

Project Idea Form

Date of submission 05/06/2025

1. Project idea identification

Project idea name	predictive acting, adaptive, and autonomous water management system for small and medium-sized regions
Short name of the project	PAAAM
Previous calls	yes ◯ no ◉
Seed money support	yes ◯ no ◉

2. Programme priority

2. Water-smart societies

3. Programme objective

4. Potential lead applicant

Name of the organisation (original)	Universität zu Lübeck
Name of the organisation (English)	University of Luebeck
Website	https://www.iti.uni-luebeck.de
Country	DE

Type of Partner	Higher education and research institution

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Which organisation(s) in the planned partnership take part in a project within the Interreg Baltic Sea Region Programme for the first time? Please list the respective partners.

University of Luebeck (Germany, Schleswig-Holstein) (first time Interreg)
Maritime Research and Development Center (Poland)
Klaipedos Prekiybos Pramones Ir Amato Rumai (Lithuania)
Lissabon Academy [ASI] (Denmark) (first time Interreg)
Perprof (Poland) (first time Interreg)
HYDRA.AI s.r.o. (Slovakia) (first time Interreg)
IngB RT&S GmbH (Germany, Niedersachsen)

5.1 Specific challenge to be adressed

As a result of climate change, a significant deterioration in natural drinking water quality has been observed in recent years, especially in remote, rural regions due to two phenomena:
1) long dry periods that cause a decline in drinking water resources due to runoff and evaporation
2) floods caused by heavy rainfall events inducing a variety of pollutants into drinking water.
In both cases, drinking water quality falls far short of the requirements of the EU Drinking Water Directive (EU) 2020/2184, or even becomes toxic.
Since this problem currently can only be addressed apropriety with immense technical and financial effort, especially in vast rural areas, this project proposes an adaptive monitoring and situation assessment system based on an affordable mobile sensors system. This system will provide residents, commercial entities, and local authorities with a prompt and preventative status report on the drinking water situation in their catchment area. This makes it possible to plan and simulate drinking water rationing, necessary drinking water supply, and/or drinking water treatment and retention measures, and to submit these to the regional authorities for further coordination.

Although the project mainly addresses "sustainable waters" its results might also aid "civilian resilience/ resilient economies and communities against potential sabotage actions from adversaries outside of the EU that might target fresh/drinking water infrastructure in order to weaken the baltic region.
This project will enable especially baltic remote rural regions to react to climate change, by adapting, decentralizing, and digitalizing water management in order to establish faster decision processes.

5.2 Focus of the call

Effective drinking water management begins with an inventory of drinking water resources, drinking water quality, and potential sources of changes in drinking water quality. While this is to a certain extend possible with fixed sensor devices, their installation, maintenance, and replacement (especially in the event of loss due to heavy rainfall events) are costly in terms of both acquisition and daily use (especially given long periods of stable freshwater supply of sufficient quality). Furthermore, site-specific planning or simulation of improvements in drinking water protection or drinking water distribution are currently only possible through higher-level institutions (usually without involving the local population and their trades). On the other hand, both sensor technology and the technology of adaptive AI-based decision support systems have now reached a level that enables mobile, time-independent, focused, and simulation-capable water management, even on commercially available laptops. This can also be done independently of connections to data centers. In this way, not only is independence in decision-making from other authorities/institutions achieved through autonomy, but all stakeholders in a rural region can also be directly and locally involved in the decision-making process regarding restrictive measures.

6. Transnational relevance

While the use of mobile drinking water sensors is environment-dependent, it does not require cross-regional collaboration. However, the situation is different with the use of AI-based decision support systems. Although the basic principle of machine learning-driven modular decision support systems has been successfully demonstrated in administrative, medical, and technical fields, their use in rural areas, where ethnic, linguistic, and cultural peculiarities are to be expected, represents uncharted territory. The applicants therefore expect that these peculiarities may necessitate some kind of subsequent tuning of the technology. This subsequent tuning will not be of a general nature, but will be based on the weighting of regional characteristics. However, the investigation of this subsequent tuning will provide important clues about the adaptation process in other rural areas, which will promote an effective, rapid, and immediately accepted transformation of the proposed decision support system in other rural regions.

7. Specific aims to be adressed

Building trust that could lead to further cooperation initiatives

As described, the proposed fresh water management system (DSS) involves a wide range of stakeholders in rural areas. This ensures that the actions, plans, and projects of other interest groups,

along with their impacts, are transparently presented to different stakeholders. This will not only foster active debate but ultimately also build trust through understanding among the various stakeholders. This should be extremely positive and effective in supporting the further concerted planning and implementation of new projects and thus the development of rural regions.

Initiating and keeping networks that are important for the BSR

It is expected that users of the innovative water managment system will exchange their experiences (both positive and negative) across regions. As a result, not only suggestions for optimizing the water management systems will be discussed, but also specific use cases will be highlighted. In summary, this means that technology-related networking among various rural regions of the BSR will emerge.

Bringing the Programme closer to the citizens

The initiation of an AI-driven and mobile sensors based water management system "for ordinary people on the countryside," which has so far been considered "urbanly detached" in rural areas, is likely to increase citizens' acceptance for the local funding program as results will ultimately be usable individuals, businesses, local authorities, and involved politicians.

Allowing a swift response to unpredictable and urgent challenges

The structure underlying the decision support system belongs, scientifically speaking, to what are known as model-free systems. While it may sound so abstract, it's simply this: You can introduce anything to such systems; they will retain it without forgetting what they've previously learned, but will connect it with everything (just like our brain does). If new situations arise, they are stored in the system and retained. This means, however, that previously non-existent (extreme) situations are immediately retained. This naturally includes crisis or defense situations that are specified for the system. Such systems therefore react in a crisis-reactive manner —and can be upgraded at any time by external crisis and defense institutions.

8. Target groups

1. Local public authorities,local government officials – are responsible for spatial planning, water management and technical infrastructure in small municipalities. They have a real influence on the implementation of nature-based solutions and will directly benefit from the project results.
2. Community leaders and representatives of rural authorities – as leaders of local communities, they have key contact with the inhabitants of smaller towns and villages. They will play an important role in transferring knowledge, organising consultations and supporting local initiatives related to climate change adaptation.
3. Residents of small towns and rural areas – are directly affected by the effects of missing fresh warer recourses, necessary influences are: reducing water consumtion, reduction of garden and field irrigation, reduction/cessation of animal husbandry. They will be involved in education, consultation and pilots, increasing their awareness and willingness to support implemented solutions and privat water management. for example: Creation of small emergency water storage facilities, planning of periods with no/reduced water reserves
4. Common Tool for a Improved Water Reserve Infrastructure for stakeholders, interested parties , universities, and higher-level administrations, commercial companies and nature conservation associations

	Please use the drop-down list to define up to five target groups that you will involve through your project's activities.	Please define a field of responsibility or an economic sector of the selected target group	Specify the countries and regions that the representatives of this target group come from.
1.	Local public authority	Local authorities will be able to obtain a general overview of the actual/ future freshwater situation online using AI-based DSS. Planning of water management in rual regions by them will be improved.	Germany Poland Lithuania Denmark
2.	NGO	The NGO will carry out educational activities, involve local residents, support the implementation DSS, contribute to the catalogue of good practices and promote the results of the project.	Poland Denmark Litunia Germany
3.	Small and medium enterprise	SMEs will support the implementation of mobile fFreshwater analysis equipment and DSS. They will participate in educational activities and networking at local and transnational levels.	out of their capabilties and experiance, they ensure the efficiency and impact of the DSS and the activities taken and planned. Poland, Germany, Lithuania
4.	Higher education and research institution	The research institute will provide substantive and scientific support, provide special equipment, leads, coordiantes, recommendations and support the implementation of project.	Germany

5.	Interest group	Residents, Steakholders will take part in the use of ther DSS and educational activities, co-creating local solutions to increase water managment in normal and crisis situations	Germany, Denmark, Polen, Litunia

9. Contribution to the EU Strategy for the Baltic Sea Region

Please indicate if your project idea has the potential to contribute to the implementation of the Action Plan of the EU Strategy for the Baltic Sea Region (https://eusbsr.eu/implementation/).

yes ◉ no ◯

Please select which policy area(s) of the EUSBSR your project idea contributes to most.

	PA Hazards
	PA Safe
	PA Spatial Planning

The MA/JS may share your project idea form with the respective policy area coordinator(s) of the EUSBSR. You can find contacts of PACs at the EUSBSR website (https://eusbsr.eu/contact-us/).

☐ If you disagree, please tick here.

10. Partnership

1. University of Luebeck Institute of Computer Engineering – Is the lead partner, a higher education and research institution in Schleswig-Holstein (Germany) with strong expertise in autonomous environmental and infrastructure monitoring using autonomous underwater vehicles. It will act as the lead partner, due to its extensive experience in multiple domains such as autonomous robotics, computer engineering, and SW as well as HW optimizations including digital design. The institute will coordinate knowledge transfer and ensure good scientific practice in planning and evaluation of the pilot measures.
2. IngB RT&S brings scientific and technical expertise in the development and running AI-driven self-adapting decission suport systems, leading the development of model solutions and contributing to the creation of the catalogue of good practices.
3. Lissabon Academy will promote the project and communicate with local authorieties and

communities, and ensure the project's activities and the system implementation are relevant to the needs of residents. It will Identify stakeholders and end users, conduct an exploratory search activity (e.g., surveys questionnaires), and collect data (e.g., groundwater, regions space-time boundaries, surface water, quality water). Also it will and present and discuss results of the DSS (e.g., Regional discussion panel).
4. HYDRA.AI s.r.o. performs field testing on rivers (using boats and/or drones) incl. data collection with environmental sensors for freshwater monitoring in a backend system
Other concerns are: Data and Results API for data retrieval and manipulation, SQL database for storing processed results, Machine learning system for data processing, Frontend mobile and web application.
5. PERPROT will: identify parameters to be measured; determine available sensors; design, develop and build integration platform with wireless communication (BT or WiFi) with base station (laptop); acquire data from the sensors (on request or periodically); store data, process data and frame data to be ready for transmission; and establish communication with remote base station and send stored data .
6.Maritime R&D Center (part of university of Szczecin) will be responsible for installation and supervision of water quality measuring device in the Odra river and contribute to connectivity and data flow implementations.
7. Klaipedos Prekiybos Pramones Ir Amato Rumai is a chamber of commerce representing business and economic interests.

11. Workplan

Main project activities are:
1) The precise selection of Requirements and application definition.
- Identify a significant subset of candidate applications
- Define user requirements to these applications
- Define power budgets and physical requirements
- Define interface requirements
- Define requirements for the SW drivers
- Define processing requirements
- Derive initial implementation strategies for SW and HW
- Create an initial development plan

2) The Implementation of Reference missions and smart algorithms optimization
- Assess the mission/application optimizations for the selected use cases and identify the most suitable application algorithms and their improvements;
- Deliver optimized algorithms for implementation into the concept system;
- Develop the relevant software suite to enable the project partners, and eventually the end system customers, to develop applications properly running on their own system;
- Develop and optimize software applications for the desired system and evaluate performance through computational test/benchmarks on the actual hardware system;

3) The Implementation of a reference processing system for water management
- Evaluate, specify and select interfaces;
- Implement and test the processing system;

- Integrate the software

4) Integration of processed results into a front-end mobile and web application

5) Dissemination and Communication of project goals and results/outcome
The project activities will actively involve:
Local public authorities and officials – through participation in the diagnosis, pilot implementations, lectures, workshops, trainings and study tours;
Village leaders and representatives of rural communities – as local leaders supporting the contact with the residents;
Residents and entrepreneurs – through meetings and practical education in public spaces.
NGOs – responsible for education, consultation and promotion of the results;
Researchers – supporting the project with expert knowledge and evaluation of the effectiveness of the solutions;
Professionals and planners – as designers and implementers of BGI solutions;

6) Project Management
-Project Coordination
-Technical Management

The results of the project will benefit:
1. Partner municipalities and cities, who will implement solutions to improve retention and quality of life for their residents.
2. Other municipalities in the Baltic Sea Region, who will use the "Recommendations for the implementation of blue-green infrastructure" and the "Catalogue of good practices for residents and entrepreneurs in the field of increasing retention potential" as an inspiration and implementation tool.
3. Local communities which will benefit from the improved environmental conditions and quality of public space and will have the opportunity to increase their competences and knowledge in the field of implementing blue-green infrastructure in their area.
4. Planning and design institutions, who will receive proven models for technical solutions.

12. Planned budget

ERDF budget (planned expenditure of partners from the EU)	EUR 489,000.00
Norwegian budget (planned expenditure of partners from Norway)	*EUR XXX*
Total budget (including preparatory costs)	**EUR 489,000.00**

13. Project consultation

Please indicate if you wish to have a consultation (online meeting) with the MA/JS to discuss your project idea

yes ◉ no ◯

14. Questions to the MA/JS

Questions related to the content of the planned project	*(max.1.000 characters incl. spaces)*
Questions related to budgeting and expenditure	*(max.1.000 characters incl. spaces)*
Any other questions	*(max. 1.000 characters incl. spaces)*

15. Additional information

Programme Objective: Sustainable Waters

Unfortunately the proposal form didn't allow the selection of the programme objective under a variety of Adobe Acrobat Reader versions. Therefore, it is indicated in this section.

Your account in BAMOS+

Please remember that to officially submit your application you need to access our electronic data exchange system BAMOS+. More information about the process of applying for your account in BAMOS+ you will find here:
https://interreg-baltic.eu/gateway/bamos-account