Issue 1

RESCUER Newsletter

November 2024

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The Doctoral Network **RESCUER**

(Resilient Solutions for Coastal, Urban, Estuarine and Riverine Environments)

aims to train 10 young researchers to tackle medium and long term water challenges that face coastal communities, focusing on forecasting and modeling of coastal, riverine, and urban flooding and associated water quality issues.

RESCUER is on social media

Follow us: Instagram

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EDITORIAL

On behalf of the whole RESCUER consortium, we are happy to welcome you to this first project newsletter.

This newsletter aims to keep the consortium informed about the project's key activities and to engage a broader audience by sharing updates and fostering potential collaborations.

Published biannually, the newsletter will be available for download on the RESCUER website: https://www.rescuer-msca.net/.

In this first issue we introduce the RESCUER project, highlight the consortium members, and share insights from our kickoff meeting held in Bergen, Norway.

The next issue will be released in February 2025! Stay tuned and happy reading!

Funded by the European Union

The project has received funding from the European Union's Horizon Europe research and innovation program under the grant agreement No. 101119437

Project's coordinator letter

Welcome to the first issue of our RESCUER Newsletter! Our goal is to keep you informed about upcoming events, the latest results and opportunities within our network.
It is a particular pleasure to welcome all the PhD fellows to the RESCUER network !!!
In the stark reality of global warming, there are interesting and important scientific challenges to be addressed, and this network is well suited to produce excellent and useful results for applications in coastal and river engineering and water quality.
Planning for this Doctoral Network started in November of 2020. Starting from a core group of partners, we built a durable network of beneficiaries. We added associate partners with important expertise in key areas and recruited a distinguished External Advisory Board. The first application to Horizon Europe failed, but after a round of extensive revisions, we submitted the second application in November 2022. This time, we succeeded, and the network officially started in February 2024.
Recruitment of the PhD fellows is almost completed. Seven fellows have already started, one is due to start on December 1st, and two more will start in 2025.
Training of the PhD fellows is the central aim of our doctoral network as stated in the application:

The Doctoral Network RESCUER (Resilient Solutions for Coastal, Urban, Estuarine and Riverine Environments) aims to train 10 young researchers to tackle medium to long term water challenges, focusing on forecasting and modeling of coastal, riverine, and urban flooding and associated water quality issues.

I am looking forward to an exciting and fruitful three years with the network working as one to address the challenges upon us and to make good on the promises made in the application phase. No doubt there will be many unforeseen issues but let's keep our eyes on the goal and deliver for the sake of improving coastal safety.

Henrik

The coordination team:

Coordinator: **Henrik Kalisch**, University of Bergen, Norway

Assistant coordinator: **Matteo Postacchini**, Universita Politecnica delle Marche, Ancona, Italy

Grant manager: **Rosa-Maria Vargas-Magana**, University of Bergen, Norway

Communications: **Maria Kazolea**, INRIA of the University of Bordeaux, Bordeaux, France

Ombudsman: **Francesco Lagona**, Uni Roma Tre, Rome, Italy

About RESCUER

RESCUER (Resilient Solutions for Coastal, Urban, Estuarine and Riverine Environments) aims to leverage advances in the numerical treatment of multi-scale and multi-physics problems made in the past decade, into models to address the pressing needs in the practical modeling of hydrodynamic phenomena in the coastal and estuarine zone with the goal of improving overall safety of coastal area

Participants to RESCUER project will exchange skills and knowledge through secondments and thematic workshops to make progress through key advancement in modeling of hydrodynamic phenomena in the coastal and estuarine zone. RESCUER will also strengthen collaborative research between different countries like Norway, Italy, France, Portugal, Spain.

The **outcome** of this project will be a suite of universal, highly efficient, and accurate numerical models addressing a wide range of hazards caused by sea and river forces. These include wave run-up and overtopping, coastal and urban flooding, water-quality issues, and bed and riverbank erosion. These advanced multi-physics models will be validated through data obtained from dedicated laboratory experiments and field measurements conducted at a selected site in Senigallia, Italy. Once validated, the models will be deployed by our commercial partners to provide a comprehensive understanding of hazardous coastal conditions.
The models will serve both operational purposes and as essential tools for risk assessment, mitigation planning, and offering guidance to decision-makers.

Key Focus Areas of the RESCUER Project

The RESCUER project is structured around four main axes, each addressing critical challenges in hydrodynamic modeling:

- **Coastal Modeling**
  Development of numerical tools to simulate wave action in the nearshore zone on a wave-by-wave basis. These tools will enable accurate wave forecasting, even in steep bathymetries and complex coastal geometries.
- **River and Estuary**
  Creation of fast and precise numerical models for studying coupled surface flows over erodible beds and porous subsurfaces, including interactions with dry and wet granular flows on unstructured meshes.
- **Urban Flooding**
  Development of a accurate numerical models that accounts for detailed structures in the urban environment like openings and yards, providing advanced simulations for urban flooding scenarios.
- **Water Quality**
  Design, calibration, and validation of an integrated hydraulic and biochemical model capable of simulating the entire urban coastal water system.

The RESCUER Consortium

Beneficiaries

University of Bergen (Norway) As the project coordinator, the University of Bergen contributes its expertise in PDE modeling for free surface flows. It focuses on designing and implementing numerical methods, particularly for narrow channel flows.

Universidad de Zaragoza (Spain) With a strong background in computational models, the university will develop tools to simulate flow dynamics over erodible beds with variably saturated subsurface flows and dry/wet granular flows. Additionally, it will work on an integrated hydraulic and biochemical model to simulate the complete urban coastal wastewater system, encompassing sewer dynamics, WWTP processes, and interactions with receiving waters.

Universita Politecnica delle Marche (Italy) The university brings extensive experience in urban flooding modeling and experimental studies to support and validate numerical models.

Aalborg Universitet (Denmark) Aalborg will investigate the fidelity of atmospheric forcing models and their impact on coastal flooding by developing a coupled wave-wind model.

Université de Pau et des Pays de'Adour (France) It will enhance numerical modeling of free surface flows coupled with atmospheric flows, improving nearshore computational capabilities under atmospheric forcing.

University of Coimbra (Portugal) The university will focus on eco-hydraulic threats in fluvial and coastal environments, such as those caused by heavy metals, pesticides, and detergents. It will develop models to predict the transport and fate of pollutants, sediments, and microplastics, providing tutorials for modeling specific zones and validated dispersion coefficients.

INRIA (France) INRIA will apply its strong expertise in numerical modeling to advance urban flooding simulations using innovative and cutting-edge techniques.

SUEZ EAU FRANCE SUEZ will contribute to developing phase-resolved operational wave forecasting, particularly for areas with highly irregular bathymetry.

Associated Partners

Águas da Águas Figueira (Portugal)**, Foundation AZTI** (Spain)**, The Norwegian Public Roads Administration** (Norway)**, Civil Protection (Senigallia Municipality)** (Italy)**, Università Roma Tre** (Italy)**, Columbia University** (US)**, COWI** (Denmark)**, Karlsruher Institut Fur Technologie** (Germany)**, Hydronia-Europe** (Spain)

The Associated Partners will host the secondments, where the Fellows will be exposed to a non-academic environment and mindset and will gain valuable experience working with practical problems in coastal protection river hydraulics and urban flooding.

Kick-off meeting

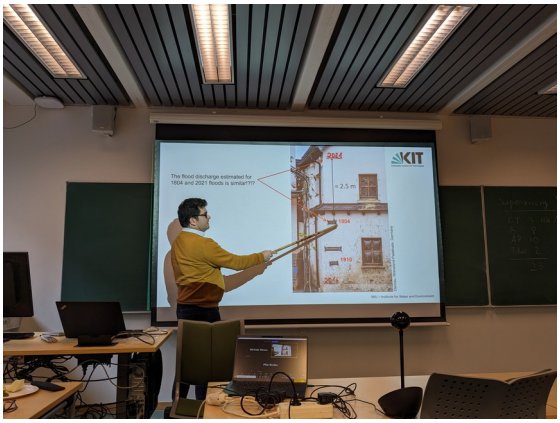
Bergen, Kick-off meeting 25-26 March 2024

The Kick-off meeting took place on March 25–26, 2024, in Bergen, Norway. During this first plenary session, the network was introduced, along with the Committee and the Board. An overview of the members of each Committee and Board was also presented. The goal was to

- Explain the roles and responsibilities of each committee and board in the broader organizational framework.
- Establish communication channels, reporting structures and interaction points between the committees and boards.
- Set frequency of meetings.

Further more, an overview of each work package and planned secondments was presented. The recruitment strategy and the data management plan were also defined during the meeting.

Details regarding the Grant Agreement and the Consortium Agreement were discussed, and a comprehensive introduction to the communication, dissemination, and exploitation strategy was presented.



Henrik Kalisch Project Coordinator

News and Events

RESCUER at the Night of the Researchers

On September 29, 2023, RESCUER participated in the *Night of the Researchers* at Cap Sciences in Bordeaux, France. As part of the *Bouche à Oreille* section, we engaged with attendees of all ages through a fun and interactive game.

The activity aimed to introduce the general public to the RESCUER project, providing a simple yet engaging explanation of its objectives and structure. This event offered a great opportunity to raise awareness about our work and foster interest in the project's mission.

RESCUER at HONOM 2024

From September 8–13, 2024, RESCUER participated in the *High-Order Nonlinear Numerical Methods for Evolutionary PDEs: Theory and Applications* (HONOM 2024) conference. The event, held in Chania in the island of Crete Greece, brought together experts in numerical analysis.

As part of the poster session, we presented the RESCUER project to the scientific community, highlighting its objectives and innovative approaches. This was an excellent opportunity to showcase our work and engage with leading researchers in the field.

For more details, visit the conference website.

Upcoming Events:

The 1st RESCUER Workshop will provide training in the development of new accurate, robust and efficient numerical methods, GPU programming and multi-block grids. It will take place in Bergen from December 2nd to December 6th .

The project has has received funding from the European Union's Horizon Europe research and innovation program under the grant agreement No. 101119437.

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