

# Ten full-time PhD Fellowships in MSCA doctoral network *RESCUER*

## Offer description

The RESCUER network brings together 8 beneficiaries and 9 associated partners, located in 8 countries (for beneficiaries: Denmark, France, Italy, Norway, Portugal and Spain, for associated partners: Denmark, France, Germany, Italy, Norway, Portugal, Spain, United States). Ten Doctoral candidates will enjoy a multi-disciplinary and international environment with abundant training opportunities and exchange within the institutions involved in the network.

### Scientific Background:

In the face of rising temperatures and sea levels, new approaches to coastal safety and flooding protection are needed. Ensuring the safety of property and commercial developments onshore and offshore requires an integrated approach, including phase-resolving wave modeling, tracking and mitigation of morphological changes, potential flooding in urban areas and monitoring of water quality. While protective structures and emergency plans for catastrophic storm waves and storm surges are well established, the confluence of global warming and sea level rise with other known natural risk factors and increasing human activity create a new set of hazards and requires new thinking in coastal modeling and the planning of mitigation strategies.

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

The doctoral candidates will be able to spend time one or two partner organizations through mandatory secondments. The hosts for these secondments include other beneficiaries and also academic and non-academic partners (Águas da Figueira, Portugal; Foundation AZTI, Spain; The Norwegian Public Roads Administration, Norway; Civil Protection Authority for Senigallia Municipality, Italy; Hydronia-Europe, Spain, COWI, Denmark).

*Be aware that some fields of research, especially within sensitive technology areas, might be enforced by Norwegian and EU international regulations regarding Control of the Export of Strategic Goods, Services and Technology. Candidates who by assessment of the application and attachments are seen to conflict with the criteria in these regulations will be prohibited from recruitment.*

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## Project 6: Multiphysics shallow-water models for river and estuary dynamics

**Description:** Rivers and estuaries are complex, interconnected systems which are subject to a multitude of physical, chemical and biological effects. Proper maintenance includes monitoring water levels, flow rates, water quality and sediment status, and effective management depends on real-time measurements as well as accurate numerical tools. The aim of this project is the development of computational models enabling the simulation of flow dynamics over erodible beds with variably saturated subsurface flows as well as dry and wet granular flows. In particular, a numerical 2D coupled surface-subsurface flow model will be extended to handle a moving bed, which affects both the surface and the subsurface computational domain. While standard practice today is the use of dedicated uncoupled models for river flow, sediment transport, recent advances in numerical techniques and GPU implementations enable an integrated and comprehensive multi-physics model encompassing and linking all the effects mentioned above.

### Requirements:

- Master's degree in Physics, Civil Engineering or a related field.
- Programming skills are required.
- **RESIDENCE PERMIT**  
*Non-EU applicants who have a permit of stay in Spain (or the receipt of the request for the permit) must show at Staff Department (University of Zaragoza), no later than the deadline for entering the contract, the original copy of the permit of stay (or the receipt of the request for the permit). Failure to provide the document means that the winner loses the right to enter the contract. Non-EU applicants who do not yet have a permit to stay in Spain and who have been offered a fellowship, must wait for the official authorisation, which is necessary to apply for a visa. Activities can only start after the above-mentioned visa has been supplied to the Staff Department. Failure to provide the document means activities cannot begin.*
- **INCOMPATIBILITIES**
  1. The research fellowship is incompatible with public or private employment, including short-term or part-time contracts, starting from the enrolment time.
  2. The fellowship is not compatible with other scholarships, except for those awarded by national or foreign institutions with the purpose of integrating the research activities with stays abroad.

**Supervisor:** Prof. Pilar Garcia-Navarro

**Institution:** University of Zaragoza, Spain.

**Location:** University of Zaragoza, María de Luna 3 50018 Zaragoza, Spain

Application deadline: 15.05.2024

Expected starting date: September 2024

To apply for this position, please send an e-mail to: [pigar@unizar.es](mailto:pigar@unizar.es)

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