



*DOCTORAL INPhINIT FELLOWSHIPS PROGRAMME – INCOMING FRAME  
INFORMATION CALL 2023*

**PhD POSITION OFFER FORM**

**Position**

1. Project Title/ Job Position title: **IMPEST: Unraveling the impacts of pesticide mixtures on ecosystem health**
2. Area of Knowledge: **(choose one option)**
  - **LIFE SCIENCES**
3. Group of disciplines: **(choose one option)**

LIFE SCIENCES

Medicine, Public Health, Sport Sciences, Nutrition, Clinical Psychology, Health Management
<b>Animal, Plant, Environmental Biology, Physiology, Ecology and Conservation</b>
Human Biology, Microbiology, Molecular Biology, Genetics, Cellular Biology, Genomics and Proteomics, Biochemistry
Agriculture, Veterinary Science, Animal Production, Forestry
Biotechnology, Bioinformatics, Pharmacy, Food Technology

PHYSICAL SCIENCES, MATHEMATICS AND ENGINEERING

Theoretical and Applied Mathematics, Computer Sciences
Physics



**Geology, Earth Sciences, Environmental and Atmosphere Sciences, Mines, Geological Engineering, Oceanography, Hydrology**

Civil and Construction Engineering, Energy, Nuclear Energy and Renewable Energy Engineering

Chemistry and Chemical Engineering

Telecommunications, Electronics, Robotics, Biomedical Engineering, Automation Engineering, ICT

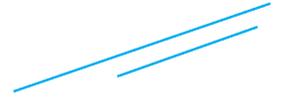
Industrial Engineering, Mechanical Engineering, Metallurgy, Materials, Nanotechnology, Aeronautical, Naval and Aerospace Engineering

4. Research project/ Research Group description (max. 2.000 characters)

Background:

Conventional agriculture are highly dependent on the use of plant protection products (PPPs) to ensure yield and food security in crop production. In Europe almost 2000 PPP containing nearly 500 active substances are currently used and between 420,000 and 500,000 tons of pesticides - i.e. PPPs are used annually. Mixtures of distinct PPP residues have been commonly found in distinct compartments, including in soil, water, crops, animals, and humans. Almost 50% of the active substances approved as PPP in the EU market have the potential to bioaccumulate and 25% are persistent in soil. Additionally, 30% of approved PPP have a high acute aquatic toxicity and 28 are suspected carcinogens. Hence, approved PPP are potentially harmful to ecosystems and human health. Although their known toxicity, the actual extent of their effects on the ecosystem has been neglected, notably because the effects resulting from the interaction of distinct PPP is not regularly evaluated. Moreover, the available ecotoxicological information concerns standard species whose relevance at regional or even European level is limited, disregarding the impacts on native species that may have implications for the normal functioning of the ecosystem.

Aim: **Under the scope of the European Project – SPRINT (<https://sprint-h2020.eu/>), the main objective of IMPEST is to assess the effects of PPP mixtures on the ecosystem health. Based on more realistic scenarios, the specific objectives of this proposal are: (i) to evaluate the ecotoxicological effects of PPP mixtures found in distinct crop systems across Europe on native**



**terrestrial and aquatic species; (ii) to assess the extent to which the terrestrial and aquatic ecosystems retain their natural function and so have the capacity to deliver a range of services.**

Expected Outcomes: Aligned with CESAM's mission and its strategic objectives, as well as with the United Nations Sustainable Development Goals (e.g. 12 and 15), IMPEST will represent an advancement in the state-of-the-art providing new ecotoxicological knowledge on the impacts of realistic PPP mixtures on non-standard species as well as on the ecosystem functioning, hence allowing to better identify new causal effects between the pesticide mixtures and the ecosystem health. This information is of crucial importance for regulators and policymakers in the domains of environmental and pesticide use regulation, for farmers and general public.

Research team: It relies on a dynamic interdisciplinary team within two of CESAM's research groups (RG), the "Social-Ecological Systems Analysis, Management & Planning (SES RG)" and the "Aquatic Toxicology & Risk Assessment (ATRA RG)", with large experience in ecotoxicology and ecological risk assessment. With a solid collaboration previously established, the team also has extensive experience in the supervision of post-graduation students.

5. Job position description (max. 2.000 characters)

To address the goals of IMPEST, the following four tasks were defined (T1-5):

T1- Ecotoxicological effects of PPP mixtures on terrestrial species.

Monospecific assays with non-standard terrestrial species, including earthworms and beneficial insects, will be performed to assess the effects of 11 distinct PPP mixtures (corresponding to the 11 cases studies of the SPRINT project across Europe). Beside the traditional endpoints at individual level, sub-individual endpoints will also be assessed, including biochemical, genotoxicity and cellular biomarkers.

T2- Ecotoxicological effects of PPP mixtures on aquatic species.

Similarly to the previous task, monospecific assays with non-standard aquatic species (e.g. native macroinvertebrates) exposed to the 11 PPP mixtures will be conducted. Both sub-individual and individual endpoints will be assessed.



T3- Impacts of PPP mixtures on terrestrial ecosystem functioning.

To assess the effects on the ecosystem function distinct parameters will be measured, including nitrification, potentially mineralisable N, hot water extractable C, microbial biomass, microbial respiration and bait lamina (following Griffiths et al 2016);

T4- Impacts of PPP mixtures on aquatic ecosystem functioning.

The functions of the aquatic system will be assessed by measuring distinct parameters, including: microbial and decomposers/detritivores activity, diversity of bacterial, fungal and diatom communities.

The student will also be responsible for the outreach activities, such as publication of scientific papers and presentations at conferences and attend complementary training workshops.

The candidate will work at the Centre for Environment and Marine Studies (CESAM), University of Aveiro, under the supervision of CESAM researchers Joana Pereira and Nelson Abrantes. The CESAM has all the facilities and laboratories with cutting edges equipment, providing all the support and required conditions to achieve the goals.

## Group Leader

1. Title: PhD
2. Full name: Joana Luísa Lourenço Estevinho Pereira
3. Email: [jpereira@ua.pt](mailto:jpereira@ua.pt)
4. Research project/ Research Group website (Url): [www.cesam.ua.pt/joanaluisapereira](http://www.cesam.ua.pt/joanaluisapereira)
5. Website description: The CESAM's research group "**Aquatic Toxicology & Risk Assessment (ATRA RG)**" core activities focuses on risk assessment and biomonitoring studies and their interlinks and contributes to three CESAM's Thematic Lines: Ecology and Functional Biodiversity, Environment & Health, and Integrated Environmental Systems. ATRA RG aims at providing insight and generating new knowledge about causes and consequences of contaminants, as a result of present and past anthropogenic activities, contributing to the assessment of risk posed by contaminants to the environment and their impacts on biodiversity, ecosystem functions and ecosystem services link with human wellbeing.

1. Title: PhD
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4. Research project/ Research Group website (Url): [www.cesam.ua.pt/njabrantes](http://www.cesam.ua.pt/njabrantes)
5. Website description: The CESAM's research group "**Social-Ecological Systems Analysis, Management & Planning (SES RG)**" integrates environmental, socio-economic and policy sciences and contributes to three CESAM's Thematic Lines: Environment & Health, Integrated Environmental Systems and Marine Ecosystems & Resources. One of the main research topics of the SES RG research is the environmental assessment studies underpinning for decision-making on sustainable land and surface water resources management, focusing on the assessment, prediction, mitigation and demonstration to key stakeholders. Special attention is given to the surface processes driven by climate change, with particular focus on post-fire impacts on soil, resulting contamination to downstream aquatic habitats and the eco-toxicological effects on aquatic organisms.

#### **Additional website (optional, max. 5 websites)**

1. Url: [www.cesam.ua.pt](http://www.cesam.ua.pt)
  2. Website description: The **Centre for Environment and Marine Studies (CESAM)** is a Research Unit created in 2005 and hosted at the University of Aveiro. Its mission is to develop leading international Research and Advanced Training on environmental and marine sciences. Its main objective is to promote a more efficient use of terrestrial and aquatic (from catchment to the deep sea) environmental resources and a more competitive, resilient and sustainable economy. CESAM develops its research along four thematic Lines: Ecology & Functional Biodiversity, Environment & Health, Integrated Environmental Systems and Marine Ecosystems & Resources. CESAM's interconnected Thematic Lines are operationalized through twelve interlinked Research Groups (RG). CESAM has a fully equipped facilities and state-of-art equipment for addressing multidisciplinary research on ecology/functional biodiversity, sustainable natural resource management, ecosystem services, climate change adaptation/mitigation, environmental risk assessment, and public health. CESAM team integrate ca 500 members (researchers, PhD students, MSc students and collaborators) offering huge opportunities for collaboration through projects, networks or scientific supervision. Therefore, CESAM stands out due to its transdisciplinary research character and the promotion of international collaboration.
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1. Url: <http://ler.web.ua.pt>
  2. Website description: The **Laboratory of Ecotoxicology and Risk (LER)** is dedicated to monitoring and assessing impacts on inland aquatic ecosystems and their interface with adjacent terrestrial ecosystems. The areas of ecology, ecotoxicology and biotechnology are covered by research, from perspectives of diverse complexity and information generated at different levels of biological organization. Promoting the connection to the community, LER has been involved in providing specialized services to external entities, as well as in the promotion of science communication and education activities. One of the main research lines within LER is related to the assessment of impacts of stressors and global change, using diverse experimental approaches to assess endpoints different levels of biological organization using a plethora of standard and non-standard model organisms, then applying prospective



and retrospective ecological risk assessment frameworks to support environmental management and protection.