

Academic Supervisor looking for Industry Partner

NeighbourWatch: GeoAI Monitoring of Nature-Based Solutions and Community Flood Adaptation in Irish Cities

Postdoctoral Research Fellowship — Project Opportunity

Host Institution	Maynooth University, ICARUS Climate Research Centre, Ireland
Supervisor	Dr. Payam Sajadi, Assistant Professor — Remote Sensing, GIS & Urban Resilience
Programme	Sustain-FIT (Enterprise Ireland / Horizon Europe MSCA, Grant No. 101177663)
Duration	36 months (including 6–12 month industry secondment)
Industry Partner	Irish environmental technology / water utilities company (TBC with candidate)
EU Green Deal Theme	Climate Action · Digitalisation for Sustainability
Closing Date	Rolling — applications reviewed upon receipt (project formation deadline: 30 April 2026)

Background & Motivation

Urban pluvial flooding is an increasingly dominant and rapidly evolving risk in European cities, driven by intensifying short-duration rainfall extremes and progressive urbanisation. In Ireland, recent events such as Storm Éowyn (January 2025), which caused widespread damage and disruption, have highlighted the sensitivity of urban systems to high-intensity rainfall under conditions of increasing surface impermeability. In Dublin, impervious surface cover has increased from 57% to 63.8% within a three-year period, significantly altering runoff generation and drainage dynamics. Nature-Based Solutions (NBS), including permeable surfaces, green roofs, and distributed neighbourhood-scale interventions — are now embedded within Ireland’s National Strategy for Nature-Based Management of Urban Rainwater (2024) and the revised EU Urban Waste Water Treatment Directive, which explicitly emphasise quantifiable, evidence-based evaluation of hydrological performance. Yet a critical scientific and practical gap remains: while NBS design is typically supported by modelling and scenario analysis, there is limited empirical understanding of how these interventions perform under real hydrometeorological conditions and at neighbourhood scale over time.

In particular, cities lack integrated, multi-scale observational frameworks that link NBS characteristics to measurable changes in runoff generation, infiltration behaviour, and local flood response, and the contribution of distributed, community-driven interventions (e.g. garden modifications) to neighbourhood-scale outcomes remains poorly quantified. NeighbourWatch addresses these challenges by developing AI-enabled, multi-source data integration approaches to monitor, characterise, and interpret the real-world hydrological performance of NBS and community-level interventions across urban environments.

The project builds directly on existing infrastructure and datasets led by Dr. Sajadi, including the SFI National Challenge Fund project on domestic garden NBS for flood mitigation (RESTORATION, in collaboration with OPW) and the INHERITANCE project (Google/UCD), which established LoRaWAN-based sensor networks, satellite data processing pipelines and spatial optimisation frameworks in Dublin “sponge neighbourhoods”. This provides a unique foundation to move from conceptual design towards empirically grounded, data-driven evaluation of urban flood adaptation strategies.

Research Objectives

Indicative questions the Fellow may address include:

- What can satellite and AI tell us about how well NBS are actually working at neighbourhood scale? Develop GeoAI methods to monitor and evaluate NBS performance using Earth Observation and urban spatial data.

- How do green infrastructure and local interventions influence runoff and infiltration under real conditions? Quantify the influence of NBS on runoff generation, infiltration processes, and local hydrological response, with explicit consideration of event-scale and seasonal variability.
- What role do community actions play in building flood resilience? Investigate the contribution of resident-led garden modifications and small-scale interventions to neighbourhood-scale flood outcomes.
- How can monitoring evidence translate into practice? Develop transferable monitoring and evaluation frameworks co-designed with local authorities and industry to support data-driven NBS rollout across Irish and European cities.

Methodology

The Fellow will work across three interconnected workstreams:

- **WP1 — Multi-Source spatial data integration & mapping:** High-resolution mapping of NBS features and urban surface characteristics will be conducted using Sentinel-1/2 data, derived spectral indices, and GIS-based urban morphology metrics (e.g. imperviousness, connectivity, slope, drainage pathways). Representative neighbourhoods will be selected based on variability in NBS density, land use, and hydrological conditions, building on the spatial database developed within the RESTORATION & INHERITANCE project.
- **WP2 — Integrated monitoring & analysis of NBS performance:** Integrate EO data with the existing LoRaWAN sensor network (soil moisture, water level, weather) and targeted field observations. Analyse rainfall–response relationships using machine learning and GeoAI methods (Random Forest, LSTM) to identify key performance drivers and seasonal dynamics.
- **WP3 — Community engagement & decision-support:** Co-design citizen-science data collection approaches (reporting tools, mapping, surveys) with Dublin communities and local authorities. Integrate community knowledge with environmental data to develop practical, transferable NBS monitoring frameworks for cities and practitioners.

Expected Outputs

- Novel GeoAI methodologies for monitoring NBS performance at neighbourhood scale
- High-resolution dataset linking NBS presence, community actions, and hydrological response across Dublin neighbourhoods
- 3–4 peer-reviewed publications (Remote Sensing of Environment, Journal of Hydrology, Environmental Science & Policy)
- A practical NBS monitoring and evaluation framework co-designed with Dublin City Council, OPW/LAWPRO and the industry partner, supporting implementation of Ireland’s Climate Action Plan and EU Green Deal NBS ambitions.

Ideal Fellow Profile

We are seeking a motivated, internationally trained postdoctoral researcher with:

- A PhD in remote sensing, GIS, hydrology, environmental science, or a closely related field
- Experience with Earth Observation data, spatial analysis, or machine learning (Python, Google Earth Engine, or similar)
- Interest in urban flooding, climate adaptation, and nature-based solutions
- Ability to work with interdisciplinary data and engage with stakeholders and communities
- Strong publication record and motivation for impactful, applied research

Experience with hydrological modelling, IoT sensor data, or citizen science approaches is an advantage but not required.

What the Fellow Gains

- Full MSCA-level salary + mobility allowance for 36 months
- Ready-to-use research infrastructure from Day 1: deployed LoRaWAN IoT sensor network, Sentinel satellite data pipelines, and established OPW/Dublin City Council stakeholder relationships
- 6–12 months embedded in an Irish environmental tech or water utilities company, building industry experience and co-developing applied IP
- Supervision from a multidisciplinary team spanning remote sensing, urban resilience, spatial optimisation, and community engagement
- Clear dual career pathway: academic (strong publication platform in high-impact EO and hydrology journals) or industry (commercial NBS monitoring tool co-developed during secondment)

How to Express Interest

Candidates are invited to send a short expression of interest (1-page CV + brief cover note explaining fit) to:

Dr. Payam Sajadi

Assistant Professor, ICARUS Climate Research Centre, Maynooth University

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Expressions of interest reviewed on a rolling basis. Early contact strongly encouraged.