

# Water Challenges in a Changing World

## AUGUST NEWSLETTER

Hello everyone – we have had some wonderful and encouraging feedback from readers regarding the first Water Challenges in a Changing World newsletter and we are glad that you have enjoyed the content. As always, if you have anything that you would like us to include in the next newsletter, please do send it in. Details about where to send this are at the end of the newsletter. We hope you are all enjoying your summer break and we look forward to seeing you back in person soon.



## NEW MEMBERS OF STAFF

We are pleased to announce the arrival of our 2 newest members of staff, Reza Dehbandi and Alice Phillips, who have both joined us earlier on in the year.



Reza Dehbandi joins GEES as a new Marie Cure postdoctoral fellow (MSCA). He studied his PhD in Environmental Geochemistry at Shiraz University, Iran and then joined Ahvaz Jundishapur University of Medical Sciences in Iran as an assistant professor of Environmental Health. In his MSCA fellowship, he will study the fate and transport of micro - and nanoplastics (MnPs) from agricultural mulching practices to groundwater resources and their possible risks through soil-column experiments.

He is also interested in hydrogeochemistry of environmental pollutants and soil and respirable dust pollution by potentially toxic elements.

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Alice Phillips joins GEES as a technician working on microplastic projects following work in industry at the Rosalind Franklin Laboratory on COVID-19 testing. Prior to joining the University, Alice carried out part-time work with Stefan Krause and Semira Manaseki -Holland investigating the presence of microplastics in drinking water and infant stool in Mali. The cross-sectional study, environmental sample handling and environmental health form the bulk of Alice's workload.



## CLIMATE CHANGE EVENTS

Use the following link to find out about the climate change related events taking place at the University of Birmingham:

<https://www.birmingham.ac.uk/research/climate/climate-events-and-attendance.aspx>



### [REPM 2023](#)

Sunday 3 September (17:00) - Thursday 7 September 2023 (17:00)

Location: University of Birmingham

This conference will bring scientists and engineers working on rare-earth permanent magnets together to explore topics such as raw materials, resources, processing of rare-earth and future permanent magnets.

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## CONGRATS TO ANNA KUKKOLA

We'd like to congratulate Dr Anna Kukkola for her successful viva. Anna is a valued member of our group, and we are extremely proud of her achievements.

Anna studied how different anthropogenic activities affected microplastic distribution in three different river catchments. She focused on source evaluation in a quantitative manner, the temporal distribution downstream from a well-defined point source, and aimed to uncover the optimal sampling frequency to truly capture the heterogeneity of microplastic concentrations to obtain a better understanding of the processes. She also focused on the difference between diffused and point sources, with the aim to understand the mechanisms that determine which of these source types are dominant within a catchment and why.

She is continuing her work on transport, with the aim to elude how different fibers are getting suspended back to suspension from riverbeds, as well as expanding our understanding of the ecotoxicity of fibers on specific cell lines.



*Anna and the group celebrating her successful viva*

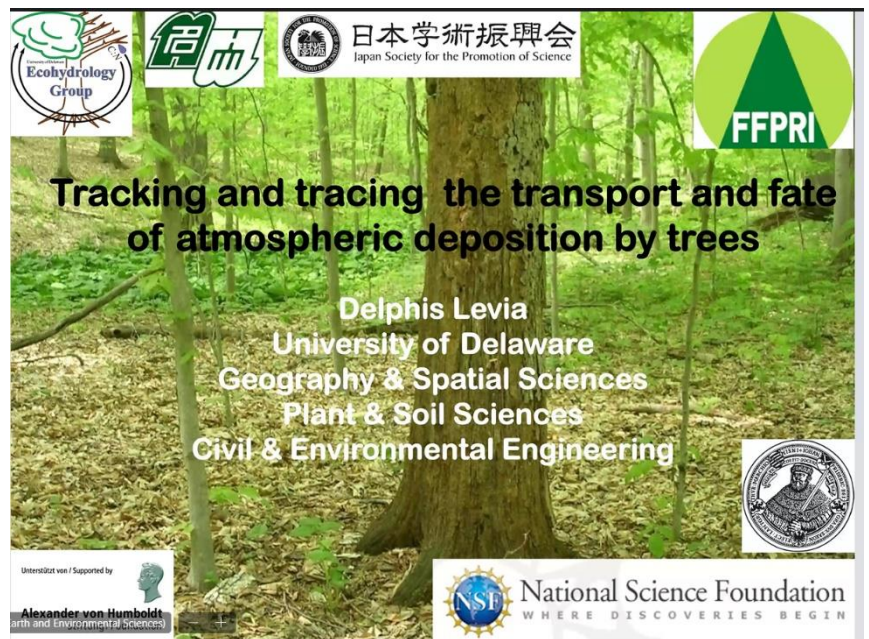
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## WATER SEMINAR SERIES

Our final Water Seminar Series of the year was carried out by Dr. Delphis F. Levia, a professor of Ecohydrology at the University of Delaware. The title of Del's talk was ***Tracking and tracing the transport and fate of atmospheric deposition by trees***. The talk was carried out online and at the IGI, followed by a networking lunch.

Summary: The transport and fate of atmospheric deposition and leachates through the tree canopy are poorly understood. This talk examines: (a) how solutes and particulates originating from the canopy and/or atmospheric deposition are transported over the woody frames of trees to the soil via branchflow and stemflow; (b) the infiltration of stemflow into forest soils; and (c) the drainage and routing of stemflow through soils. Results from both empirical and modelling work are presented.

In conjunction with efforts to improve the efficacy of urban greening efforts in cities around the world, some implications of this work for the planning of green infrastructure are discussed.



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## WATER SEMINAR SERIES – SEPTEMBER TALK

We are excited to announce that we will be kick starting our new semester of Water Seminar Series with Prof Quentin Grafton. He will be passing by the University of Birmingham during a trip to the UK and we are pleased that he will be joining us for the day on **Monday 18<sup>th</sup> September**. The talk will take place in **Geography 125 from 12pm – 1pm** followed by lunch. The link to join online will be sent out closer the time.



Quentin Grafton, FASSA, is Professor of Economics, Australian Laureate Fellow, Convenor of the [Water Justice Hub](#) at the Crawford School of Public Policy at the Australian National University. In April 2010 he was appointed the Chairholder, the [UNESCO Chair in Water Economics and Transboundary Water Governance](#) and between August 2013 and July 2014 served as Executive Director at the [Australian National Institute of Public Policy](#) (ANIPP). He currently serves as the Director of the [Food, Energy, Environment and Water Network](#).

Prof Grafton will present **‘Too much, too little and too dirty water’**.

The world water crisis is manifest through ‘Too Much, Too Little and Too Dirty’ water at multiple scales from the local to the global. Understanding the key drivers and consequences of this water crisis, and who bears the biggest costs, is necessary to develop appropriate responses, at scale and over time. Using four framings: (1) water stocks and limits; (2) water rights and responsibilities; (3) water values and prices; and (4) green and grey water infrastructure, we review the challenges and possible responses. Using a water justice lens, we highlight the transitional and transformational pathways towards a safer and more just water future.

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## CSC STUDENT – LIN ZHANG

This week our Chinese Scholarship Council student, Lin Zhang, returned to China after a successful 6 months visit to the group. See below for Lin's account of what he has achieved during his time at the University. We wish Lin all the best for the future.

Under the sponsorship of the China Scholarship Council (CSC), I embarked on a six-months collaborative study program on February 16, 2023, at the University of Birmingham. I joined the School of Geography, Earth and Environmental Sciences specifically within the Water Science group, under the supervision of Prof. Stefan Krause. I am pleased to report that I have made significant progress in accordance with my study plan. The highlights of my study program are as follows:

### ©Progress in Research Relevant to the Doctoral Dissertation

During my international study period, I have been consistently submitting the PGR Monthly Supervision (GRS2) forms, aligning with

the core research themes of my doctoral thesis. These submissions have facilitated ongoing monitoring and evaluation of my research advancement by my lead supervisor, Prof. Stefan Krause.

### ©Academic Presentations and Lectures

During the period of joint training, I actively participated in the regular Weekly Group Meetings held every Tuesday morning by Prof. Stefan Krause's research team, as well as the Academic Water Seminar Series organized by the Water Science Group. I attended several weekly group meetings and academic seminars. On May 30,



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2023, under the guidance of Prof. Stefan Krause, I delivered an academic presentation based on my research findings in nitrogen transformation and greenhouse gas emissions in riparian zones. The title of the presentation was "Influence of Water Level Fluctuation on Nitrogen Transport and Transformation and Greenhouse Effect in the Riparian Zone." During the presentation, I engaged in in-depth discussions and exchanges with attending professors (Stefan Krause, Uwe Schneidewind, Liam Kelleher, Jing Liu, etc.) and fellow doctoral students (Andrea Rabbai, Jaswant Singh, Yuxia Yang, Hongzheng Zhu, etc.), incorporating insights from cutting - edge research in riparian nitrogen migration and transformation. This interaction provided invaluable guidance for the advancement of my

research in this area.

## © Research Paper

During my study period at the University of Birmingham, under the joint guidance of my domestic Lead Supervisors, Prof. Menggui Jin and Prof. Xing Liang, and my foreign Lead Supervisors Prof. Stefan Krause and Dr. Uwe Schneidewind, in May 2023, I published an academic paper titled "Influence of seasonal water-level fluctuations on depth-dependent microbial nitrogen transformation and greenhouse gas fluxes in the riparian zone" in the renowned international journal *Journal of Hydrology*.



Research papers  
**Influence of seasonal water-level fluctuations on depth-dependent microbial nitrogen transformation and greenhouse gas fluxes in the riparian zone**

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### ARTICLE INFO

This manuscript was handled by Cecelia Garfield, Editor-in-Chief.

**Keywords:**  
 Riparian zone  
 Soil profile  
 Nitrogen transformation  
 Greenhouse gas emissions  
 Seasonal water-level fluctuations  
 Wetting-drying cycles

### ABSTRACT

Greenhouse gas (GHG) emissions from riparian zones affect the global GHG balance, contribute to global warming and climate change, and pose adverse effects on ecological health as well as environmental, economic and social sustainable development. However, the influence of water-level fluctuations on depth-dependent soil properties, nitrogen transformation and GHG emissions in riparian zone ecosystems during wetting-drying cycles remains unclear. In this study, we analyzed seasonal nitrogen dynamics under seasonal water-level fluctuations at seven different depths (0–20, 20–40, 40–60, 60–80, 80–100, 100–120 and 120–140 cm) along a typical transect in the Jiangnan Plain, Central China for 2018–2019. Changes in depth-dependent soil physical and chemical properties, soil textural characteristics and mineralogy, potential nitrification rate (PNR) and potential denitrification rate (PDR), as well as soil GHG emission rates were determined across a range of meteorological conditions and surface water and groundwater level fluctuations. Groundwater levels varied significantly between seasons with rising water levels during the wet seasons and falling water levels during the dry seasons. The physicochemical properties and chemical composition in the three studied riparian soil textures revealed higher spatiotemporal variability during the wet seasons as compared to the dry seasons. Our results showed that groundwater level depth was a crucial influencing factor controlling the microbial nitrogen transformation in the soil profiles. The PDR values were characterized by substantial seasonal variation with the same or higher metabolic activity in the dry season than in the wet season owing to water-level fluctuations, while they declined with depth. Compared to the wet season, the PDR values in the studied riparian zone were typically lower in the dry season due to extremely low soil water content constrained by fluctuating water-levels. Besides, the PDR values in the silt loam layers were higher than in the sandy loam layer for most of the monitoring period. The depth-dependent GHG flux rates highlighted that the riparian zone ecosystem was a key source of CO<sub>2</sub> and N<sub>2</sub>O and a sink for CH<sub>4</sub>. In summary, our findings suggest that fluctuating water table management in riparian ecosystems must be considered to more effectively control seasonal fluctuations of nitrogen dynamics and mitigate GHG emissions. Thus, a suitable riparian groundwater quality control and management scheme is urgently necessary to bring awareness of seasonal water-level fluctuations of riparian zones to catchment managers and policy makers.

### 1. Introduction

Over the past decades, riparian corridors bordering intensively

managed agricultural fields have received large amounts of reactive nitrogen including ammonium (NH<sub>4</sub><sup>+</sup>), nitrite (NO<sub>2</sub><sup>-</sup>) and nitrate (NO<sub>3</sub><sup>-</sup>) (Blettling et al., 2002; Jurado et al., 2017; Krause et al., 2008; Su et al.,

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https://doi.org/10.1016/j.jhydrol.2023.129676

Available online 17 May 2023  
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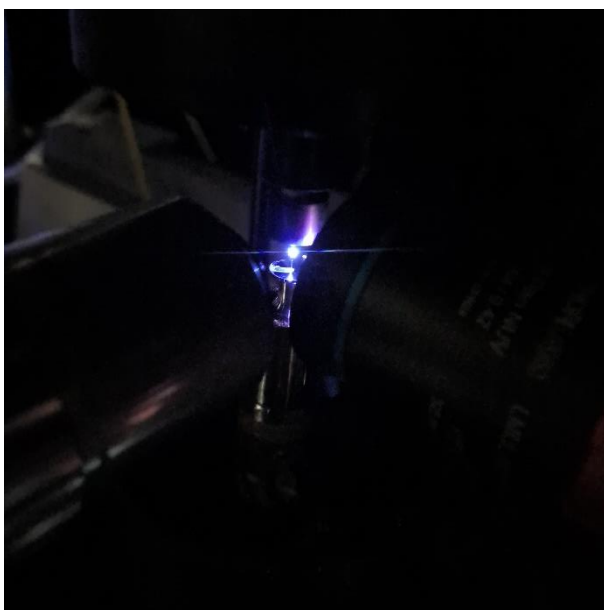
## 9TH FRIEND-WATER GLOBAL CONFERENCE



The [scientific programme](#) for the 9<sup>th</sup> FRIEND-Water Global Conference has been finalised. The conference, scheduled to take place from the 25<sup>th</sup> to the 29<sup>th</sup> September in Dakar, promises to be a significant event, bringing together experts and stakeholders from around the world to discuss critical water-related issues.

## CENTRAL LASER FACILITY VISIT

As part of an STFC research facilities grant, Liam Kelleher travelled to the Central Laser Facility (CLF) to make use of specialist optical trapping equipment to study microplastics (MP). The study looked at the UV ageing effect of singular MP as they degraded over time. Hopefully you will see published work on this at Wintertime. For anyone interested in further information and access calls please keep an eye on the following [link](#)



*Image of the acoustic trap and a trapped microplastic bead*



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## UPCOMING GRANTS

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### [Innovate UK - AgriFood Africa innovation awards](#)

Deadline to apply: 04/08/2023

Award amount: £30k

Innovation Awards support collaborations between organisations in the UK and Africa to address African AgriFood challenges. Successful UK-registered applicants will receive a grant of up to £30,000 for a 5-month project to be completed by 30 January 2024.

### [Grand Challenges Canada - Creating Hope in Conflict: A Humanitarian Grand Challenge - Round 4](#)

Deadline to apply: 22/08/2023

Award amount: CAD 250k

Grand Challenges Canada seeks bold, life-saving or life-improving innovations that better meet the needs of the most vulnerable and hardest-to-reach people impacted by humanitarian crises caused by conflict. Proposed innovations must be relevant to one of three focus areas: 1) access to energy, 2) lifesaving information, or 3) health supplies and services.

### [Hudson River Fund Call for Proposals](#)

Deadline to apply: 27/08/2023

The Foundation seeks to elucidate the dynamic interactions among the biological, chemical, physical and human processes that are important to the Hudson River ecosystem. In particular, the Foundation encourages research in areas that are both scientifically important and relevant to current or anticipated public policy and resource management issues affecting the River and its watershed.

### [HORIZON-CL5-2023-D6-01 - safe, resilient transport and smart mobility services for passengers and goods](#)

Deadline to apply: 05/09/2023

Horizon Europe, under Global Challenges and European Industrial Competitiveness, and its climate, energy and mobility cluster, invites applications for HORIZON-CL5-2023-D6-01 - safe, resilient transport and smart mobility services for passengers and goods. Please see [Climate resilient and safe maritime ports](#) and other specific streams on webpage.

### [Birmingham Institutional Impact Fund](#)

Deadline to apply: 06/09/2023

Award amount: £10k

Impact Grants of up to £10,000 are available to support high quality research impact by offering investment at critical points in the research-to-impact pathway. Funding is designed to support impact, knowledge exchange and translational activities at various stages in order to strengthen engagement with research users and accelerate the translation of research into outputs and impacts. \* Proposals must not be covered as part of existing IAAs – NERC remit applications expected ([link](#)).

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## [Birmingham Impact Leave](#)

Deadline to apply: 06/09/2023

Award amount: £10k

Birmingham Impact Leave grants of up to £10,000 are available to fund teaching replacement costs that will allow researchers to undertake dedicated periods of impact and knowledge exchange activity.

## [Innovate UK/DEFRA - Improving observation capabilities of biodiversity in UK waters](#)

Deadline to apply: 06/09/2023

Award amount: £200k

The aim of this competition is to test innovative technologies and approaches as part of end-to-end marine monitoring systems from in-situ data collection through to generating insights from the data. The innovation must focus on measures of marine asset extent, condition, and human pressures. The outputs of the work must demonstrate how the data collected can be used to generate insights into ecosystem services flows from marine assets, or how these flows could be impacted by human pressures.

## [EIT RawMaterials-Eramet water resource innovation challenge 2023](#)

Deadline to apply: 13/09/2023

Award amount: €50k

The European Institute of Innovation and Technology, under EIT RawMaterials, in partnership with Eramet, invites applications for its water resource innovation challenge. This supports breakthrough solutions designed to deliver rapid, transformative change towards a sustainable mining and metals industry in the focus areas of water use and quality, and environment. The primary focus of the challenge is to minimize the environmental impact of the mining and metals industry, and to promote sustainable development through technology. The proposed solutions should be scalable, technically feasible, economically viable, and environmentally sustainable.

## [Scottish Government - Short term economic and social research support on peatlands, biodiversity and water](#)

Deadline to apply: 14/09/2023

Award amount: tender

The Scottish Government's Rural and Environmental Science and Analytical Services Division wishes to procure economic analysis and modelling to support policy development on peatlands, water and biodiversity.

The supplier will be asked to provide economic analysis and modelling to support Scottish Government analysts with economic appraisal and research synthesis to inform the development of future policies on peatlands, biodiversity and water.

## [HORIZON-HLTH-2024-ENVHLTH-02-two-stage - environment and health](#)

Deadline to apply: 19/09/2023

Award amount: €8M

Horizon Europe, under Global Challenges and European Industrial Competitiveness, and its health cluster, invites applications for HORIZON-HLTH-2024-ENVHLTH-02-two-stage - environment and health. Call round is: The role of environmental pollution in non-communicable diseases: air, noise and light and hazardous waste pollution.

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## [HORIZON-MISS-2023-OCEAN-SOIL-01 –](#)

Deadline to apply: 20/09/2023

Award amount: €8M

mission ocean and waters and Mission Soil Deal for Europe Joint demonstration of approaches and solutions to address nutrient pollution in the landscape-river-sea system in the Mediterranean sea basin. This supports proposals that address the objectives and impacts of these three missions ocean, water and soil.

## [NERC - Engaged Environmental Science](#)

Deadline to apply: 20/09/2023

Award amount: £800k

Apply for exemplar projects that demonstrate excellence in engaged environmental science research (with bursary to develop equitable public partnerships).

## [Hello Tomorrow, FR – Deep Technology Global Challenge](#)

Deadline to apply: 23/09/2023

Award amount: €100k

Hello Tomorrow invites applications for its deep technology global challenge. This supports scientists and entrepreneurs in developing new deep technology research and projects. Challenges include sustainable construction and infrastructure, environment, food and agriculture + more.

## [Sea-Changers, GB – Innovation Fund](#)

Deadline to apply: 28/09/2023

Award amount: £10k

This supports ideas that are new or experimental solutions in the field of marine conservation. This includes innovations that address the root causes of marine conservation threats and challenges in the UK, prevent or reduce negative impacts on UK coastal and marine environments or species, or add to the body knowledge about marine conservation and threats.

## [Stockholm Water Foundation – Stockholm water prize](#)

Deadline for nominations: 30/09/2023

This recognizes people and organizations who have made outstanding contributions to the sustainable use and protection of the world's water resources. The main achievements of the candidate should be within one or both of the following categories: policy and practice - covering achievements that have improved the governance and management of water, as a natural and economic resource and as a human right and basic service; research - covering basic and applied research to develop new knowledge and scientific leadership.

## [Understanding geohazard processes and their impacts across India](#)

Deadline to apply: 03/10/2023

Award amount: £1M

Apply for funding for a collaborative UK-India project to improve understanding of geohazard events in India and its neighbouring countries.

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## [Resilient UK coastal communities and seas Network Plus](#)

Deadline to apply: 12/10/2023

Award amount: £1.8-2M

Apply for funding to develop a Network Plus to enhance the resilience, health and wellbeing of UK coastal communities and seas. The network will provide a coordinating function across projects funded through the complementary resilient UK coastal communities and seas research programme.

## [NERC - Tools for automating image analysis for biodiversity monitoring](#)

Deadline to apply: 18/10/2023

Award amount: £500-750k

Apply for funding to develop software systems, which will help to improve biodiversity monitoring by automating the analysis of images and videos.

## [Akademie Schloss Solitude – Fellowship](#)

Deadline to apply: 30/10/2023

Award amount: €14.4k

The Akademie Schloss Solitude invites applications for its fellowship. This enables international artists, scientists, scholars and business representatives to attend the Akademie Schloss Solitude to devote themselves to their research projects

## [UKRI Creating Opportunities Evaluation Development Fund](#)

Deadline to apply: 31/10/2023

Award amount: £100-250k

Apply for up to 12 months of funding to undertake evaluation activities that improve our understanding of interventions that increase opportunities and reduce disparities in economic, health and social outcomes for people and places across the UK.

## [Pre-announcement: NERC strategic capital funding opportunity 2023](#)

Deadline to apply: 05/12/2023

Award amount: £350-£750k

\*Call opens in September. Apply for funding to improve the environmental research landscape through new or improved equipment.

## [Innovate UK - UK - Singapore Collaborative R&D Call Sustainability and Net Zero](#)

Deadline to apply: 06/12/2023

Award amount: £750k

*UK registered organisations* can apply for a share of up to £5 million as part of a collaboration with a Singapore partner for industrial research projects that develop sustainable technologies helping reduce emissions and achieve a net-zero future.

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## [US - Postdoctoral and Visiting Research Scientist Program](#)

Deadline to apply: 08/12/2023 (forecast)

The Atmospheric and Oceanic Sciences program provides a stimulating and supportive environment for career development of both early career and established researchers. Postdoctoral and visiting research scientists have access to collaborators from a pre-eminent government laboratory in NOAA-GFDL, as well as Princeton University research collaboration and training opportunities.

## [UK Space Agency – Climate Services](#)

Deadline to apply: 30/12/2023

Award amount: £10k

The UK Space Agency is looking to provide small grants to help the UK develop business-viable ideas that use space data in a climate-related application.

## [MDPI – Water Journal Travel Award](#)

Deadline to apply: 31/01/2024

Award amount: CHF 800

This supports PhD and postdoctoral researchers in presenting at an international conference relating to water.

## [International IGB Fellowship Program in Freshwater Science](#)

Deadline to apply: 01/03/2024 (forecast)

The Institute invites excellent postdoctoral and senior scientists to apply for a fellowship at IGB. Positions are offered to enable postdoctoral scientists to further their scientific development. Senior scientists are supported for up to 12 months to contemplate and pursue new inspiring research ideas in collaboration with scientific staff at IGB.

### **Open Calls with no closing date:**

#### [UKRI – Knowledge Transfer Partnership](#)

Open for business and not-for-profit organisations. Partnerships can last between 12 and 36 months. Business provide one-third to half the project cost depending on their size.

#### [NERC - Work with US-based researchers on environmental science research](#)

Award amount: £300k

Apply for funding to work with US-based researchers on an environmental science application. Collaborative work is governed by an agreement between NERC and NSF.

#### [Work with Brazilian researchers: NERC FAPESP lead agency](#)

This opportunity allows UK-based researchers and researchers in the State of São Paulo, Brazil to submit a collaborative proposal under existing NERC funding opportunities. This will go through a single review process.

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## [UKRI - Collaborate with researchers in Norway](#)

UK Research and Innovation (UKRI) and Research Council of Norway (RCN) have signed a Money Follows Cooperation agreement to reduce barriers to cross-border collaboration.

## [UKRI - Collaborate with researchers in Luxembourg](#)

UK Research and Innovation (UKRI) and FNR have signed a memorandum of understanding (MoU) to welcome and support collaborative applications. The MoU provides for a lead agency agreement whereby UKRI will receive and assess joint applications from eligible UK and Luxembourg applicants on behalf of both organisations.

We welcome your contributions and suggestions for the newsletter. Please feel free to email  
Liam and Suman – [l.kelleher@bham.ac.uk](mailto:l.kelleher@bham.ac.uk) / [s.hira@bham.ac.uk](mailto:s.hira@bham.ac.uk)