Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

PRESS RELEASE **FOR IMMEDIATE RELEASE**

£20 million to tackle nitrogen pollution

The UK Government today (January 22) announces its commitment to fund a major international research programme to tackle the challenge that nitrogen pollution poses for the environment, food security, human health and the economy in South Asia.

The South Asian Nitrogen Hub, a partnership led by the UK's Centre for Ecology & Hydrology and comprising around 50 organisations from across the UK and South Asia, will be established with funding from UK Research and Innovation (UKRI) under its Global Challenges Research Fund (GCRF). The Hub will be awarded £19.6 million over the next five years, comprising £17.1 million from URKI and £2.5m from UK and international partners, including the South Asia Cooperative Environment Programme (SACEP). Contributions in-kind worth a further £7 million are being provided by partners of the UKRI GCRF South Asian Nitrogen Hub.

The Hub is one of 12 GCRF hubs being announced today by UKRI to address intractable challenges in sustainable development. The interdisciplinary hubs, between them, will work across 85 countries with governments, international agencies, partners and NGOs on the ground in developing countries and around the globe, to develop creative and sustainable solutions that help make the world safer, healthier and more prosperous.

Public debate about planetary health tends to focus on carbon. But nitrogen is also critically important as it is connected to air pollution, biodiversity loss, the pollution of rivers and seas, ozone depletion, health, economy and livelihoods. Nitrogen pollution is caused, for example, by emissions from chemical fertilizers, livestock manure, and burning fossil fuels. Previous efforts have addressed only specific aspects of the problem, while the Hub will bring these together in a more coherent approach.

A farmer sows urea fertilizer on a paddy field in Madurai, India *Picture: Shutterstock*

Nitrogen pollution comes in many forms, with multiple impacts – for humans, animals and plant life. Gases such as ammonia (NH_3) and nitrogen dioxide (NO_2) contribute to poor air quality and can aggravate respiratory and heart conditions, leading to millions of premature deaths across the world; while nitrous oxide (N_2O) is a greenhouse gas that depletes the ozone layer. Nitrate from chemical fertilizers, manure and industry pollutes rivers and seas, posing a health risk for humans, fish, coral and plant life.

The UKRI GCRF South Asian Nitrogen Hub will study the impacts of the different forms of pollution to form a coherent picture of the nitrogen cycle. In particular, it will look at nitrogen in agriculture in eight countries – India, Pakistan, Bangladesh, Nepal, Afghanistan, Sri Lanka, Bhutan and Maldives. The Hub's recommendations will support cleaner and more profitable farming, as well as industrial recycling of nitrogen, fostering development of a cleaner circular economy for nitrogen.

Nitrogen pollution presents significant barriers to achieving United Nations Sustainable Development Goals on: Zero Hunger, Climate Action, Good Health & Well-being, Clean Water & Sanitation, Affordable & Clean Energy, Life Below Water, Life on Land, No Poverty, Responsible Consumption & Production, and Decent Work & Economic Growth. The Hub will support progress towards meeting SDGs, address barriers to change, and demonstrate the economic benefits of tackling nitrogen pollution. The involvement of UN Environment, SACEP and South Asian governments will ensure that the outcomes are shared widely as a basis to accelerate uptake of the most promising solutions.

Nitrogen flux testing over rice fields in Odisha, India Picture: Mark Sutton

Science and Universities Minister Chris Skidmore, says: "The UK has a reputation for globally influential research and innovation, and is at the centre of a web of global collaboration – showing that science has no borders. We have a strong history of partnering with other countries – over 50 per cent of UK-authored research involves collaborations with international partners. The projects being announced today reinforce our commitment to enhance the UK's excellence in innovation at home and around the world, driving high-skilled jobs, economic growth and productivity as part of the modern Industrial Strategy.

UKRI Chief Executive Sir Mark Walport says: "From tackling climate change to preventing and treating infectious diseases, the search for knowledge is a global endeavour that requires collaboration between the world's best minds. The creation of 12 global research hubs demonstrates the commitment of the UK to ensuring our researchers and innovators can work with their counterparts across the world to address important questions."

Professor Mark Sutton of the Centre for Ecology & Hydrology, an international nitrogen expert who will head up the UKRI GCRF South Asian Nitrogen Hub, says: "As a global society, we struggle with the intractable problems of air pollution, climate change and declining water quality, biodiversity and health. However, better nitrogen management will provide solutions to all of them and offers a triple win – for the economy, health and environment. Joining up across the nitrogen cycle will catalyse change for a cleaner, healthier and more climate-resilient world."

Professor Tapan Adhya, Hub Co-Director for Science, who is from the Kalinga Institute of Industrial Technology, Bhubaneswar, India, one of the partners in the South Asian Nitrogen Hub, says: "High doses of fertilizer input of nitrogen to agriculture combined with low nitrogen-use efficiency mean that research on nitrogen pollution must be a priority for South Asia. This is emphasised by the scale of nitrogen subsidies across South Asia at around 10 billion dollars per year. Better nitrogen management will have huge economic and environmental benefits. "

Director General of the SACEP, Dr Abas Basir, who is the Hub Co-Director for Policy, adds: "SACEP, as an international organisation, has the responsibility to embrace Strategic Development Goals (SDGs). Considering the impacts of nitrogen on climate change, air and water, addressing nitrogen pollution throughout the hubs will help us to mobilise major progress towards multiple SDGs globally, starting from the South Asia region, to meet the global needs."

Contact details

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Notes to editors

- UK Research & Innovation is providing £17.1m for the hub out of the UK Government's £1.5 billion Global Challenges Research Fund, a key component in delivering the UK AID strategy and puts UK-led research at the heart of efforts to tackle the United Nations Sustainable Development Goals. An additional £2.5m and other resources will be provided by the project partners.
- In addition to the Centre for Ecology & Hydrology, UK project partners include the Universities of Edinburgh, Aberdeen and Bristol, plus the Cool Farm Alliance, London School of Hygiene and Tropical Medicine, Moredun Research Institute, National Oceanography Centre, Nourish Scotland, Plymouth Marine Laboratory, Rothamsted Research, Royal Botanic Garden Edinburgh, Scottish Government and Scotland's Rural College. The Hub also includes the intergovernmental South Asia Cooperative Environment Programme (SACEP) as well as research institutes, universities and government agencies in South Asia, the UN Food & Agriculture Programme and UN Environment, plus industry including international chemical company BASF.

About nitrogen

- Nitrogen is a naturally occurring element that is a component of all proteins and essential for all life – humans, animals and plants. Unreactive nitrogen gas (N_2) makes up 78 per cent of the air we breathe.
- Human activities contribute to various forms of nitrogen pollution such as ammonia, nitrate, nitrogen dioxide and nitrous oxide, which worsens air, water and soil quality and contributes to climate warming, with multiple threats for health of people, animals and plants.
- South Asia, home to a quarter of the world's population, is critical to the global nitrogen cycle. By 2050, its population of 1.8 billion is expected to rise by 20 per cent, while its use of fertilizers could double.
- Around 12 million tonnes of nitrogen are used in fertilizers across South Asia to support food production, but the efficiency is low, with around 80% wasted which contributes to multiple forms of nitrogen pollution.
- About 10 billion USD worth of nitrogen is lost as pollution in South Asia. In India alone, the total societal cost of nitrogen pollution on human health, ecosystems and climate is estimated at about 75 billion USD annually.
- Atmospheric nitrogen pollution stimulates growth of certain plants at the expense of more sensitive species with a high conservation value. There is a significant risk to global biodiversity hotspots such as the Himalayan foothills, especially as the Indo-Gangetic Plain (IGP) has the highest ammonia (NH_3) concentrations in the world, arising mainly from livestock excreta and urea fertilizer used in agriculture.
- Government subsidies of the fertilizer industry in South Asia are around 10 billion US dollars a year (including 7 billion USD in India). In his Mann ki Baat address of 26 November 2017, India Prime Minister Narendra Modi asked the country's farmers to cut urea fertilizer consumption by half by 2022.

About the Centre for Ecology & Hydrology

The Centre for Ecology & Hydrology (CEH) is the UK's Centre of Excellence for integrated research into land and freshwater ecosystems and their interaction with the atmosphere. CEH is part of the Natural Environment Research Council (NERC) and employs more than 450 people at four major sites in England, Scotland and Wales. CEH tackles complex environmental challenges to deliver practicable solutions so that future generations can benefit from a rich and healthy environment.

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About Professor Mark Sutton

Professor Mark Sutton is an Environmental Physicist at the Centre for Ecology & Hydrology. He is Vice Chair of the Global Partnership on Nutrient Management of UN Environment and leads the International Nitrogen Management System (INMS) – a global science policy support process for nitrogen – which is a joint endeavour of UN Environment and the International Nitrogen Initiative (INI), supported by the Global Environment Facility (GEF).

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About UK Research & Innovation

UK Research and Innovation (UKRI) works in partnership with universities, research organisations, businesses, charities, and government to create the best possible environment for research and innovation to flourish**.** It aims to maximise the contribution of each of our component parts, working individually and collectively. UK Research and Innovation works with its many partners to benefit everyone through knowledge, talent and ideas. Operating across the whole of the UK with a combined budget of more than £7 billion, UKRI brings together the seven Research Councils, Innovate UK and a new organisation, Research England. For more information about UKRI and the GCRF Hubs, visit www.ukri.org