

NERC Forward Look: Summary

The NERC *Forward Look* is a framework for our activities and investments over the next ten years. It sets out three priority areas where environmental science research and innovation can make a significant contribution to meeting societal challenges in the UK and around the globe. We will continue to support the health of environmental sciences through our enabling capabilities, ensuring we have the people, knowledge and facilities to maintain our world-leading expertise. Taken together, these priorities and capabilities will help us shape and guide our community in the coming decade.

Research and Innovation Themes

Green Growth

An environmentally responsible net zero transition

The Challenge

As we accelerate efforts to transition to net zero, we must ensure that we do so in ways that are equitable and sustainable. Reducing our greenhouse gas emissions is a fundamental and urgent challenge which we must meet. We cannot do so in ways which store up issues for tomorrow, so must find ways to reduce carbon without significant cost elsewhere in our environmental systems such as impacts on land, water and other natural resources, or continued degradation of ecosystems. There is no economy without nature: reaching net zero while enhancing the environment is the only pathway to sustained (and sustainable) economic growth.

The Opportunity

NERC funded science provides the understanding and information to optimise decisions for (e.g.) clean energy provision, efficient extraction and use of resources and sustainable agriculture. We will support green growth through the placement of green energy and infrastructure, the optimisation of land, water, coasts and subsurface, managing ecosystems and the services they provide, and improving health and well-being. Across supply chains which rely on natural resources, from food to critical minerals, we will support the diversification of production and supply, minimising the need for extraction. NERC will champion a systems approach to the net zero transition, investing in integrated approaches to ensure mitigation and adaptation go hand in hand and that mitigating carbon does not come at the cost of biodiversity and the wider environment; that new technologies do not place an intolerable burden on our land, energy, water and already scarce natural resources; and that new materials are not novel pollutants.

Environmental Security

Contributing to national security, global stability and shared prosperity

The Challenge

In the coming decades climate and nature will become inseparable from the UK's national security. Climate risks are geopolitical risks – they are systemic and pervasive across our critical systems and our way of life. Many of the challenges we face now and in the future are a direct result of or exacerbated by environmental change. The impacts of a changing climate will

increase pressure on the food-ecosystems-water-energy nexus, with growing scarcity and insecurity of supply. Extreme events will become more frequent and more intense. There are greater risks of new or altered disease outbreaks (in plants, animals and humans).

The Opportunity

NERC science can identify and address the drivers of these risks, providing a longer, more systematic view of the interplay between climate, nature, security and prosperity. The science we fund is critical for modelling and predicting environmental change and integrating this into thinking on social, economic, and diplomatic risks. Environmental science can inform UK preparedness for sudden shocks, ensure the resilience of economic systems and global supply chains and protect environmentally exposed infrastructure. We will ensure robust environmental data and advice is provided to policymakers, businesses and the public to inform their decisions and improve our capacity to scenario plan, communicate impacts and uncertainties, integrating our modelling into economic, social and diplomatic planning, and national security considerations.

Responsible Innovation

Evidence to enable nature positive innovation and effective regulation

The Challenge

New technologies are emerging at greater speed and scale than ever before, creating new industries and reshaping the way we live and work. Informed regulation is needed to keep pace with these innovations, being agile enough to enhance opportunities for entrepreneurs and businesses in the UK while working quickly to identify and mitigate any potential negative consequences. Environmental concerns cannot be simply an 'add-on' to technologies or business practices but must be integrated into their development as early as possible.

The Opportunity

There are significant opportunities to streamline the way we do our science and unlock new insights through AI, data analytical and other digital and autonomous technologies, and we will support our community in harnessing these. We will be more active in identifying the emerging industries which need insights from our science, setting baselines for the environments in which they are working such as the deep ocean, and helping to shape their activity to minimise harm and boost positive impacts. We will look carefully at new technologies, especially those that are focused on intervening in the environment, informing the policy framework for ethical research, regulatory approaches and international governance of these technologies, and minimising potential harms. In partnership across UKRI, with other funders and industry partners we will develop sustainable technologies for emerging industries, ensuring that new activities are environmentally sound and providing the UK with a competitive advantage or export potential. We will foster entrepreneurialism in our researchers to close the gap between diagnosis and solutions.

Enabling Capabilities

Our research and innovation priorities are underpinned by the foundational capabilities we invest into maintain and grow a thriving, world leading environmental science community which enables growth and delivers better outcomes for citizens. . Across these capabilities we will ensure the development of new talent, support curiosity-driven research, provide deep expertise and policy advice, and build the capacity of the environmental science and innovation community to tackle large-scale challenges.

Frontiers of Knowledge

Curiosity-driven research is the foundation on which all of NERC's activity rests. Our funding enables researchers to pursue new ideas and grow our understanding of the environment. Through our investment in discovery science we will ensure the health of our disciplines, generate knowledge, and ensure we have the capability to respond to emerging issues. We will foster imaginative approaches and novel ideas by increasing our appetite for high risk, high reward investment.

NERC has a critical role in ensuring the UK has talented researchers and innovators, able to lead on both our strategic priorities and undertake world leading curiosity-driven environmental science. NERC will continue to invest in training across its remit, and support UKRI activity to enhance our offer with interdisciplinary and solutions-focused postgraduate training. As part of our offer NERC will ensure that the next generation of environmental scientists has access to the broader skills training in (for example) Artificial intelligence, engineering biology, data analytics, environmental management, and governance and reporting to support careers in academic research and beyond.

National capability

NERC infrastructure and facilities enables the UK's world-leading environmental science, providing state of the art research ships and marine autonomy, an airborne research laboratory, and polar research stations. NERC, as part of UKRI, will develop a pipeline of infrastructure projects, anticipating future science needs and the changing needs of our community. This will allow us to co-ordinate our research and innovation and infrastructure funding, maximising the value of our infrastructure and facilities to the NERC community, other researchers and business.

Through our Centres we support research and experimental platforms at sites spread across the UK, providing benefits to local economies through our research and innovation, high-skilled jobs and regional supply chains. Our Centres are already loci of innovative approaches (for example when operating in remote environments) so we will boost the role of our centres as incubators for collaboration and innovation. We will help them enable real-world benefits of our research investments and provide support to business through, for example, dedicated spaces for business interaction and knowledge transfer, the provision of evidence and insight or the use of facilities for testing and development.

Partnerships

Environmental science is fundamental to creating the imaginative, socially acceptable solutions we need to tackle national and global challenges. NERC will act as a generous partner in designing and joining large-scale, challenge-focused programmes, maximising the impacts of

our investments through national and international collaboration. We will work with government to support evidence-driven policy making by co-designing and delivering programmes which address policy priorities. We will enable active engagement and leadership in national and international dialogue to frame strategy and inform policy. Through targeted engagement in key sectors, we will work with business to provide the fundamental research and skills they need to make informed decisions and innovate new products. And we will continue the important work of engaging the public with our science, making our work relevant to their concerns and bringing in diverse approaches to understanding the environment.

In the coming decade, we intend to stretch the boundaries of the 'NERC community', helping foster connections and transferring skills and knowledge between environmental science and other disciplines - such as computer science, politics, behavioural science, building the interdisciplinary partnerships needed to drive breakthroughs and deliver solutions.

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