

ANNUAL REPORT AND ACCOUNTS 2022



UK Centre for
Ecology & Hydrology

2022

THE YEAR IN PICTURES



UK Environment Minister Rebecca Pow visited UKCEH and engaged with our researchers on subjects including sustainable land use, water quality, flood forecasting, and biodiversity targets.



Professor Alan Jenkins of UKCEH met the Hon. Francis Asenso-Boakyee MP, Ghana's Minister for Works and Housing, to discuss the creation of an early warning system for floods and water shortages, as part of the WMO's HydroSOS initiative.



Our hydrologists reported on the evolving drought situation around the UK, informing water resources planning.



Scottish Environment Minister Màiri McAllan visited our Auchencorth Moss field site and unveiled a plaque recognising the site's ICOS accreditation as a Class 1 Ecosystem Station. The site supports air quality, climate and ecosystem research.



Dr Semeena Shamsudheen, a land-atmosphere scientist at UKCEH, presented work on wildfires at a side event of COP27 in Sharm El Sheikh, Egypt.



We launched our E-Surveyor app, which uses artificial intelligence to allow farmers to identify plants and assess the quality of the habitats they manage.



Dr Doug Wilson joined UKCEH as our new Science Director from the Environment Agency, where he was Chief Scientist.



Dr David Odee, visiting scientist at UKCEH, was presented with the Marsh Award for Ecologists in Africa at the British Ecological Society annual meeting in Edinburgh.



Annette Burden, wetland scientist at UKCEH, featured in an HM Treasury and London Stock Exchange green finance film, talking about the development of a Saltmarsh Carbon Code.



Dr Claire Carvell spoke at an event to mark the conclusion of the ASSIST programme, which has provided scientific evidence to inform the transition to sustainable agriculture in the UK.



A new study led by UKCEH warned the red-billed leiothrix is emerging as a new invasive species in Britain, threatening to dominate the dawn chorus of native robins, blackbirds and warblers.



Dr Tom August and Dr Michael Pocock collaborated with artist Bryony Bengel and poet Thomas Sharp on an installation exploring what is gained and lost when an observation of wildlife becomes a digitised record.

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INTRODUCTION FROM THE CHAIR AND THE EXECUTIVE DIRECTOR



Lord Cameron of Dillington, Chair
Professor Mark J Bailey, Executive Director

Welcome to our annual report for 2022. We are delighted to share with you a cross-section of the extraordinary work of our community over the past year, which we hope you will find as inspiring as we do.

The past year was one of change and growth. As Covid restrictions lifted, we welcomed our staff, students and visitors back to our four sites across the UK, allowing us to rebuild our community and meet face-to-face again.

We forged new partnerships to increase the reach and impact of our science, leading, for example, the development of the Saltmarsh Code, a voluntary certification standard, enabling saltmarsh carbon to be purchased by private investors in support of national net zero goals.

At the same time, we developed new approaches to mitigate and adapt to climate change, pollution and biodiversity loss – not only generating data and evidence to

underpin nature-based solutions, but also devising and testing new methods.

The demand for our science continued to grow and we increased our research income. We invested in our people and in the research infrastructures and monitoring networks we provide to the broader research community.

A particular highlight was the establishment of a new centre for micro-spectroscopic analysis of environmental samples, the first of its kind in the UK.

We also extended our reach geographically. We are excited to be leading a new £12.6 million NERC-funded international research programme to support countries, organisations and companies across



Professor Mark J Bailey signed a memorandum of understanding with the United Nations Environment Programme (UNEP), enabling collaboration on science-based solutions to global environmental challenges.

Southeast Asia, South Asia and Sub-Saharan Africa to develop and deliver plans to reduce emissions. This work will underpin high-impact investment in climate change mitigation worldwide.

Last year, we welcomed Dr Doug Wilson as our new Science Director and Professor Harry Dixon as our Associate Director of International Research and Development. They succeeded Professor Alan Jenkins,

our Science Director and Deputy Director, who retired in the spring of 2023. Alan's contribution to the continuing success and growth of UKCEH as one of the leading global environmental sciences research organisations cannot be overstated.

The need for our science has never been greater; and we have a great future ahead of us.

FAREWELL MESSAGE FROM PROFESSOR MARK J BAILEY

Sadly, this is the last time I will contribute to the annual report, as I am retiring as Executive Director in June 2023. It has been a privilege to serve and then lead this organisation for the majority of my scientific career, and it is with pride and confidence in our ongoing success that I hand over the reins to my successor Dr Stuart Wainwright, who joins us from the Government Office for Science in June 2023.

WHO WE ARE

The UK Centre for Ecology & Hydrology is an independent, not-for-profit research institute, carrying out excellent environmental science with impact. We seek to understand the environment, how it sustains life, and the human impact on it – so that, together, people and nature can prosper.

We have a long history of investigating, monitoring and modelling environmental change. Our 600+ staff provide the data and insights that governments, businesses and researchers need to create a productive, resilient and healthy environment.

HOW WE WORK

Underpinning UKCEH's research and innovation are large research infrastructures and our capabilities in monitoring, measuring and observation, experimentation, data science and modelling.

Monitoring, measuring and observation

We provide flexible, long-term, large-scale monitoring and surveillance networks essential to identify and measure environmental change, and determine the factors that drive that change.

Experimental platforms and research facilities

Our experimental platforms and research facilities enable us to test the role of different drivers of environmental change and the outcomes of novel interventions to manage the environment.

Data science and modelling

We develop models to forecast and predict aspects of the environment at different spatial and temporal scales.



Shankari Anna Balan, Molecular
Biology Laboratories, Wallingford

OUR STRATEGY

In April 2020, we published our *Strategy 2025: Research and Innovation*. The strategy sets out our role in addressing three major challenges:

- Creating and enhancing sustainable ecosystems
- Reducing and preventing pollution
- Mitigating and building resilience to climate and environmental change

Our specific contribution to these challenges focuses on ten integrated issues:



Joanna Savage, Honey Sample Archive, Wallingford

- Biodiversity
- Chemical risks
- Clean air
- Climate and land
- Ecosystem restoration and resilience
- Flood and drought impacts
- Net-zero greenhouse gas emissions
- Soil health
- Sustainable agriculture
- Water quality and resources



Galina Toteva, Glencorse Woodland Experiment Platform, Edinburgh

OUR NATIONAL ROLE

As a strategic delivery partner for the Natural Environment Research Council, part of UK Research and Innovation, UKCEH delivers impartial environmental science to benefit the UK research community, governments, businesses, and wider society. Our science infrastructures and national capability programmes enable researchers to observe, experiment, measure, understand and predict environmental processes, inter-connection, status and change.

OUR INTERNATIONAL ROLE

We provide research-based evidence, advice and solutions around the globe, addressing many of the world's most pressing environmental and societal challenges, including those identified by the UN Sustainable Development Goals (SDGs). We do this through international research partnerships, including our work with United Nations agencies and programmes such as the IPCC, IPBES, UNEP, UNECE, UNESCO and the WMO.

BIODIVERSITY

THE CHALLENGE

Biodiversity is under threat with species declining at the fastest rate ever recorded. The biggest threats include habitat fragmentation and loss, climate change, pollution, invasive species and pathogens.

OUR ROLE

Integrating monitoring, experimentation and modelling gives us the capacity to deliver solutions for conserving and restoring biodiversity. Our flagship Biological Records Centre brings together the scientific capabilities and data necessary to assess the status and trends of species populations.

HIGHLIGHTS

Automated monitoring of insects



Computer vision and autonomous monitoring are playing an increasingly important role in understanding species trends. As part of our work in this area,

during 2022 our scientists and technicians have been developing AMI-traps, platforms for long-term, autonomous monitoring of moths, based on a design originally published by researchers at Aarhus University.

Combining robust lighting for attracting insects with high resolution cameras and AI, the AMI-traps provide a practical and cost-effective solution for standardised monitoring. Our AMI-traps have been deployed to date in the UK, Canada, USA, Cyprus, Panama and Argentina, with plans to expand further. Insects are not harmed by the traps.

Work is underway to build in additional features to the AMI-trap design to widen the taxonomic groups it covers. Adding audible and ultrasound recording will enable us to monitor birds, bats, grasshoppers and crickets.



Professor Helen Roy and Dr Piero Genovesi, Head of Wildlife Service, ISPRA, at COP15, Montreal, Canada

Bending the curve of biodiversity loss

In a year which saw the conclusion of the UN biodiversity conference COP15 in Montreal, our scientists worked both internationally and nationally to develop strategies and targets to bend the curve of biodiversity loss.

Professor Helen Roy, who co-chairs the IPBES assessment of invasive alien species and their control, attended COP15, where she participated in an IUCN panel on biological invasions and gave a talk on the IPBES assessment.

Professor Paula Harrison took part in the IPBES Scenarios and Models Task Force, which developed the Nature Futures Framework to support the development of a diverse range of desirable future scenarios for nature and people, which was formally welcomed at the ninth IPBES plenary in 2022.

Meanwhile, Dr Nick Isaac worked closely with the UK's Department for Environment,

Food and Rural Affairs on the development of ambitious but realistic biodiversity targets to support the measurement of the UK Government's 25 Year Plan.

The plan was enacted through the landmark Environment Act 2021, which includes a commitment to halt the loss of species abundance by 2030 and mandates the creation of longer-term statutory targets for biodiversity, water, air quality and waste reduction. The details of those targets were published in December 2022.

For biodiversity, there is a target to increase species abundance by 10 per cent between 2030 and 2042, as well as targets for species extinction risk and creation of wildlife rich habitats. UKCEH was closely involved in the technical aspects of all three targets, the indicators of progress and the scenario modelling used to assess the appropriate level of ambition.

CHEMICAL RISKS

THE CHALLENGE

Chemicals are integral to human life and generate billions of pounds for national economies. However, chemical discharges can degrade the environment, having an adverse impact on ecosystems, and thereby affecting the health of humans and wildlife.

OUR ROLE

We investigate the dispersal, fate and behaviour of chemicals and polluting substances in terrestrial and freshwater environments. Priority pollutants include radionuclides, pesticides, organic pollutants, toxic metals, nutrients, and manufactured nanomaterials and plastics. We determine the effects of these pollutants across multiple scales, ranging from genes to populations.

CHEMICAL RISK HIGHLIGHTS

Monitoring in the Chernobyl Exclusion Zone



A new study led by UKCEH found that radiation levels in the Chernobyl Exclusion Zone are having no direct impact on soil biological activity three decades after the world's biggest nuclear accident. Soil organisms play an essential role supporting other wildlife, so the research provides

important evidence that the most radioactively contaminated ecosystem on Earth is in a good position to continue to recover.

UKCEH scientists also demonstrated that increases in gamma dose rates monitored in the Chernobyl Exclusion Zone during the war in Ukraine in February 2022 were not a consequence of either contaminated soil resuspension due to military vehicle movements, or a leak from the Chernobyl Nuclear Power Plant, theories which had been reported in the media.

Environmental monitoring in the Zone is now largely paused due to the war. The Russian invasion has had a direct impact on many of our research colleagues, their families and friends, and our thoughts are with everyone affected.



Dr Gbotemi Adediran,
UK Centre for Multimodal
Correlative Microscopy and
Spectroscopy at UKCEH

New facility to transform research into pollutants

In September, we secured a £750,000 investment from NERC for state-of-the-art laboratory equipment which will transform our understanding of chemical pollutants as well as natural and manmade particles, and their potential impact on the environment and human health.

With this investment, we are establishing a new research resource, the UK Centre for Multimodal Correlative Microscopy and Spectroscopy (CoreMiS), at UKCEH. The centre is the first of its kind in the country dedicated to micro-spectroscopic analysis of environmental samples. It will be available for all UK scientists to use to analyse environmental specimens such as sewage, soil and biological samples.

The suite of equipment represents a substantial step forward in capabilities for UK environmental science. It will enable scientists to see nanoparticles and nano-scale reactions in greater detail,

increasing our understanding of the impacts of pollution and climate change.

CoreMiS will deliver the world-class scientific infrastructure needed to underpin the UK's ambition for an evidence-based sustainable chemicals policy and the UK Government's ambition to develop a chemicals strategy. The centre will also support the training of students and early career researchers in cutting-edge technologies.

Dr Gbotemi Adediran, an emerging contaminant scientist at UKCEH and the principal investigator at CoreMiS, explains:

"This cutting-edge equipment will provide the UK environmental research community, for the first time, with access to a single solution dedicated to the combined analysis of environmental samples using techniques previously available only as stand-alone approaches."

www.ceh.ac.uk/coremis

CLEAN AIR

THE CHALLENGE

Air pollution is a major risk to human and environmental health. Around the globe, the adverse health effects of air pollutants are most prominent in urban areas, notably in African and Asian megacities. Air pollutants also have adverse effects on our natural environment, contributing to ecosystem damage and biodiversity loss, and impacting food security by reducing crop yields.

OUR ROLE

Through our groundbreaking flux measurement techniques and our field experimentation facilities, we generate long-term, high-frequency time series data of atmospheric composition change and identify the sources of emissions. This delivers vital data needed to inform the development and evaluation of effective clean air policies around the world.

HIGHLIGHTS

Air pollution reduces pollination by confusing butterflies and bees

A new study published in January 2022 showed that common air pollutants from both urban and rural environments significantly reduces pollination by preventing bees and butterflies from sniffing out crops and wildflowers.

Scientists from UKCEH and partner organisations investigated common ground-level air pollutants, including diesel exhaust pollutants and ozone, from both urban and rural environments. They reported that there were up to 70 per cent fewer pollinators, up to 90 per cent fewer flower visits and an overall pollination reduction of up to 31 per cent in test plants when the pollutants were present, but still at levels



Credit: Neil Mullinger, UKCEH

below current air quality standards. The theory is that the pollutants react with the scents of flowers, making them harder to find.

The study, funded by NERC, used a purpose-built fumigation facility, designed by our scientists, to regulate levels of nitrogen oxides and ozone in an open field environment.



Karen Yeung, Sarah Leeson and Dr Matthew Jones at our Auchencorth Moss Atmospheric Observatory

Reducing the impacts of air pollution on human health

UKCEH scientists have continued to improve our understanding of how exposure to air pollution affects human health, and to inform strategies and targets to reduce the risks.

Air pollution is associated with a range of diseases including childhood lung development, heart disease, stroke, cancer, asthma and increased mortality. Our scientists identified solutions to reduce health impacts from agriculture in the Chief Medical Officer for England's Annual Report on Air Pollution 2022. During the year, we also published new research, carried out with partners, showing that exposure to high levels of air pollution at critical points in life is detrimental to brain health, contributing to cognitive decline and dementia.

Our scientists have supported the development of PM_{2.5} (fine particles) targets for England, providing expert advice, evidence and modelling of future emission scenarios. New evidence published in

2022 showed that PM_{2.5} pollution can have harmful effects on people's health at lower concentrations than had been studied previously, and it is believed there is no threshold below which no harm occurs.

Our work has continued to underpin national policy elsewhere in the world, including in China, where the reduction of PM_{2.5} and reactive forms of nitrogen and sulphur is a key objective for air pollution control policies due to their major adverse effects on human health, ecosystem diversity, and climate.

We helped to assess the effectiveness of the Air Clean Plan (ACP) introduced in China, considering policy effectiveness and the co-benefits of carbon mitigation measures to environment and health. This included an estimation of the changes in PM_{2.5} concentration and premature deaths attributable to PM_{2.5} in China, at a fine resolution (1 km) from 2014–2020.

CLIMATE AND LAND

THE CHALLENGE

Changes in climate, involving interactions of physical, chemical, and biological processes of the atmosphere, ocean, and land surface, are having widespread impacts on societies and ecosystems. Understanding how the land surface interacts with the atmosphere is critical for climate change prediction, adaptation and mitigation.

OUR ROLE

Our land surface science is underpinned by detailed process understanding in hydrology, ecology, micro-meteorology, biogeochemistry, and, critically, their interactions. These processes are modelled within the Joint UK Land Environment Simulator (JULES) system, coordinated by UKCEH and the Met Office, which provides the community with a unique UK land surface model for accurate weather and climate prediction.

HIGHLIGHTS

Community and public engagement with the development of a new water cycle model

Hydro-JULES is a five-year national capability programme to develop an integrated water cycle model, which will contribute towards better early warning systems for floods and droughts and ensure reliable water supplies. In 2022, we continued to engage the hydrological community in the development of the model, as well as engaging the public with the science behind it. We delivered summer and winter schools to 50 undergraduate and postgraduate students from over 20 countries and engaged with over 6,000 school children and a further 11,000 members of the public.

Co-development of a meningitis sub-seasonal early warning system in Africa

Our scientists have supported the co-development of early warnings of meningitis outbreaks across sub-Saharan Africa. Using sub-seasonal atmospheric forecasts, weekly predictions of meningitis outbreaks are provided to the African sector of the World Health Organisation (WHO) and national health services. The system enables health organisations and medical services to be prepared and respond to outbreaks.



Scientists at the UK Centre for Ecology & Hydrology and the Met Office carried out modelling to predict future increases in wildfires.

Substantial increase in wildfires projected

A new report published by the United Nations Environment Programme (UNEP) in February predicted that even if greenhouse gases are reduced, there could be an increase of up to 50 per cent in wildfires around the world by the end of the century.

Scientists at UKCEH and the Met Office carried out modelling to predict future increases in wildfires for the report, *Spreading like Wildfire: The Rising Threat of Extraordinary Landscape Fires*. They combined the most up-to-date satellite observations of wildfires, vegetation cover and meteorological conditions with multiple climate models, enabling them to make projections for future fires with much more confidence than previously.

Although landscape fires are a natural process and, in some instances, needed for a healthy ecosystem, this report focuses on large, unusual fires referred to as wildfires, and it is the change in the pattern of these

wildfires that is causing most concern. There is projected to be a global increase of extreme fires of up to 14 per cent by 2030, 30 per cent by 2050 and 50 per cent by 2100.

The report found that some of the biggest increases will be in areas not typically used to seeing wildfires, such as the Arctic and central Europe. Areas of tropical forest in Indonesia and the southern Amazon are also likely to see increased burning if greenhouse gas emissions continue at their current rate.

UKCEH Land Surface Modeller Dr Douglas Kelley, the lead data analyst for the report, explains:

“In addition to impacts on climate, wildfires have wide-ranging impacts on people and the environment including damage to ecosystems, risk to people’s lives, health and livelihoods, and the economic costs of rebuilding.”

ECOSYSTEM RESTORATION AND RESILIENCE

THE CHALLENGE

The UN Decade of Ecosystem Restoration to 2030 recognises that ecosystem degradation undermines the well-being of 3.2 billion people. The resultant loss of species and ecosystem services across the world equates to a 10 per cent annual reduction in gross productivity.

OUR ROLE

Our multidisciplinary science enables us to develop innovative approaches to sustaining healthy ecosystems and restoring degraded ecosystems at landscape scales. We provide the evidence base to restore degraded ecosystems in such a way that they are resilient to climate change and extreme events, particularly where societal and environmental pressures are in conflict.

HIGHLIGHTS

Birmingham trees deliver nearly £4 million of health benefits

Trees are a great way to cut down noise from traffic, reducing the risk of stroke and cardiovascular ailments. Scientists from UKCEH have created a model that looks at the trees in a city and equates their noise-reducing benefits to a cash value, based on the impact on our health. In a study published in November 2022, they estimated that trees in and around Birmingham deliver nearly £4 million of health benefits to the people living there. The model can be applied to any city and enables the city to maximise the benefits of the tree planting it can afford.

Half of replanted tropical trees don't survive

On average, about half of trees planted in tropical and sub-tropical forest restoration efforts do not survive more than five years, but there is enormous variation in outcomes, new research published in November 2022 found. The study, led by UKCEH, analysed data from 176 restoration sites in tropical and sub-tropical Asia, where natural forests have suffered degradation. The research team found that, on average, 18 per cent of planted saplings died within the first year, rising to 44 per cent after five years. Further research is needed to hone the most appropriate and cost-effective methods for restoration.



Monitoring of the Cumbrian Lakes began in 1945, and has been led by UKCEH and its predecessor institutes since 1989.

Long-term monitoring reveals how climate change is affecting UK lakes

UKCEH holds more than 420 lake-years of data gathered from our monitoring sites in England and Scotland as part of the world's largest long-term lake monitoring programme.

A report published in April 2022, authored by UKCEH scientists on behalf of Scotland's Centre for Expertise for Waters (CREW), showed that climate change has already caused a rapid and extensive warming of Scotland's lochs and reservoirs, with impacts expected to intensify in future.

Between 2015 and 2019, 97 per cent of monitored Scottish lochs and reservoirs increased in temperature. While most warmed by up to 1.0°C per year over this period, 9 per cent increased by more than that – some by up to 1.3°C per year.

These changes increase the risk of harmful algal blooms developing, which could restrict

their use for recreation and water supply, and as a safe habitat for wildlife. The report made a number of recommendations to address these impacts.

Mairi McAllan, Scotland's Environment Minister, said:

“Research like this will be hugely valuable in informing the development of policy solutions and measures to mitigate and adapt to climate change, and also protect, restore and enhance these vital natural assets.”

In 2022, we also published analysis for the Windermere catchment which reveals clear evidence of the impacts of climate warming. For Windermere, Esthwaite Water, and Blelham Tarn water temperature was 0.4 – 0.8 °C warmer during the period 2017 to 2021, compared to 1981 to 2010.

FLOOD AND DROUGHT IMPACTS

THE CHALLENGE

Floods and droughts have the potential for immense destruction of homes, crops, wildlife and infrastructures. Since 2017, natural disasters and extreme weather events have been consistently identified in the World Economic Forum’s top five global risks by severity.

OUR ROLE

Combining expertise in hydrometeorology with data derived from national monitoring networks, we measure and model water to accurately predict, mitigate and manage the impacts of floods and droughts. We work in partnership across the world to build local capacity in monitoring, analysis and modelling, supporting planning, response and recovery.

HIGHLIGHTS

Long-term monitoring supports planning during the 2022 drought



In 2022, the UK experienced one of the driest and warmest summers ever recorded, with impacts including widespread hosepipe bans, water pollution, crop failures and wildfires. Drawing on our long-term hydrological monitoring, UKCEH scientists reported on the evolving situation around the country, comparing it to previous droughts such as that in 1976.

We worked closely with Defra, the Environment Agency and water companies to provide information about the severity of the drought, to inform planning. We also proactively contributed to public interest stories on dry weather and drought, with over 1,700 mentions of UKCEH hydrological analysis in the UK press in August alone.



The impacts of flooding on a commune in Dakar, Senegal ©Tanya Warnaars

New portal improves forecasts of devastating storms in West Africa

In May 2022, UKCEH launched a new online portal to enable forecasters in West Africa to provide communities with earlier and more reliable storm warnings.

Storms in the Sahel region, which can reach over 100km in size, have become more extreme since the 1980s due to the changing climate, with more intense rainfall. Severe flooding during the monsoon from June to September causes human and livestock deaths, as well as causing damage to property and infrastructure.

Thanks to a recent breakthrough by UKCEH scientists, national forecasting agencies in West Africa can now make short-term forecasts, known as ‘nowcasts’, for six hours ahead with a higher degree of accuracy than previously. To assist forecasters, these novel nowcasting predictions and related satellite observations for West Africa have been made available via the new portal.

National forecasters can interpret the data and make localised forecasts, sending out warnings to people in areas that are expected to be hit by a storm.

Dr Steven Cole, senior hydrological modeller at UKCEH, explains:

“The portal is a great example of how new scientific understanding can be translated into useable real-time tools by working with forecasters. Importantly, this will support communities in West Africa to better manage flood risk from intense rainfall.”

As part of a collaboration with ANACIM, the national meteorological service in Senegal, UKCEH has also developed short-term forecasts of potential flood impacts and risk in Dakar which are available on the portal, and intends to work with other national forecasting services to provide a similar service.

NET ZERO GREENHOUSE GAS EMISSIONS

THE CHALLENGE

Many countries, including the UK, have committed to a net zero emissions economy. To drive down greenhouse gas (GHG) emissions, we need to identify where they come from, how they can best be reduced, and ensure we fully understand the processes involved.

OUR ROLE

We undertake long-term national surveys of GHG emissions in both natural and managed environments, focusing on carbon dioxide, methane, and nitrous oxide. We make a major contribution to national and international GHG emissions inventories, providing GHG flux measurements, and improve understanding of the role that land use has on emissions.

HIGHLIGHTS



Peat camera
©Jonay Jovani, UKCEH

Using peat cameras to monitor emissions from peatlands

UKCEH have been commissioned by Natural England to establish a national network of over 50 low-cost peatland monitoring systems, which use timelapse photography to measure small movements in the peat surface and low-cost sensors to monitor environmental variables such as water table depth. These movements are linked to peatland attributes such as water table depth and carbon balance. This work will

feed into the development of the new England Peat Map, a set of accessible, online maps describing peat condition and GHG emissions, drawing on both ground-based and earth observation data. This approach will also provide a cost-effective way to monitor and verify the GHG benefits of peat restoration.

Measuring GHG emissions from lakes

As part of UKCEH's work to measure, understand and mitigate greenhouse gas emissions from UK inland waters, our scientists established the first flux towers to measure GHGs from lakes at Esthwaite and at Loch Leven. These are the first two of five highly instrumented sentinel sites we plan to establish across a range of different bodies of water, including lakes, reservoirs and ponds. Each one will be equipped with state-of-the-art GHG measurement technologies.



The restoration of the saltmarsh at Tollesbury, Essex, involving UKCEH scientists, was one of the first such projects undertaken in the UK.

Leading the development of saltmarsh and peatland carbon codes

Over the past year, UKCEH has led the development of the scientific methodology underpinning the Peatland Code, and the development of a Saltmarsh Code for the UK. These codes are voluntary certification standards, enabling peatland and saltmarsh carbon to be marketed and purchased by private investors, thus providing an income stream for restoration projects and supporting the achievement of national net zero goals.

UKCEH scientists carried out a major evidence review and developed new methods to support Version 2 of the UK Peatland Code, due to be published in 2023. The new methods use data from UKCEH's flux tower network to update estimates of greenhouse gas emissions and removals for different peatland categories. This enables project developers to estimate emissions reductions that could be achieved by raising water levels, based on data analysis published in *Nature* in 2021. They also

extend the Peatland Code to cover lowland fen peats, enabling lowland peat farmers to earn future carbon credits by raising water levels on their land, or converting to wetland farming ('paludiculture').

Annette Burden, a wetland scientist at UKCEH, who led the development of the first phase of the Saltmarsh Code during 2022, says:

"Research is underway to more fully understand carbon dynamics within UK saltmarsh habitat, including measurement of greenhouse gas emissions and water-borne carbon fluxes. These new insights will support the development of the UK Saltmarsh Code."

As part of this work, our scientists produced a new report for the UK Government in 2022, setting out what additional data and information would need to be collected to facilitate the addition of coastal wetlands to the UK greenhouse gas emissions inventory.

SOIL HEALTH

THE CHALLENGE

Healthy soils and peatlands are critical for life. They produce 95 per cent of our food and are the source of many of our antibiotics. They store more carbon than the world's forests, mitigate climate change, recycle nutrients and waste, and clean our water. Yet, they are vulnerable to pollution, unsustainable exploitation and erosion.

OUR ROLE

Our multidisciplinary, integrated soils research spans physical, biological and chemical soil processes and investigates their interaction with the biosphere. This research enables environmental risk assessment and predictions of how soils may change under future land use and climate change scenarios.

HIGHLIGHTS



Research shows that less intensively managed grasslands have higher plant diversity and better soil health

Grazed grassland makes up a large proportion of the British countryside and is vital to farming and rural communities. Now UKCEH researchers have shown for the first time that less intensively managed British grazed grasslands have on average 50 per

cent more plant species and better soil health than intensively managed grassland. The new study could help farmers increase both biodiversity and soil health.

First ever UK Soils Awareness Week

October saw the first ever UK Soils Awareness Week, designed to increase public understanding and appreciation of soils and the challenges they face. The awareness week was organised by uksoils, a not-for-profit community hub led by UKCEH and the Sustainable Soils Alliance. Activities developed and promoted during the week included a list of things people can do as part of their daily lives to protect and improve the nation's soils, a lexicon, and a soils quiz. Professor Bridget Emmett of UKCEH appeared on BBC World News to talk about the importance of soils as part of the campaign.



Michele Brentegani, Bangor Analytical Chemistry Laboratory; soil analysis

New web tool for measuring health of soils

In December 2022, UKCEH launched a new free web tool called Soil Fundamentals to help land managers monitor and improve the health of soil in common habitats in Britain.

The tool was developed using data from the UKCEH Countryside Survey, which has been exploring changes in soils and vegetation across Great Britain since 1978. It enables landowners to benchmark the health of their soil, seeing where it sits within the bigger national picture.

Unlike previous benchmarking tools for soil health, this is the first to consider the health of soils within the wider semi-natural landscape of grasslands, woodlands and wetlands, as well as agriculture, and to be built from a nationally representative sample from across Great Britain.

The new tool assesses indicators of soil organic matter, pH, bulk density and earthworm abundance. These provide

physical, chemical and biological indicators of healthy soil functioning and can be measured reliably for most environments in the UK.

Professor Bridget Emmett, Head of Soils and Land Use at UKCEH, explains:

“With these robust national benchmarks for soil health, land managers can now assess both the current state of their soil and how much improvement is possible if they adopt more sustainable management practices.”

We are now asking for feedback from the community to tell us how the tool has changed the way they manage soil and what else they would like to see included. This will help us prioritise conversion of our many other national indicators of soil health into benchmarks, such as fungi, nutrients and contaminants. New monitoring in Northern Ireland will allow us to extend the tool to cover all four nations of the UK for the future.

SUSTAINABLE AGRICULTURE

THE CHALLENGE

Population growth, changing diets and urbanisation are driving ever-increasing intensification of agriculture and land-use change. Meeting the need for increased food production and nutrition without degrading our environment is one of the greatest challenges facing society today.

OUR ROLE

Our research makes a major contribution to the development of sustainable and productive farming systems that are resilient to climate change and protect biodiversity, while promoting healthy soils, clean water, pollination and natural pest control.

HIGHLIGHTS



© Steven Falk

Supporting the transition to sustainable agriculture

ASSIST, a six-year £12 million research programme co-led by UKCEH, concluded in 2022. The programme brought together farmers and scientists to test new approaches and provide scientific evidence to inform the transition to sustainable agriculture in the UK. The multi-partner project team produced a suite of free tools to help farmers and land managers plan environmental improvements, explore future land use options, and assess the quality of wildlife habitats. We engaged with over 5,000 farmers and beekeepers over the

course of the programme and established over 50km of flower-rich field margins and in-field strips to support pollinating insects, among other achievements.

Informing the development of CAP replacement schemes in England and Wales

Over the last three years, UKCEH has coordinated over 50 experts drawn from 12 research organisations to help inform the development of Common Agricultural Policy (CAP) replacement schemes for both UK and Welsh Governments. Work for the UK Government in 2022 included a qualitative assessment of the environmental impact of over 700 management actions for over 40 ecosystem services and indicators ranging from biodiversity to air, soil and water quality, water flow, carbon sequestration and cultural services. Critically, the trade-offs and co-benefits of each action were also assessed.



Hillesden Farm
©Lucy Hulmes, UKCEH

Nature-friendly farming can bring wildlife back to farms without compromising food production

Agri-environment schemes can reverse declines in farmland bird and butterfly populations without damaging food production, a long-term monitoring study revealed in August 2022.

Scientists from UKCEH spent over a decade monitoring the impacts of a large-scale Defra-funded experiment at Hillesden, a 1,000-hectare commercial arable farm in Buckinghamshire. Beginning in 2005, this involved creating several wildlife habitats, including seed-bearing crops for birds, wildflowers for pollinators and tussocky grass margins to support a range of birds, insects and small mammals.

The experiment assessed the effectiveness of these agri-environmental measures in reducing biodiversity losses caused by the intensification of UK farming practices since the Second World War, including declines in species that are essential for agricultural production, such as pollinators and predators of crop pests.

Researchers found that the majority of species did better at Hillesden than on nearby farms which lacked the same mix of agri-environment habitats. There were increases of a third across populations of all bird species between 2006 and 2016, compared to an average of just under 13 per cent at other monitored sites, and 40 per cent among all butterflies 2009-2017, compared to 21 per cent elsewhere.

Marek Nowakowski, The Wildlife Farming Company, says:

“The Hillesden study shows that it is possible to balance wildlife conservation with efficient food production. I am confident other farmers could achieve similar results with the right training and advice.”

UKCEH research and monitoring over the last 30 years has contributed important evidence to underpin agri-environmental policies across the four nations of the UK.

WATER QUALITY AND RESOURCES

THE CHALLENGE

Water is a resource on which all life depends. Yet across the planet 30 per cent of people do not have access to reliable supplies of clean water. Efficient management of water is critical to addressing the competing demands of industry, agriculture and energy production, while also sustaining natural ecosystems.

OUR ROLE

Our research integrates ecology and hydrology in the evaluation of water availability and demand. We seek to understand the complex interactions that affect the availability and quality of water resources now and into the future, from local to global scales.

HIGHLIGHTS

Solutions for the global phosphorus crisis



© Glenn Rhodes, UKCEH

A major new report published in June 2022, led by UKCEH and University of Edinburgh scientists, offers solutions to the global phosphorus crisis, which threatens food and water security.

A team of 40 international experts from 17 countries, supported by the United Nations Environment Programme (UNEP),

collaborated on the *Our Phosphorus Future* report – the most comprehensive global analysis of the challenges and possible solutions to the phosphorus crisis to date. It calls on governments across the world to adopt a ‘50, 50, 50’ goal: a 50 per cent reduction in global pollution of phosphorus and a 50 per cent increase in recycling of the nutrient by the year 2050.

In December 2022, this was followed by the publication of the *UK Phosphorus Transformation Strategy*, which provides a roadmap for how the country can better manage this vital element. Drawn up by scientists from UKCEH and other institutes, the strategy’s recommendations were jointly developed with farmers, regulators, policy makers, food producers, wastewater companies and environmental managers through extensive consultation.



Heidrun Feuchtmayr,
UKCEH Aquatic
Mesocosm Facility,
Lancaster

New portal supports water resources planning

A new interactive web portal launched by UKCEH in March provides an indication of hydrological conditions across the country in the coming months.

The Hydrological Outlooks Portal allows users to visualise projections for river flows from the UK Hydrological Outlook. The monthly Outlook, produced by UKCEH in collaboration with partners, supports the water and energy sectors, farmers, local authorities and others, to assess flood risk and water availability and to plan accordingly.

Users of the new portal can click on an interactive map to look at projections for a specific geographical area or river catchment of interest.

They can also customise the downloadable maps and graphs, for example, by looking at the likelihood of river flows reaching a

trigger level relevant for drought planning in a region. Projections are typically based on a comparison with what are considered ‘normal’ river flows for a location in that month historically, with categories ranging from exceptionally low to exceptionally high.

Anne Dacey, Deputy Director of Water Resources at the Environment Agency, says:

“The last few years we have seen changing weather patterns, including increasing frequency of prolonged dry weather, which may continue to become more extreme. This requires some forward planning. The UK Hydrological Outlook is an important part of the evidence we use to plan our operational incident response to prolonged dry weather risks.”

GOVERNANCE

The Centre for Ecology & Hydrology was formed in 2000 through a merger of four NERC terrestrial and freshwater research institutes. In 2019, the Centre became independent from NERC and its parent organisation UKRI, and was re-named the UK Centre for Ecology & Hydrology (UKCEH).

The UK Centre for Ecology & Hydrology is a registered Charity in England & Wales (number 1185618) and in Scotland (number SC049849), and a registered Company Limited by Guarantee in England & Wales (number 11314957). The liability of members is limited to a maximum of £1 each.

The registered office of the UK Centre for Ecology & Hydrology is at the Maclean Building, Benson Lane, Crowmarsh Gifford, Wallingford, Oxfordshire, OX10 8BB, UK.

Our Board of Trustees

Our Board of Trustees is responsible for:

- Ensuring that UKCEH has a long-term strategy to address its objectives, and supporting strategic and business plans
- Reviewing performance in the light of the strategy, objectives, business plans and budgets and ensuring that any necessary corrective action is taken
- Ensuring UKCEH's financial stability and that there is a sound framework of financial controls
- Ensuring that UKCEH complies with charity and other law, and with the requirements of regulators
- Ensuring that UKCEH complies with its charitable objects
- Ensuring there is an effective risk management and internal control framework
- Ensuring an appropriate health and safety management framework is in place and operating effectively, through review of quarterly reports by the Board
- Ensuring appropriate safeguarding measures are in place and operating effectively with review of risk and assurance reports
- Ensuring UKCEH adheres to the principles of the charity governance code to underpin its governance framework and support high standards of governance.

Our Trustee Directors are:

- Ewen Cameron, Lord Cameron of Dillington, Chair
- Professor Mark Bailey, Executive Director (retired June 2023)
- Dr Stuart Wainwright, Executive Director (joined June 2023)
- Lynette Eastman
- Will Galgey
- Professor Iain Gillespie
- Professor Sir Charles Godfray
- Linda Naylor
- Benet Northcote
- Neil Scragg
- Alexia Tye

In addition to our Trustee Directors, NERC have the right to appoint an observer to the Board who is Alison Robinson.

Board meetings

The Board met four times during this accounting year, with attendance as follows:

	02/03/22	29/06/22	28/09/22	14/12/22
Ewen Cameron	✓	✓	✓	✓
Mark Bailey	✓	✓	✓	✓
Sam Bullen	✓	✓	✓	✓
Lynette Eastman	✓	Apologies	Apologies	✓
Will Galgey	✓	✓	✓	Apologies
Iain Gillespie	✓	✓	✓	✓
Charles Godfray	✓	✓	✓	✓
Linda Naylor	✓	✓	✓	✓
Benet Northcote	✓	✓	✓	✓
Neil Scragg	✓	✓	✓	✓
Alexia Tye	✓	✓	✓	✓

Sub-committees of the Board

The Board delegates some areas of its work to sub-committees. These are:

- **The Finance and Audit Sub-committee**

The Sub-committee oversees and reviews all financial aspects and advises the Board accordingly. They ensure there is a strong framework for financial accountability, risk analysis and risk management. They evaluate the budget before Board approval, and they oversee the financial audit and reporting process. The Sub-committee met four times during 2022.

- **The Remuneration and Appointments Sub-committee**

The Sub-committee ensures there is an appropriate pay and performance framework for UKCEH employees. They review the levels of remuneration of Trustee Director and recommend a level of remuneration for the Executive Director to the Board. The Sub-committee also oversees the recruitment and selection of new Trustees and the Executive Director. The Sub-committee met twice in 2022.

Appointment and induction of trustees

Trustee vacancies are openly advertised, with a focus on increasing diversity. New Trustee Directors are provided with information on their responsibilities as the delegation framework, and the operation of the Board and its sub-committees. They receive regular presentations from UKCEH’s scientists at Board meetings, and have opportunities to visit UKCEH’s four sites to meet with staff.

How we organise our work

The Trustees delegate the day-to-day leadership and operations of UKCEH to the Executive Board, made up of five members led by the Executive Director. The Executive Board meets formally four times a year to review science progress, finances, risk assessment, operational matters, environmental sustainability, and health and safety, as well as staffing and resource needs. In addition, the Executive Board meets once a week for informal discussions and to deal with matters arising from day-to-day operations. The Science Board also holds quarterly formal meetings and regular updates with the Science Director as required.



Key management personnel

The members of the Executive Board during 2022 were:

- Professor Mark Bailey (retired June 2023)
- Sam Bullen
- Professor Alan Jenkins (retired April 2023)
- Gill Lay
- Dr Nick Wells
- Dr Doug Wilson (joined April 2022)



Members of the Executive Board from left to right: Dr Nick Wells, Gill Lay, Professor Alan Jenkins, Professor Mark J Bailey, Dr Doug Wilson and Sam Bullen.

The members of the Science Board during 2022 were:

- Dr Doug Wilson (joined April 2022)
- Professor Gordon Blair (joined January 2022)
- Dr Eleanor Blyth
- Professor Harry Dixon (joined June 2022)
- Professor Bridget Emmett
- Professor Alan Jenkins (retired April 2023)
- Professor Richard Pywell
- Dr Gwyn Rees
- Professor Stefan Reis (resigned March 2023)
- Nick Reynard
- Dr Claus Svendsen
- Dr Nick Wells

New chief executive

Professor Mark Bailey, Executive Director of UKCEH, announced his intention to retire from UKCEH in June 2023, having led the organisation since 2011. Under Mark's leadership, UKCEH has become one of the world's foremost institutes for integrated environmental research across water, land and air.

UKCEH carried out a targeted recruitment search for a new chief executive, working with an executive search agency. The position was also advertised openly. Dr Stuart Wainwright OBE was selected in December 2022 by a panel comprising our Trustees, along with an independent panel member.

Stuart takes up leadership of the organisation from June 2023. He was Director of the Government Office for Science from 2019, the body responsible for providing science advice to the UK Government on the greatest challenges facing the nation and driving improvements in the way science is used across government.



Dr Stuart Wainwright

New science director

In 2022, we welcomed Dr Doug Wilson as our new Science Director. Doug, who was previously Chief Scientist at the Environment Agency, took up the position in April, joining the organisation's Executive Board and leading its Science Board. He succeeds Professor Alan Jenkins, who retired in April 2023 after 37 years working for UKCEH and its predecessor institutes.

Remuneration of key management personnel

The Remuneration and Appointments Sub-committee recommends the level of remuneration for the Executive Director. Remuneration for the remaining key management staff is reviewed by the Executive Director with the oversight of the Board. Benchmarking data from comparable organisations is used when reviewing and setting pay levels.

Trading subsidiary

UKCEH has one wholly owned registered trading subsidiary, the UK Centre for Ecology & Hydrology Enterprise, a Company Limited by Shares (number 12251749), which supports our charitable purpose. The principal activity of UKCEH Enterprise is to increase UKCEH's social, economic and environmental impact and science excellence through commercial product and service collaborations and commercialisation of UKCEH research outputs and capabilities.

UKCEH's investment in UKCEH Enterprise Limited is £50,000, being the whole of the issued share capital of that company. The subsidiary donates all profits earned to the charity. The financial statements of UKCEH Enterprise are independently audited and filed at Companies House. The registered office of the UK Centre for Ecology & Hydrology Enterprise is at the Maclean Building, Benson Lane, Crowmarsh Gifford, Wallingford, Oxfordshire, OX10 8BB, UK.

Performance and achievements of our trading subsidiary

In 2022, UKCEH Enterprise reported a surplus before tax of £0.35m, while using UKCEH staff time charged at £0.46m, in order to meet its deliverables. During this accounting period, UKCEH Enterprise developed a five-year strategic plan to 2027, defining strategic objectives, key performance indicators, strategic interventions and tactics. UKCEH Enterprise maintained its return on information product sales in 2022, and from 2023 will place greater emphasis on new product development and launch. Research contract delivery increased in 2022 resulting in an increased contribution to the reported surplus.

Notably, during 2022 UKCEH Enterprise enabled national and international sales of an Automated Moth Instrument, extending designs from Aarhus University, as described on page 12. These sales supported the iterative development and field testing of this instrument, and this will continue to be the case throughout 2023. This activity also underpinned our capability and capacity to manufacture, supply and work in collaborative research partnerships, contributing to wider national and international networks of automated biodiversity sensors.

UKCEH Enterprise Directors

The directors of UKCEH Enterprise are:

- Professor Alan Jenkins, Executive Director (resigned November 2022)
- Linda Naylor, Chair and Non-Executive Director
- Ian Reid, Non-Executive Director
- Dr Nick Wells, Managing Director
- Dr Doug Wilson, Executive Director (appointed November 2022)

Advisors

Auditors

Crowe U.K. LLP
St James House
St James Square
Cheltenham
Gloucestershire GL50 3PR

Legal advisors

Eversheds Sutherland
(International) LLP
One Wood Street
London EC2V 7WS

Insurers

Marsh Ltd
The Paragon
Counterslip
Bristol BS1 6BX

Bankers

Barclays Bank PLC
South West & Wales Corp
1 Churchill Place
London E14 5HP

Section 172 statement

The UKCEH Board of Trustees have acted in the way they consider to be in good faith, would be most likely to promote the success of the company for the benefit of its members as a whole, and in doing so have regard to the matters set out in s172(1)(a-f) of the Companies Act 2006. During the year, the Trustees have considered the long-term consequences of their decisions. For example, focuses of this reporting period included the implementation of the organisation’s five-year *Strategy 2025: Research and Innovation*, and building relationships and reputation to support future income and impact.

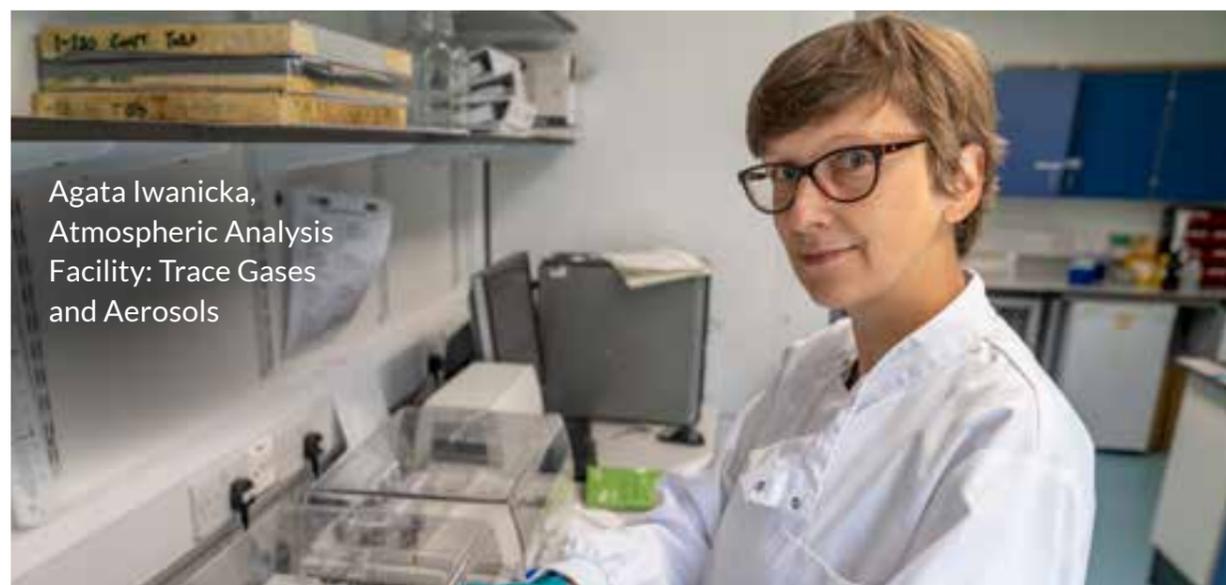
How we deliver public benefit

Our charitable objects are:

- To carry out pure and applied scientific research in terrestrial and aquatic environments, including their interactions with the atmosphere.
- To advance education in the environment and environmental sciences, and sustainable development.
- To promote sustainable development for the benefit of the public by promoting the preservation, conservation, protection and improvement of the environment and the prudent use of natural resources.
- To promote sustainable means of achieving economic growth and regeneration.

The ways in which we deliver public benefit are outlined both in the performance and achievements section of this report above, and in the people, stakeholders, and environment sections below.

The Trustees confirm that they have complied with the duty in section 17 of the Charities Act 2011 to have regard to the Charity Commission’s general guidance on public benefit, “Charities and Public Benefit”.



OUR PEOPLE

UKCEH is committed to providing an inclusive working environment, and to nurturing a culture of scientific and professional excellence. Our ability to conduct world-class research and innovation relies on our ability to attract, retain and develop talented people and 2022 was another year of growth for the organisation.

We continue to recognise the importance of fair remuneration and benefits, and we pay competitively within the context of affordability. In 2022, we enhanced our cycle-to-work scheme provision, provided a one-off cost of living payment for our lowest earners, and introduced season ticket loans to support employees with their public transport / car parking costs at each of our sites.

Consultation and communication

UKCEH supports trade union membership and recognises Prospect as the employee representative with which it will consult and negotiate. During 2022, we ran surveys and focus groups to consult with colleagues on subjects including pay and reward, benefits and wellbeing, alongside formal union meetings of the Joint Consultation and Negotiation Committee (JCNC).

We also continued to encourage feedback from staff and students using our People and Communication Team (PACT). PACT is made up of representatives from each professional services department and each science area. It provides a forum for engagement with colleagues on UKCEH wide matters, to propose changes and learn about topics that are important to our community.

Our gender composition

The data provided here represent a snapshot of our gender composition on 5 April 2022 compared to 5 April 2021.

	Total workforce	Women	Men
2021	549 individuals	276	273
2022	554 individuals	276	278

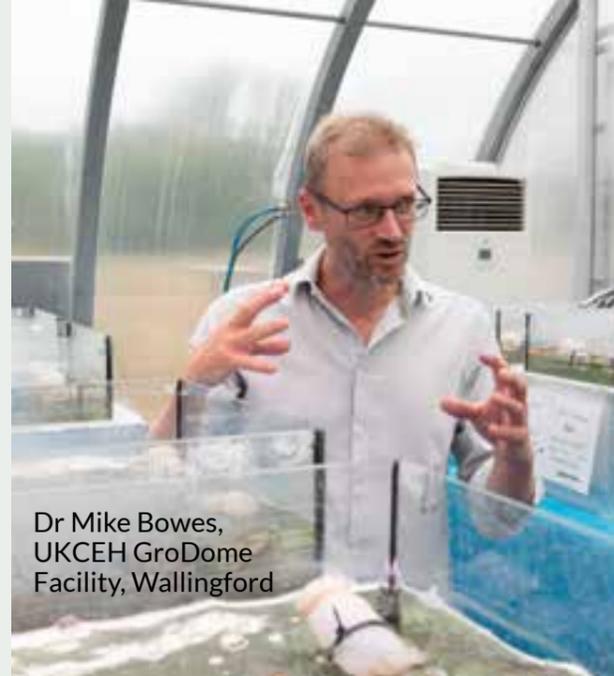
The proportions of men and women within each pay quartile.

	Upper quartile	Upper middle quartile	Lower middle quartile	Lower quartile
2021	33% women 67% men	44% women 56% men	54% women 46% men	67% women 33% men
2022	33% women 67% men	44% women 56% men	56% women 44% men	66% women 34% men

Our scientists
jointly supervised

179

postgraduate
masters and
doctoral researchers



Dr Mike Bowes,
UKCEH GroDome
Facility, Wallingford



Ian Sparks and Jennie Bishop
People Team

We trained

>400

external learners
through face-to-face
and online training
courses

We participated in

10

UKRI Doctoral Training
Partnerships and

4

UKRI Centres for
Doctoral Training



Fred Duarte, Atmospheric Analysis Facility:
Trace Gases and Aerosols, Edinburgh

Equity, equality, diversity and inclusion (EEDI)

UKCEH is committed to creating an inclusive research environment. In summer 2022, we launched a six-month initiative to inform future EEDI plans at UKCEH. As part of this, we audited and reviewed existing EEDI related policies and processes, and explored the lived experiences of our staff through focus groups, surveys and individual meetings, resulting in the creation of a comprehensive action plan to take forward into 2023.

We recognise the importance of an environment where all employees feel valued and supported to deliver their best in the workplace, and we have undertaken a number of actions in 2022 to foster this, including: launching new EEDI resources, including guides and training materials; carrying out inclusive language checks on all our job adverts, and refreshing our EEDI procedures, including implementing a transgender policy and guidance document.

Learning and development

We offer staff and students a range of professional development opportunities to support their growth. During the year, our line managers completed training on topics including performance improvement, unconscious bias, mental health awareness, and anti-harassment and bullying. Our staff completed a total of over 3,500 compliance training courses, covering topics including returning to work during or after Covid, cyber security awareness, and EEDI.

Postgraduate and early career research

UKCEH continues to play a prominent role in training the next generation of environmental scientists. In 2022, 85 of our scientists jointly supervised 175 masters and doctoral researchers, who benefited from access to our laboratory facilities, field sites and data centres. At the end of 2022, we had 54 active research associates at UKCEH. We reviewed the support we are providing to early career researchers following the pandemic.

Health and safety report

During 2022, we continued to deliver improvements to our ISO certified Safety, Health and Environment (SHE) systems and services, laying down the foundations for a more people-centred programme. We appointed a new Occupational Health provider and offered flu vaccination clinics to staff at all four sites. The establishment of a Wellbeing Working Group to support implementation of the Strategy engaged UKCEH people in various initiatives during 2022. Our 'Move More' campaign in October 2022 to support reduction of display screen equipment associated AINMs (accidents, incidents and near misses) was hugely successful with UKCEH participants recording over 63 million steps (over 28,000 miles!).

Accident reporting

Over the 12 month period there were 41 Accidents (including ill-health), 18 Incidents (including vehicle incidents) and 32 Near Misses reported across UKCEH in 2022. There were no RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013) reportable accidents, incidents, or Covid outbreaks.

As part of a move to improve reporting systems, the associated statistics are now provided in newly defined categories by injury and incident type.

Research integrity

UKCEH's values set out the way we want to work together, across UKCEH and with our partners, focusing on excellence, integrity and teamwork. Integrity encompasses maintaining the highest standards of research and professional ethics and impartiality. This is underpinned by UKCEH's core expectations of staff.

UKCEH operates to UKRI's Good Research and Trusted Research Policies and Processes, and has a Code of Ethics extending to all aspects of governance, policy, operations and administration. In addition, UKCEH is a signatory of the Concordat to Support Research Integrity, a national framework for good research conduct and its governance.

In 2022, UKCEH extended the scope and formalised its procedures for research ethics. Members of the research ethics committees, including external experts, are responsible for promoting research ethics, as advocates and points of contact. Members of the committees received formal training in 2022, led by an independent expert. A formal learning needs analysis identified the opportunity for UKCEH-wide ethics and research integrity training, including conflicts of interest, which will be delivered in 2023.

No claims of scientific misconduct were received or investigated in 2022. From 2023, UKCEH will adopt the UK Research Integrity Office template for institutional annual statements on research integrity.



Debbie Guy at UKCEH Bangor reception

OUR STAKEHOLDERS

How we work with stakeholders

We engage key stakeholders through various means at organisational and research programme levels, including:

- Inviting researchers from Higher Education Institutes across the UK and beyond, as well as representatives of government departments and agencies, to engage with the design and delivery of our National Capability programmes and other collaborative research initiatives, including advisory panels.
- Organising stakeholder engagement events. For example, in 2022, we held an event for parliamentary and policy stakeholders in the House of Lords, hosted by our chair, Lord Cameron of Dillington.
- Holding regular bilateral meetings with key stakeholders, for example government chief scientists.
- Providing regular communications to our key stakeholders, including via regular and one-off email newsletters.
- Carrying out periodic stakeholder perception surveys. In 2022, we carried out a survey to key stakeholders nationally and internationally to understand perceptions of the organisation.
- Co-designing international research projects with partners around the world to ensure that our science is informed by local knowledge and expertise and meets local needs.

External training

In 2022, we trained over 400 external learners through face-to-face and online courses, on subjects ranging from using drones to map habitats to transforming environmental data in R, and from radiological environmental protection to evidence synthesis. We provided bespoke training for partners including Defra, BEIS, the Government Office for Science, The Wildlife Trusts, the Ireland Environmental Protection Agency, Lancaster University and Gloucester University.

Complaints and feedback

In February 2022, we achieved recertification for ISO 9001, demonstrating our commitment to providing a quality service. We have policies and processes in place for external complaints and customer satisfaction, supporting the requirements of our quality management system and good business practice.

Customer satisfaction reviews are undertaken twice a year for pertinent completed projects, and we also ask for feedback from customers for long-term projects at the half-way mark of the project. The Executive Board review this feedback and oversee the external complaints process. All complaints made in 2022 have been resolved. The Board of Trustees also have an overview of both processes.

How we work with suppliers

We are committed to obtaining value for money for all our procurement activities whilst working towards our commercial, charitable, environmental and social objectives, complying with all relevant legislative requirements. We want our key suppliers to mirror our values and goals. As a charitable organisation whose funding is predominately through the public sector, we follow the Purchasing Contracts Regulations 2015.

Our procurement policy is to use preferred and framework suppliers through an open and transparent competitive process. Using preferred and framework suppliers provides a secure, cost-effective and efficient route to purchasing as well as providing additional risk mitigation and assurances and achieving best value outcomes.

In 2022, we met the challenges of long procurement lead times in specific areas, as well as inflationary pressures. We were able to mitigate cost increases through measures including extending existing contracts where permissible, and use of framework agreements.

How we engage the public

We are committed to fostering public engagement with our research in a way that is mutually beneficial to our research ambitions, our researchers and our publics. We are working to increase the excellence and impact of our public engagement, and to embed excellent public engagement into relevant research programmes across all our sites and science areas, with a particular focus on citizen science, community engagement and public dialogue. During 2022, we developed and delivered bespoke training for our scientists on how to design, carry out and evaluate excellent public engagement with research.

Public engagement case study: Engaging communities to mitigate zoonotic diseases in India

In India, around 200 million people depend on degraded forests for their livelihoods – for food, fuel, livestock fodder and other non-timber forest products. These communities are at increasing risk of exposure to zoonotic pathogens, transmitted from animals, when carrying out essential activities related to their livelihoods.



For example, Kyasanur Forest Disease (KFD) is a viral tick-borne disease which has spread rapidly since 2014 and involves multiple tick species and wildlife and domestic animals in transmission. The disease can lead to long-term, debilitating health issues, loss of income, reduced forest access, and death.

Through extensive engagement with local partners, communities and decision makers, UKCEH scientists examined the social and environmental factors which increase vulnerability to this disease among forest users in the Western Ghats, South India, and co-produced decision support tools and risk guidance.

Our scientists modelled disease patterns in relation to key risk factors identified by decision makers across a range of sectors during stakeholder workshops. They found the highest risk of transmission to humans in diverse agro-forestry landscapes, created when moist evergreen forest is replaced with plantations and rice cultivation. Through focused ecological sampling, they also found that people can be exposed to infected ticks not only in forests but also in forest edges, plantations, houses and gardens.

The team conducted household surveys and interviews with the community, including smallholder farmers, tribal groups, forest and health department workers. These revealed that households with poor access to land, at or below the poverty line, and headed by an older person, had higher vulnerability to KFD. They also revealed the key barriers to effective KFD prevention and the most risky activities for exposure to ticks.

Drawing on this evidence, the team co-developed multi-lingual educational materials with local communities, health workers and managers, detailing risks from ticks and tick-bite prevention measures, and distributed these to health centres in the affected regions and online. They also developed and refined web-based tools for decision-makers, to be used in targeting surveillance, vaccination and awareness raising activities.

This work is continuing through the IndiaZooRisk project.

ENVIRONMENT

Environment, energy and carbon reporting

In April 2022, we moved all fully controlled main site electricity supplies to a zero carbon tariff, supplied by 50% REGO / 50% nuclear energy generation in support of our net zero goal. Some of our smaller field sites also moved to use electricity fully supplied by on-site renewables. We replaced much of our IT equipment across UKCEH with newer, more efficient models and we upgraded lighting at our Edinburgh site, installing LED fittings.

The Analytical Chemistry Group at Lancaster achieved Silver certification under the Laboratory Efficiency Assessment Framework (LEAF), which includes implementing measures to reduce energy use and improve energy efficiency. This framework will be rolled out to remaining UKCEH labs in 2023.

In July 2022, we undertook a comprehensive data collation and analysis exercise and published our Carbon Reduction Plan, setting out our aims to 2040 and beyond: to reduce UKCEH reliance on fossil fuels and achieve 'Net Zero' Scope 1 and Scope 2 greenhouse gas emissions by 2040 and associated Scope 3 emissions by 2050. Throughout 2022, we also made further improvements to habitats on our office sites to encourage and support biodiversity, including the refurbishment of our on-site pond at Wallingford and embedding requirements for 'no mow' areas within our grounds maintenance contracts.

In 2022, largely due to the continuing resumption of on-site working and fleet travel requirements after Covid restrictions were lifted, total energy usage increased compared to 2021. However, on the basis of energy usage per member of staff a reduction was achieved. Greenhouse gas emissions decreased, largely due to the move of main sites electricity to a zero carbon regime.

Table 1: Summary energy use and associated greenhouse gas emissions for UKCEH 2021 and 2022.

Overall UKCEH energy use and associated GHG emissions	1 January 2022 - 31 December 2022	1 January 2021 - 31 December 2021
UK energy use ¹ (kWh)	8,190,394	8,100,806 ^{1a}
Associated GHG emissions ² (tonnes CO ₂ e)	1644.25 (2036.79)	1769.61 (2051.27)
Intensity ratio energy use (kWh) per £1k turnover ³	160.50	155.38
Intensity ratio emissions (tonnes CO ₂ e) per £1k turnover ³	0.03 (0.04)	0.03 (0.04)
Intensity ratio energy use (kWh) per m ² floor area ⁴ (24147)	339.19	335.48
Intensity ratio emissions (tonnes CO ₂ e) per m ² floor area ⁴ (24147)	0.07 (0.08)	0.07 (0.08)
Intensity ratio energy use (kWh) per average staff number ⁵ (537)	14048.70 (583 FTE)	14465.73 (560 FTE)
Intensity ratio emissions (tonnes CO ₂ e) per average staff number (based on respective year FTE values) ⁵	2.82 (3.49)	3.16 (3.66)

Table 2: Detail of supporting data which contributes to overall figures presented in Table 1 (left).

Breakdown data contributing to Table 1 figures	1 January 2022 - 31 December 2022	1 January 2021 - 31 December 2021
UK gas use ¹ (kWh)	4,230,889	4,140,611
UK electricity use ¹ (kWh)	3,574,841	3,601,504
UK energy use associated with transport (kWh) ²	381,983	357,072
Scope 1 GHG energy emissions ⁶ (tonnes CO ₂ e)	862.54	849.89
Scope 2 GHG energy emissions ⁷ (tonnes CO ₂ e)	283.07 (675.61)	471.81 (753.47)
Scope 3 T+D emissions ⁸ (tonnes CO ₂ e)	413.61	447.91

Methodology and limitations

- UK energy use includes electricity and gas use across UKCEH sites along with mains supplied electricity use on our UK field sites. In addition, energy use includes conversion of km travelled and fuel purchased for fleet vehicles, hire cars and personal vehicles. Solar generation exported to the grid is excluded. Where fuel purchase costs are known but not fuel quantities, the litres have been estimated from UK Government average fuel costs data.
 - Total energy use for 2021 has been amended to reflect a duplication error accounting for non-fleet fuel purchased.
- Figures in brackets are calculated using mains grid conversion factors for all supplies to give best practice comparative purposes. Greenhouse gas emissions associated with 2022 energy use and personal km travelled have been calculated using UK Government 2022 Conversion Factors. Transport emissions relating to fleet vehicles are calculated from km travelled and individual vehicle emission intensity ratios. These have been uplifted in line with UK government environmental reporting guidance.
- The intensity ratio for "Project Income" has been recalculated for 2021 and 2022 to ensure consistent methodology for exclusion of funding for capital and maintenance improvements.
- The intensity ratio for average staff number has been recalculated for 2021 (560 FTE) and 2022 (583 FTE) to reflect the average month end staff numbers across the year rather than quarter end.
- The intensity ratio per m² of floor area has been recalculated for 2021 and 2022 to reflect an updated survey of site area which now includes a new storage building constructed in 2021.
- Scope 1 emissions include mains supplied gas use, fugitive refrigerant emissions, fleet vehicle km travelled and other fuel purchased.
- Scope 2 emissions have been calculated using emissions factors specified by utility providers. For best practice comparative purposes Scope 2 emissions, calculated using mains grid conversion factors as specified by the UK Government, are included in brackets.
- Scope 3 emissions include hire car and personal km travelled for business purposes along with transmission and distribution emissions relating to mains electricity use. These figures are presented voluntarily.

RISK MANAGEMENT

The Trustee Directors have ultimate responsibility for risk management in the organisation. Our risk strategy outlines the organisation's approach to risk while our risk policy sets out responsibilities for managing these risks.

The Trustees delegate day to day management of risks to the Executive Board who are responsible for identifying, evaluating and monitoring the key risks faced by UKCEH, as well as the controls and actions taken to manage and mitigate these risks. Risk management is further embedded in the organisation through individual risk assessments for scientific projects.

On a quarterly basis, both the Finance and Audit Sub-committee, and the main Trustee Board, review the risk register, with a focus on the principal risks and significant changes in the quarter.

This approach is supported by an organisation-wide audit schedule, approved by the Executive Board, wherein audit findings support a culture of continuous improvement. UKCEH's risk management approach is defined within the Quality Management System, certified to the ISO 9001 standard. There are monthly risk courses available to staff, and in addition a list of mandatory training modules for all staff is informed by our risks, and covers subjects such as cyber security and anti-bribery.

Key risks for the organisation include those related to; reputation management, working overseas and sanctions, a serious health and safety incident, data management, effective business systems, key person reliance, and disruption resulting from an external event. Throughout 2022, the Trustee Board also paid specific attention to risks relating to the high inflationary environment. All of these risks are being actively managed with robust mitigation actions in place.

The current highest ranked risk to the organisation is the risk associated with a cyber-attack, including loss of data and financial loss. In 2022, we continued to invest in our information security capabilities to mitigate this risk.

Cyber security and data protection

UKCEH constantly monitors cyber threats and trends, with a particular focus on risks such as ransomware, which we consider critical. This surveillance informs our approach to controls and mitigations, which include annual cyber insurance, targeted investment, and process improvements such as online backups.

In addition, we regularly monitor and review the effectiveness of our technological defences, reporting and recovery capabilities, and take proactive action to keep our risk exposure to an acceptable level. In 2022, UKCEH maintained its Cyber Essentials

accreditation in line with major changes in the requirements and had no ICO reportable data breaches.

All staff undertake annual mandatory courses in General Data Protection Regulation (GDPR) and cyber security awareness, and we provide ongoing advice and communications on these issues. All project audits and UKCEH risk assessments have a standing item to look at how personal data are managed.



Franck Mpinda in the Wallingford server room

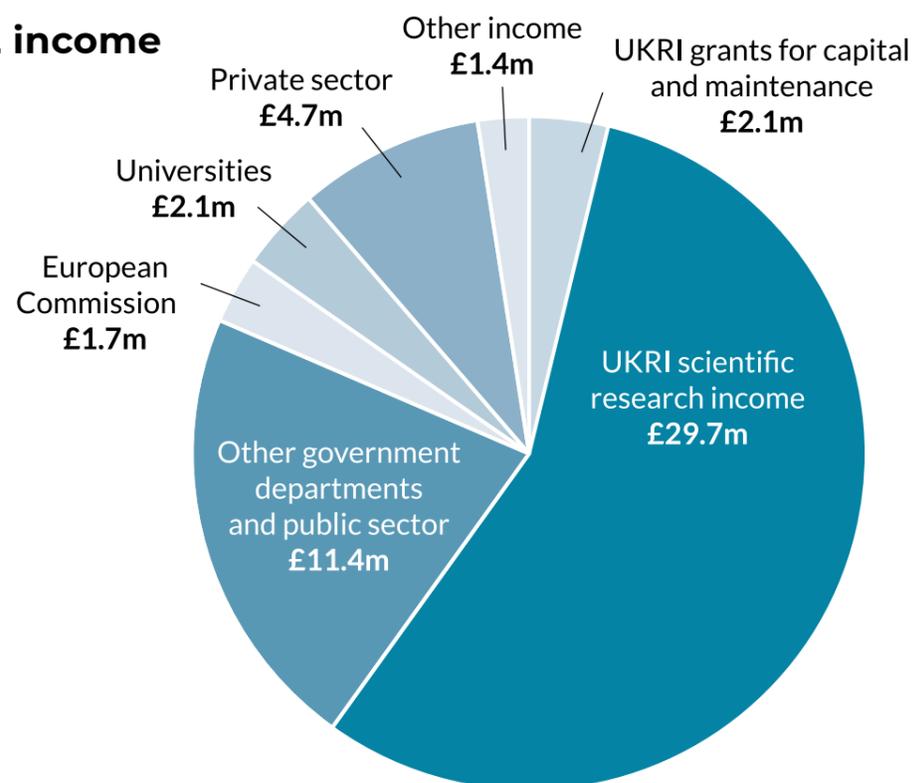
OUR FINANCES

The Statement of Financial Activities on page 63 shows an overall deficit position for the year ended 31 December 2022 of £(0.3)m. This comprises a surplus of £1.5m on operating activity within our non-capital unrestricted and restricted funds, and a deficit of £(1.8)m on capital funds. Our capital funds include capital funding income for new assets, and depreciation on existing assets. Capital funding income fluctuates annually and in years where new capital funding is less than the depreciation charge on the asset portfolio a deficit on these funds will be seen. The net income for the previous year ended 31 December 2021 was £8.4m, which included a surplus of £2.6m on capital funds (including £4.5m of capital income) and a surplus of £5.8m on non-capital funds (including a one-off Covid support funding of £1.5m).

Principal funding sources and income

UKCEH's total income for 2022 was £53.1m. The majority of this income came from UKRI in the form of awards, grants, and agreements for scientific research activities of £29.7m. This is in line with £29.7m in 2021. Grants for capital, maintenance and enabling work of £2m were received from UKRI during the 2022, compared to £4.5m in 2021. Other government departments and the public sector accounted for a further £11.4m of research income compared with £11.2m in 2021. In 2022, £4.7m was received for private sector projects compared to £4.5m in 2021. Income from other trading activities derives principally from UKCEH's trading subsidiary UKCEH Enterprise and from rental income.

2022 income

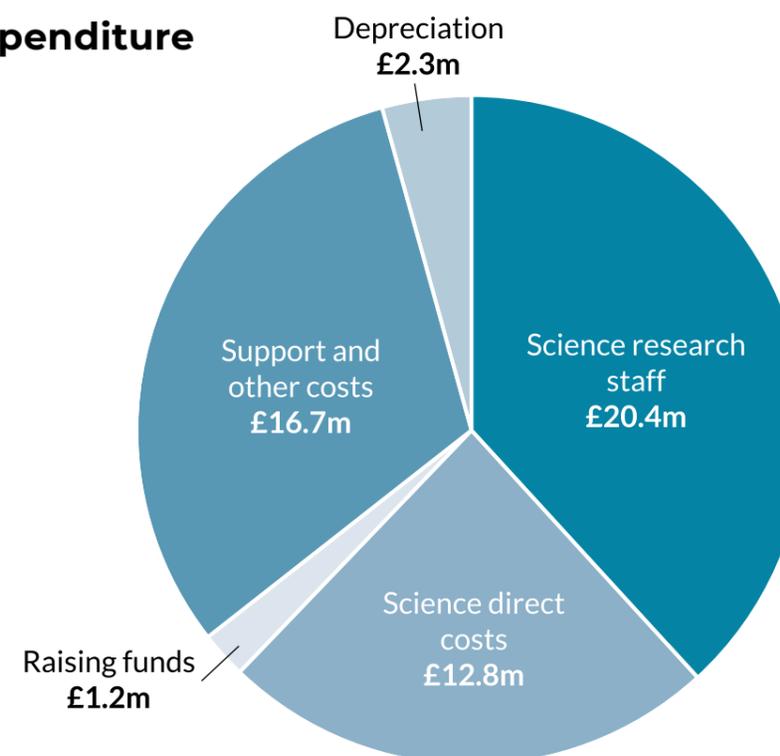


Expenditure

The principal cost to the organisation is the remuneration and related staff costs of the scientific research staff, which accounted for £20.4m in the year, compared to £18.2m in 2021. Science direct costs of £12.8m include the subcontracted costs of our partners, where work is delivered in partnership with other institutions; this was £12.4m in 2021.

Support costs include the pay and related costs of professional service teams as well as the premises, information technology, and administrative costs of running the organisation.

2022 expenditure



Reserves policy

Reserves consist of restricted funds (capital and non capital in nature), unrestricted designated funds, and the remainder, unrestricted funds, which we call "free" or "general" reserves, an amount available for the furtherance of general charitable objectives at the discretion of the Trustees.

UKCEH prices its grant and award-funded research under a methodology that allows it to meet funder requirements, sustainably cover costs, reinvest in capital equipment and infrastructure, and build a reserve. This is supplemented by other income, including that generated by the trading subsidiary, UKCEH Enterprise Limited.

The balance of the unrestricted designated capital fund at 31 December 2022 was £3.8m, which largely results from the transfer of assets from UKRI-NERC on independence and internal investment in capital. It will be used for future capital expenditure.

The restricted capital fund had a balance of £7.3m at 31 December 2022, and this represents funding the organisation has received where the use is capital in nature and has been specified by the funder.

The restricted fund had a balance of £nil at 31 December 2022. This fund comprises funding and costs in respect of specific research projects. For some scientifically important projects, closely tied to our charitable goals, the funding does not fully cover the costs of delivering the project. For those projects, we transfer unrestricted funds to restricted funds to enable UKCEH participation. This is done in total, annually, hence resulting in a £nil fund balance at the year end.

On independence from UKRI-NERC in 2019, UKCEH had an initial reserve of £2m. On independence, our reserves policy set a reserve target of £5m general reserves to cover operational risk. The general reserve is the unrestricted fund balance of £8.4m. The unrestricted income includes institutional funding, an amount awarded by UKRI-NERC annually that both enables scientific development and advancement, and alignment with existing activity, including supporting those scientifically important but deficit-making projects described above. The trustees will review the reserves policy and target in 2023 to reflect the latest risk profile for the organisation, and determine how to reinvest any reserves above the target level.

Our approach to investments and cash management

No financial investments were made in 2021 and 2022. The cash balance for the organisation includes a significant portion of grants and awards received in advance of spend, and hence needs to be readily available. We utilise a 95-day notice bank account to maximise interest earned, whilst ensuring that sufficient cash is available to meet day to day operational commitments.

Fundraising

The organisation did not carry out fundraising activities with the general public and no donations were sought from the public during this accounting period. The charity had no fundraising activities requiring disclosure under S162A of the Charities Act 2011.

Going concern

The Trustees of UKCEH consider the organisation to be a successful going concern. UKCEH was established on the 1 December 2019 as a not-for-profit research organisation, a company limited by guarantee with charitable status. Across its first three years of trading the organisation had a positive net income in aggregate, and has exceeded its initial general reserve target of £5m.

The Board of Trustees reviewed and approved the 2023 UKCEH plan in December 2022. This plan showed a small surplus for 2023 and we have a high degree of confidence in

income levels. UKCEH continues to be very successful in bidding for funding and by April 2023 had secured in excess of 100% of its planned income for 2023.

Demand for our environmental science expertise is high and is expected to remain so for the foreseeable future. We are actively managing the impact of inflation on our cost base and believe that there are no known measurable material uncertainties that could call into doubt the ability of UKCEH to continue as a going concern.



Dr Katrina Sharps and Dr Felicity Hayes recording data at the Climate Change Exposure Facility (Aber Solardomes)

OUR FUTURE PLANS

Three years after becoming independent from UKRI, we have demonstrated success in attracting funding, developing our staff and infrastructure, and delivering science with impact. Next year will see continued focus on all of these areas:

- We will continue to deliver against the three global science challenges as set out in our five-year *Strategy 2025: Research and Innovation*: creating and enhancing sustainable ecosystems; reducing and preventing pollution; and mitigating and building resilience to climate and environmental change. The climate emergency and biodiversity crisis reinforce the need for scientific evidence to both understand impacts and to inform the actions to address them.
- Many countries, including the UK, have set ambitious targets for reaching net zero. We will grow our science activity in this area to ensure that approaches to reducing carbon and other emissions are supported by evidence and do not have unforeseen environmental consequences. We will continue to work with the emerging green finance sector to ensure that investors can have confidence in measures taken to sequester carbon and improve biodiversity.
- We will invest in our research infrastructure to enable the work of the UK environmental research community through our National Capability activities. This will include: increasing the use of remote sensing as part of our monitoring networks to assess environmental change, making greater use of artificial intelligence and advances in molecular ecology to provide insights into ecosystem function, and improving access via data portals to environmental information and analytical tools. The delivery of the state-of-the-art facility for Multimodal Correlative Microscopy and Spectroscopy, described on page 15, will be the first of its kind in the UK dedicated to environmental applications.
- Many of the environmental and scientific challenges we face are important internationally as well as in the UK. We will grow our presence internationally, in areas including West Africa and Southeast Asia, continue to work closely with international bodies such as UNEP and the World Meteorological Organization, as well as with research partners around the world.
- In 2022, we developed a long-term business plan which set out the income expected from funded science activity, and the resources required to support this. The business plan showed that we can expect to continue to grow as an organisation, with the increasing demand for excellent environmental science, but that we will do this in a controlled manner, ensuring our long-term success and sustainability.
- The benefits of limited fundraising for public engagement with particular research activities were evaluated in 2022, and we plan to pilot new approaches to fundraising to support this in 2023, supported by a formal Donations Acceptance Policy and Procedure.



Eugene Green, Workplace Team,
Wallingford

STATEMENT OF TRUSTEES' RESPONSIBILITIES

The Trustees, who are also directors of the UK Centre for Ecology & Hydrology for the purposes of company law, are responsible for preparing the Trustees' annual report and the financial statements in accordance with applicable law and United Kingdom Accounting Standards (United Kingdom Generally Accepted Accounting Practice).

Company law requires the Trustees to prepare financial statements for each financial year. Under that law, the Trustees must not approve the financial statements unless they are satisfied that they give a true and fair view of the state of affairs of the charitable company and the group and of the incoming resources and application of resources, including the income and expenditure, of the charitable group for that period.

In preparing these financial statements, the Trustees are required to:

- Select suitable accounting policies and then apply them consistently
- Observe the methods and principles in the Charities Statement of Recommended Practice (SORP)
- Make judgments and estimates that are reasonable and prudent
- State whether applicable UK accounting standards have been followed, subject to any material departures disclosed and explained in the financial statements
- State whether FRS 102 "The Financial Reporting Standard applicable in the UK and Republic of Ireland" has been followed, subject to any material departures disclosed and explained in the financial statements
- Prepare the financial statements on the going concern basis unless it is inappropriate to presume that the charitable company will continue in business.

The Board of Trustees is responsible for keeping adequate accounting records that are sufficient to show and explain the charitable company's transactions, disclose (with reasonable accuracy) at any time the financial position of the charitable company and enable them to ensure that the financial statements comply with the Companies Act 2006, the Charities and Trustee Investment (Scotland) Act 55 Contents 2005, the Charities Accounts (Scotland) Regulations 2006 (as amended) and the provisions of the charity's constitution. They are also responsible for safeguarding the assets of the charity and the group and for taking reasonable steps for the prevention and detection of fraud and other irregularities.

Insofar as each of the Trustees is aware:

- There is no relevant audit information of which the charitable company's auditor is unaware
- The Trustees have taken all steps that they ought to have taken as Trustees to make themselves aware of any relevant audit information and to establish that the auditor is aware of that information.

The Trustees are responsible for the maintenance and integrity of the corporate and financial information included on the company's website. Legislation in the United Kingdom governing the preparation and dissemination of financial statements may differ from legislation in other jurisdictions.

Approved by the Board of Trustees of the UK Centre for Ecology & Hydrology on
28 June 2023

including in their capacity as company directors, the strategic report contained therein, and signed on its behalf by:



Ewen Cameron, Lord Cameron of Dillington
Chair

INDEPENDENT AUDITOR'S REPORT TO THE TRUSTEES OF THE UK CENTRE FOR ECOLOGY & HYDROLOGY

Opinion

We have audited the financial statements of the UK Centre for Ecology & Hydrology ('the charity') and its subsidiaries ('the group') for the year ended 31 December 2022, which comprise Consolidated Statement of Financial Activities, Consolidated Balance Sheet, Consolidated Statement of Cash Flows, Charity Statement of Cash Flows and notes to the financial statements, including significant accounting policies. The financial reporting framework that has been applied in their preparation is applicable by law and United Kingdom Accounting Standards, including Financial Reporting Standard 102 The Financial Reporting Standard applicable in the UK and Republic of Ireland (United Kingdom Generally Accepted Accounting Practice).

In our opinion the financial statements:

- give a true and fair view of the state of the group's and the parent charity's affairs as at 31 December 2022 and of the group's income and expenditure, for the year then ended;
- have been properly prepared in accordance with United Kingdom Generally Accepted Accounting Practice; and
- have been prepared in accordance with the requirements of the Charities Act 2011 and Regulations 6 and 8 of the Charities Accounts (Scotland) Regulations 2006 (amended).

Basis for opinion

We conducted our audit in accordance with International Standards on Auditing (UK) (ISAs (UK)) and applicable law. Our responsibilities under those standards are further described in the Auditor's responsibilities for the audit of the financial statements section of our report. We are independent of the group in accordance with the ethical requirements that are relevant to our audit of the financial statements in the UK, including the FRC's Ethical Standard, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Conclusions relating to going concern

In auditing the financial statements, we have concluded that the Trustees' use of the going concern basis of accounting in the preparation of the financial statements is appropriate.

Based on the work we have performed, we have not identified any material uncertainties relating to events or conditions that, individually or collectively, may cast significant doubt on the charity's or the group's ability to continue as a going concern for a period of at least twelve months from when the financial statements are authorised for issue.

Our responsibilities and the responsibilities of the Trustees with respect to going concern are described in the relevant sections of this report.

Other information

The Trustees are responsible for the other information contained within the annual report. The other information comprises the information included in the annual report, other than the financial statements and our auditor's report thereon. Our opinion on the financial statements does not cover the other information and, except to the extent otherwise explicitly stated in our report, we do not express any form of assurance conclusion thereon.

Our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit or otherwise appears to be materially misstated. If we identify such material inconsistencies or apparent material misstatements, we are required to determine whether this gives rise to a material misstatement in the financial statements themselves. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact.

We have nothing to report in this regard.

Matters on which we are required to report by exception

We have nothing to report in respect of the following matters in relation to which the Charities (Accounts and Reports) Regulations 2008 and the Charities Accounts (Scotland) Regulations 2006 requires us to report to you if, in our opinion:

- the information given in the financial statements is inconsistent in any material respect with the Trustees' report; or
- sufficient and proper accounting records have not been kept by the parent charity; or
- the financial statements are not in agreement with the accounting records and returns; or
- we have not received all the information and explanations we require for our audit.

Responsibilities of Trustees

As explained more fully in the Trustees' responsibilities statement set out on page 56, the Trustees are responsible for the preparation of the financial statements and for being satisfied that they give a true and fair view, and for such internal control as the Trustees determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Trustees are responsible for assessing the group and the parent charity's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the Trustees either intend to liquidate the charity or to cease operations, or have no realistic alternative but to do so.

Auditor's responsibilities for the audit of the financial statements

We have been appointed as auditor under section 151 of the Charities Act 2011, and section 44(1)(c) of the Charities and Trustee Investment (Scotland) Act 2005 and report in accordance with the Acts and relevant regulations made or having effect thereunder.

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs (UK) will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

Details of the extent to which the audit was considered capable of detecting irregularities, including fraud and non-compliance with laws and regulations are set out below.

A further description of our responsibilities for the audit of the financial statements is located on the Financial Reporting Council's website at: www.frc.org.uk/auditorsresponsibilities. This description forms part of our auditor's report.

Extent to which the audit was considered capable of detecting irregularities, including fraud

Irregularities, including fraud, are instances of non-compliance with laws and regulations. We identified and assessed the risks of material misstatement of the financial statements from irregularities, whether due to fraud or error, and discussed these between our audit team members including internal specialists. We then designed and performed audit procedures responsive to those risks, including obtaining audit evidence sufficient and appropriate to provide a basis for our opinion.

We obtained an understanding of the legal and regulatory frameworks within which the charity and group operates, focusing on those laws and regulations that have a direct effect on the determination of material amounts and disclosures in the financial statements. The laws and regulations we considered in this context were the Charities Act 2011 together with the Charities SORP (FRS 102) and the Charities Accounts (Scotland) Regulations 2006. We assessed the required compliance with these laws and regulations as part of our audit procedures on the related financial statement items.

In addition, we considered provisions of other laws and regulations that do not have a direct effect on the financial statements but compliance with which might be fundamental to the charity's and the group's ability to operate or to avoid a material penalty. We also considered the opportunities and incentives that may exist within the charity and the group for fraud.

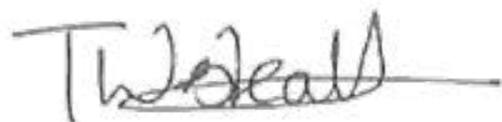
Auditing standards limit the required audit procedures to identify non-compliance with these laws and regulations to enquiry of the Trustees and other management and inspection of regulatory and legal correspondence, if any.

We identified the greatest risk of material impact on the financial statements from irregularities, including fraud, to be within income recognition (specifically grant and contract income recognised on a judgemental basis), going concern and the override of controls by management. Our audit procedures to respond to these risks included enquiries of management and the Finance and Audit Sub-committee about their own identification and assessment of the risks of irregularities, designing and performing audit procedures over income, sample testing on the posting of journals, reviewing accounting estimates for biases, reviewing regulatory correspondence with the Charity Commission, and reading minutes of meetings of those charged with governance.

Owing to the inherent limitations of an audit, there is an unavoidable risk that we may not have detected some material misstatements in the financial statements, even though we have properly planned and performed our audit in accordance with auditing standards. For example, the further removed non-compliance with laws and regulations (irregularities) is from the events and transactions reflected in the financial statements, the less likely the inherently limited procedures required by auditing standards would identify it. In addition, as with any audit, there remained a higher risk of non-detection of irregularities, as these may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal controls. We are not responsible for preventing non-compliance and cannot be expected to detect non-compliance with all laws and regulations.

Use of our report

This report is made solely to the charity's Trustees, as a body, in accordance with Part 4 of the Charities (Accounts and Reports) Regulations 2008 and Regulation 10 of the Charities Accounts (Scotland) Regulations 2006. Our audit work has been undertaken so that we might state to the charity's Trustees those matters we are required to state to them in an auditor's report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the charity and the charity's Trustees as a body, for our audit work, for this report, or for the opinions we have formed.



Tara Westcott
Senior Statutory Auditor
For and on behalf of Crowe U.K. LLP
Statutory auditor
Cheltenham

29 June 2023

Crowe U.K. LLP is eligible for appointment as auditor of the charity by virtue of its eligibility for appointment as auditor of a company under section 1212 of the Companies Act 2006.

Crowe U.K. LLP is eligible for appointment as auditor of the charity under regulation 10(2) of the Charities Accounts (Scotland) Regulations by virtue of its eligibility under section 1212 of the Companies Act 2006.

FINANCIAL STATEMENTS

Consolidated statement of financial activities for the year ending 31 December 2022

Incorporating an income and expenditure account

		Unrestricted funds	Restricted funds	Unrestricted designated capital funds	Restricted capital funds	Total 2022	Total 2021
	Note	£000	£000	£000	£000	£000	£000
Income from charitable activities							
Scientific research		5,131	43,745	-	-	48,876	47,171
Capital and maintenance grants		-	1,566	-	478	2,044	4,539
Education and training		390	279	-	-	669	1,567
Income from other trading activities							
Trading income		982	-	-	-	982	985
Other income		352	-	-	-	352	2,410
Income from Investments							
		150	-	-	-	150	2
Total Income	2	7,005	45,590	-	478	53,073	56,674
Expenditure							
Charitable activities		2,946	30,210	1,140	1,186	35,482	32,557
Raising funds		-	1,167	-	-	1,167	1,156
Other		964	15,747	-	-	16,711	14,574
Total Expenditure	3	3,910	47,124	1,140	1,186	53,360	48,287
Net income for period before transfers							
		3,095	(1,534)	(1,140)	(708)	(287)	8,387
Transfer between funds		(4,264)	2,467	1,025	772	-	-
Net movement in funds in period		(1,169)	933	(115)	64	(287)	8,387
Fund balances at beginning of period		9,584	(933)	3,873	7,217	19,741	11,354
Fund balances at 31 Dec 2022	14	8,415	-	3,758	7,281	19,454	19,741

All income and expenditure derives from continuing activities.

Results of the charitable company for the year were total income £52,662k and deficit £287k.

Consolidated balance sheet as at 31 December 2022

Company Registration No: 11314957

		2022 Charity	2022 Group	2021 Charity	2021 Group
	Note	£000	£000	£000	£000
Fixed assets					
Tangible assets	7	9,036	9,036	7,560	7,560
Investments	8	50	-	50	-
Total fixed assets		9,086	9,036	7,610	7,560
Current assets					
Debtors	9	9,581	9,437	8,492	8,286
Cash at bank and in hand	10	21,413	21,712	29,818	30,182
Current liabilities					
Creditors falling due in one year	11	20,626	20,731	26,179	26,287
Net current assets		10,368	10,418	12,131	12,181
Net assets		19,454	19,454	19,741	19,741
The funds of the charity					
Unrestricted funds					
Unrestricted funds		8,415	8,415	9,584	9,584
Unrestricted designated capital funds		3,758	3,758	3,873	3,873
Total unrestricted funds		12,173	12,173	13,457	13,457
Restricted funds					
Restricted funds		-	-	(933)	(933)
Restricted capital funds		7,281	7,281	7,217	7,217
Total restricted funds		7,281	7,281	6,284	6,284
Total charity funds	14	19,454	19,454	19,741	19,741

The financial statements on pages 63-83 were approved by the Board and authorised for issue on 28 June 2023 and signed on its behalf by:



Ewen Cameron
Lord Cameron of Dillington, Chair

Consolidated cash flow statement for the year to 31 December 2022

	2022 Charity	2022 Group	2021 Charity	2021 Group
	£000	£000	£000	£000
Cash flows from operating activities				
Net income and net movement in funds for the year	(287)	(287)	8,387	8,387
Interest receivable	(150)	(150)	(2)	(2)
Interest payable	-	-	4	4
Depreciation	2,326	2,326	1,930	1,930
Capital grants receivable	(478)	(478)	(4,539)	(4,539)
Increase / (decrease) in debtors	(1,089)	(1,151)	592	447
Increase / (decrease) in creditors	(5,553)	(5,556)	6,586	6,616
Net cash provided by operating activities	(5,231)	(5,296)	12,958	12,843
Cash flows from investing activities				
Interest received	150	150	2	2
Purchase of tangible assets	(3,802)	(3,802)	(3,893)	(3,893)
Capital grants received	478	478	4,539	4,539
Net cash provided by investing activities	(3,174)	(3,174)	648	648
Cash flows from financing activities				
Interest payable	-	-	(4)	(4)
Net cash used in financing activities	-	-	(4)	(4)
Change in cash and cash equivalents in the reporting period	(8,405)	(8,470)	13,602	13,487
Cash and cash equivalents at the beginning of the period	29,818	30,182	16,216	16,695
Total cash and cash equivalents at the end of the year	21,413	21,712	29,818	30,182

Notes to the consolidated financial statements

1. Accounting Policies

a. Basis of preparation

UK Centre for Ecology and Hydrology (UKCEH) (“the Charity”) is a private company limited by guarantee, domiciled and incorporated in England and Wales on 17th April 2018. The Company is registered as a charity in England and Wales and Scotland. The registered trading address and company and charity numbers are on page 86. The Charity began trading on 1st December 2019. The charity is a public benefit entity as defined by FRS102 and part of a public benefit group. Monetary amounts in these financial statements are rounded to the nearest whole £1,000, except where otherwise indicated. Sterling is the Group’s functional and presentational currency.

The group accounts have been prepared under the historical cost convention with items recognised at cost or transaction value unless otherwise stated in the relevant note/s to those accounts. The accounts have been prepared in accordance with the accounting and reporting by Charities Statement of Recommended Practice applicable to charities preparing their accounts in accordance with the Financial Reporting Standard applicable in the UK and Republic of Ireland (FRS102).

The principal accounting policies adopted in these financial statements, which have been consistently applied, are as follows:

b. Basis of consolidation

The consolidated financial statements incorporate the financial statements of UKCEH and its subsidiary undertaking in accordance with Financial Reporting Standard (“FRS”) 102 “Accounting for Subsidiary Undertakings”. The results of the subsidiary are consolidated on a line by line basis. The financial statements of all group undertakings and associates are made up to 31 December 2022. A separate income and expenditure account has not been presented for UKCEH as this is exempted by Section 408 of the Companies Act 2006.

UKCEH has one wholly owned subsidiary undertaking, UK Centre for Ecology & Hydrology Enterprise Limited (Company registration number: 12251749). The principal activity of the subsidiary is management of intellectual property. The registered office of the subsidiary is Maclean Building, Crowmarsh Gifford, Wallingford, Oxfordshire, OX10 8BB.

c. Going concern

The Trustees have reviewed whether it is still appropriate for the financial statements to be prepared on a going concern basis. A key assumption when assessing the going concern is the agreements in place with key funders. UKCEH receive a significant majority of funding from UKRI-NERC through long term research agreements.

The Group undertake a detailed annual Business Planning and budgeting exercise and forecasts income and expenditure for the following five years, which include the level of secured income. The Trustees have reviewed the going concern status of the Group and the Charity and their assessment based on these forecasts is that the Charity and the Group can continue as a going concern for the foreseeable future and no material uncertainty exists.

d. Income

Grant income is recognised in the statement of financial activities when received or when the charity becomes entitled to receipt. Grants that have been received will be treated as deferred income where there are specific requirements in the terms of the grant that the income recognition is dependent on certain activities being completed in a future accounting period.

Investment income relates to interests receivable from bank accounts. The interest is recognised in the year that it is earned.

Other income includes property rental income, training income, data licensing income and miscellaneous income. Revenue is recognised when the obligation is fulfilled. Capital grants and Institutional Funding are recognised in the consolidated statement of financial activities (“SoFA”) when entitlement passes.

e. Expenditure

Charitable activity expenditure represents the full cost of the research performed. It includes the cost of direct staff, consumable and indirect costs apportioned on the basis of use. Raising funds represents the cost of business development and communications. Governance costs represent the necessary cost of compliance with statutory and constitutional requirements. Support costs have been allocated to charitable activity expenditure, costs of generating funds and governance costs on a basis consistent with the use of resources.

f. Restricted funds

Where research at UKCEH is funded by grants with conditions attached to them, these are shown as restricted. Capital grants received and receivable together with other restricted funds received and receivable and used to purchase tangible assets are included within restricted funds. A restricted capital reserve has been established representing the net book value of fixed assets purchased from capital grants and the remaining committed but unspent capital funding.

g. Unrestricted funds

Research grants that do not contain conditions for the final receipt of funds have been treated as unrestricted. Funds received for non-specified purposes have also been included as unrestricted. The designated capital fund within unrestricted reserves represents the funds that have been set aside by the Trustees following transfer of assets from UKRI-NERC on independence and internal investment in capital.

h. Tangible assets and depreciation

Tangible assets are shown at cost or valuation less accumulated depreciation. The cost of tangible assets is their purchase cost, together with any incidental costs of acquisition. Items over £5,000 are capitalised. Depreciation is calculated using the straight line method to write off the cost or valuation of assets, less any estimated residual value, over their estimated useful lives at the following rates:

- Improvements to buildings - 99 years
- Plant and machinery - 8 to 10 years
- Fixtures and fittings - 5 to 10 years
- Major equipment - 8 years
- Motor vehicles - 5 years
- IT equipment - 3 years

Assets under the course of construction are included at cost, and will be depreciated to their estimated residual values over their expected useful lives on a straight-line basis once the asset is available for use. An assessment is made at each reporting date of whether there are any indications that a fixed asset may be impaired or that an impairment loss previously recognised has fully or partially reversed.

i. Debtors

Debtors are non-interest bearing and are stated at their nominal value, as reduced by appropriate allowances for estimated irrecoverable amounts.

j. Trade creditors

Trade creditors are non-interest bearing and are stated at their nominal value.

k. Staff and pensions

UKCEH staff that joined before 1 December 2019 were employed by UKRI-NERC up to 1 December 2019, when they transferred employment to the Institute under TUPE. Transferred employees retain their membership of the Research Councils Pension Scheme (RCPS), where applicable, with UKCEH becoming an admitted employer in the scheme. The RCPS is a defined benefit scheme funded from annual grant-in-aid on a pay-as-you-go basis. The RCPS Pension Scheme is a multi-employer scheme and UKCEH is unable to identify its share of the underlying assets and liabilities. UKCEH therefore accounts for the scheme as if it were a wholly defined contribution scheme. As a result, the amount charged to the income and expenditure account represents the contributions payable to the scheme in respect of the accounting period. Liabilities for the payment of future benefits are the responsibility of the RCPS and accordingly are not included in these Financial Statements. UKCEH has recruited all new staff from December 2019 on its own terms and conditions, covering basic pay and allowances, contractual payments, tax, NI, and liabilities for pension contributions and redundancy. Such staff are eligible to join a defined contribution scheme.

l. Operating leases

Rental costs are charged to the statement of financial activities on a straight line basis over the life of the lease.

m. Foreign currency transactions

The functional and reporting currency is pounds sterling. Transactions in foreign currencies are recorded at the rate of exchange ruling at the date of the transaction. Assets and liabilities denominated in foreign currencies are translated at year end exchange rates. All gains and losses are taken to the statement of financial activities in the year to which they relate.

n. Judgements in applying accounting policies and key sources of estimation

Preparation of the financial statements require management to make significant judgements and estimates. The items in the financial statements where these judgements and estimates have been made include:

- Depreciation, which has been charged in line with the accounting policy above. The amount of depreciation charged and net book value of the assets is included in Note 7.
- Grant income is estimated based on future payment profiles and expenditure incurred to date.

o. Donated goods, services and facilities

These are included at the value to the charity where this can be quantified. In accordance with the Charities SORP (FRS 102), no amounts are included in the financial statements for services donated by volunteers.

2. Analysis of incoming resources

	Research activities	Education and training activities	Other activities	2022 Total	2021 Total
	£000	£000	£000	£000	£000
Income from charitable activities					
Grant and contract income					
UKRI	29,212	508	-	29,720	29,730
Other government departments and public sector	11,382	15	-	11,397	11,210
European Commission	1,656	-	-	1,656	1,424
Universities	1,977	146	-	2,123	1,904
Charities	798	-	-	798	614
Private sector	3,851	-	-	3,851	3,856
Total grant income	48,876	669	-	49,545	48,738
Capital and maintenance grants					
UKRI					
Repairs and maintenance	1,566	-	-	1,566	-
Capital expenditure	478	-	-	478	4,539
Total capital grants	2,044	-	-	2,044	4,539
Total income from charitable activities	50,920	669	-	51,589	53,277
Income from other trading activities					
Trading income	-	-	982	982	985
Rental income	-	-	155	155	202
Training income	-	134	-	134	126
Other income	-	-	63	63	2,082
Total income from other trading activities	-	134	1,200	1,334	3,395
Income from investments	-	-	150	150	2
Total income	50,920	803	1,350	53,073	56,674

3. Analysis of expenditure

Analysis of resources expended

	Research activities	Education and training activities	Other activities	2022 Total	2021 Total
	£000	£000	£000	£000	£000
Direct charitable expenditure:					
Science staff cost	19,861	544	-	20,405	18,233
Science direct costs	12,648	103	-	12,751	12,394
Depreciation	2,326	-	-	2,326	1,930
Expenditure on charitable activities	34,835	647	-	35,482	32,557
Governance costs	-	-	77	77	57
Support costs	16,022	201	-	16,223	14,115
Raising funds	-	-	1,167	1,167	1,156
Trading expenditure	-	-	411	411	402
Expenditure on other activities	16,022	201	1,655	17,878	15,730
Total expenditure	50,857	848	1,655	53,360	48,287

Allocation of support costs, governance and raising funds

	Research activities	Education and training activities	Raising funds	Governance costs	2022 Total	2021 Total	Basis of allocation
	£000	£000	£000	£000	£000	£000 Restated	
Senior management and other central costs	848	11	-	77	936	1,346	Chargeable hours
Facilities (including rent and maintenance)	6,326	80	-	-	6,406	5,001	Chargeable hours
Business development and engagement	-	-	1,167	-	1,167	1,157	Activity
Finance, procurement and project support	2,005	25	-	-	2,030	2,056	Chargeable hours
IT	4,109	51	-	-	4,160	3,203	Chargeable hours
People & skills	1,458	18	-	-	1,476	1,167	Chargeable hours
Research contracts, licensing and info services	1,050	13	-	-	1,063	1,159	Chargeable hours
Science support	226	3	-	-	229	239	Chargeable hours
Total support costs	16,022	201	1,167	77	17,467	15,328	

We have reviewed cost allocations in 2022 and restated 2021 for consistency.

Analysis of governance costs

	2022	2021
	£000	£000
Audit of the financial statements	35	15
Other assurance services	17	16
Trustees remuneration and expenses	25	26
	77	57

4. Employee information

The monthly average number of persons employed by the group and charitable company during the year, analysed by category, was as follows:

Group and Charitable Company	2022	2021
	Number	Number
Science	428	402
Infrastructure	155	158
Total	583	560

The aggregate payroll costs of these persons were:

Group and Charitable Company	2022	2021
	£000	£000
Wages and salaries	21,356	19,369
Social Security costs	2,261	1,949
Pension costs	4,215	4,259
Total	27,832	25,577

An analysis of the number of staff who fall within staff cost bands (excluding pension cost) from £60,000 upwards is provided below:

Group and Charitable Company	2022	2021
£60,000 - £69,999	14	8
£70,000 - £79,999	10	8
£80,000 - £89,999	1	1
£90,000 - £99,999	2	0
£100,000 - £109,999	0	1
£110,000 - £119,999	2	0
£140,000 - £149,999	0	1
£150,000 - £159,999	1	0
Total	30	19

* The Executive Director's remuneration package includes an additional allowance on top of base salary instead of an employer's pension contribution

Staff that joined prior to 1 December 2019 were employed by UKRI-NERC, when these employees transferred employment to the charity under TUPE.

Transferred employees retain their membership of the Research Councils Pension Scheme, where applicable, with UKCEH becoming an admitted employer in the scheme.

Staff that joined after 1 December 2019 are employed under UK Centre for Ecology & Hydrology terms and conditions.

The key management personnel of the group comprise of the Executive Board and Science Board, as listed on page 35.

The employment costs (salaries, social security costs and pension costs) of the key management personnel for the group and charitable company were £1,695,917 (2021: £1,312,731).

Redundancy and early termination payments in the year totalled £103,550 (2021: £99,418).

5. Remuneration of Trustees

	2022	2021
	£000	£000
Salary	13	12
Expenses	10	8
Total	23	20

Lord Cameron of Dillington received remuneration of £13,004 (2021: £12,438), covering work completed as Chair of the Board of Trustees. The remuneration was agreed and provided under a provision in the governing document of the Charity. Remuneration was provided due to the Trustee's role as the Chair of the Trustees, which requires a range of knowledge and experience and has a remit in terms of the role that the Trustee is required to provide. The Trustee did not receive any employee benefits or pension contribution.

The Executive Director, Mark Bailey, is also a Trustee – a role for which he received no remuneration during 2022. The payroll cost for his services as Executive Director (including employer's national insurance contribution) totalled £171,461 (2021: £163,905). No pension contributions were made by the charity for the Executive Director.

UK Centre for Ecology & Hydrology articles of association provide legal authority for this payment to be made.

The total reimbursement of travelling and subsistence expenses incurred by 8 trustees amounted to £10,117 (2021: £7,954).

6. Taxation

UK Centre for Ecology & Hydrology (UKCEH) is an exempt charity within the meaning of the Charities Act 2011 and as such is a charity within the meaning of section 506(1) of the Income and Corporation Taxes Act 1988 and is not subject to corporation tax in respect of its charitable activities.

The trading activities of the subsidiary company are subject to corporation tax; however profits in the year are gifted to the charitable company resulting in a £nil tax charge payable.

7. Tangible assets

Group and charitable company	Improvements to buildings	Plant equipment	Fixture & fittings	IT equipment	Transport	Assets under construction	Total
Cost							
As at 1 January 2022	767	8,242	255	2,370	187	172	11,993
Addition	-	1,867	-	1,271	-	664	3,802
Disposal	-	-	-	(4)	-	-	(4)
Transfer	-	172	-	-	-	(172)	-
As at 31 December 2022	767	10,281	255	3,637	187	664	15,791
Depreciation							
As at 1 January 2022	(36)	(2,961)	(101)	(1,172)	(163)	-	(4,433)
Charged in the period	(7)	(1,448)	(47)	(803)	(21)	-	(2,326)
Disposal	-	-	-	4	-	-	4
As at 31 December 2022	(43)	(4,409)	(148)	(1,971)	(184)	-	(6,755)
Net book value							
As at 31 December 2022	724	5,872	107	1,666	3	664	9,036
As at 1 January 2022	731	5,281	154	1,198	24	172	7,560

On 1 December 2019 all moveable assets, being plant, equipment (including IT equipment), vehicles and fixtures and fittings, were transferred to the charity by way of a capital grant from UKRI totalling £6,442k.

8. Investments

The Charitable Company has an interest in the following operating subsidiary:

Subsidiary undertaking	Registration number	Country of registration	Principal activity	Class and percentage of share held
UK Centre for Ecology & Hydrology Enterprise Limited	12251749	England	Management of intellectual property	100%

Investments - Charitable Company

The movement in the value of investments during the year was as follows:

	2022	2021
	£000	£000
	Charity	Charity
Valuation		
At 1 January	50	50
Acquisition	-	-
At 31 December	50	50

The registered office of the subsidiary is Maclean Building, Crowmarsh Gifford, Wallingford, Oxfordshire, OX10 8BB.

The results of UK Centre for Ecology & Hydrology Enterprise Limited (company no 12251749) for the year ended 31 December 2022, which are included in the consolidated financial statements, are set out below:

	2022	2021
	£000	£000
Turnover	982	985
Expenditure	(634)	(634)
Profit for the year	348	351
Gift aid distribution	(348)	(351)
	-	-
Net assets at 1 January 2022	50	50
Net assets at 31 December 2022	50	50
Being:		
Current assets	594	644
Current liabilities	544	594
Net assets at 31 December 2022	50	50

UK Centre for Ecology & Hydrology Enterprise Limited's principal activity during the year was commercialisation of UK Centre for Ecology & Hydrology (UKCEH) intellectual property and the delivery of research contracts and commercial services in support of UKCEH's ambition and charitable purpose.

9. Debtors

	2022	2022	2021	2021
	£000	£000	£000	£000
	Charity	Group	Charity	Group
Trade debtors	1,737	1,875	1,570	1,664
Amounts owed from subsidiary undertaking	435	-	487	-
Prepayments and accrued income	7,279	7,432	6,386	6,573
Other debtors	130	130	49	49
Total	9,581	9,437	8,492	8,286

10. Cash and cash equivalents

	2022	2022	2021	2021
	£000	£000	£000	£000
	Charity	Group	Charity	Group
Cash at bank	11,301	11,600	19,818	20,182
Notice deposits	10,112	10,112	10,000	10,000
Total	21,413	21,712	29,818	30,182

11. Creditors

	2022	2022	2021	2021
	£000	£000	£000	£000
	Charity	Group	Charity	Group
Trade creditors	1,043	1,043	1,428	1,429
Accruals and deferred income	18,757	18,863	23,756	23,848
Payroll & expense	600	600	581	581
Taxation (VAT payable)	222	225	414	429
Amounts owed to subsidiary undertakings	4	-	-	-
Total	20,626	20,731	26,179	26,287

12. Deferred income

	2022	2022	2021	2021
	£000	£000	£000	£000
	Charity	Group	Charity	Group
Opening balance at 1 January	20,398	20,398	16,196	16,196
Deferred income released from previous year	(17,147)	(17,147)	(12,324)	(12,324)
Amounts deferred in year	11,132	11,183	16,526	16,526
Carried forward at 31 December	14,383	14,434	20,398	20,398

Deferred income relates to grant income, including research grants, which are received in advance of specific conditions being met. The income is shown as deferred until those conditions are fully satisfied.

13. Capital commitments

	2022	2021
	£000	£000
Group and charitable company		
Contracted capital commitments at the end of the financial year not otherwise included in these accounts	1,376	921

14. Funds

Analysis of net assets between funds - current year

	Unrestricted funds	Restricted funds	Unrestricted designated capital funds	Restricted capital funds	Total 2022
	£000	£000	£000	£000	£000
UKCEH Charity					
Fixed assets	-	-	1,892	7,144	9,036
Current assets	8,520	20,626	1,866	137	31,149
Current liabilities	(105)	(20,626)	-	-	(20,731)
At 31 December 2022	8,415	-	3,758	7,281	19,454

Analysis of net assets between funds - prior period

	Unrestricted funds	Restricted funds	Unrestricted designated capital funds	Restricted capital funds	Total 2021
	£000	£000	£000	£000	£000
UKCEH Charity					
Fixed assets	-	-	2,531	5,029	7,560
Current assets	10,192	24,746	1,342	2,188	38,468
Current liabilities	(608)	(25,679)	-	-	(26,287)
At 31 December 2021	9,584	(933)	3,873	7,217	19,741

Analysis of funds movements - current year

	Unrestricted funds	Restricted funds	Unrestricted designated capital funds	Restricted capital funds	Total 2022
	£000	£000	£000	£000	£000
UKCEH Group					
At 1 January 2022	9,584	(933)	3,873	7,217	19,741
Total income and expenditure for the year	3,095	(1,534)	(1,140)	(708)	(287)
Restricted funds transfers	(3,239)	2,467	-	772	-
Designated capital transfers	(1,025)	-	1,025	-	-
At 31 December 2022	8,415	-	3,758	7,281	19,454

Analysis of funds movements - prior period

	Unrestricted funds	Restricted funds	Unrestricted designated capital funds	Restricted capital funds	Total 2021
	£000	£000	£000	£000	£000
UKCEH Group					
At 1 January 2021	3,345	198	4,679	3,132	11,354
Total income and expenditure for the year	6,909	(1,131)	(1,476)	4,085	8,387
Designated capital transfers	(670)	-	670	-	-
At 31 December 2021	9,584	(933)	3,873	7,217	19,741

Unrestricted funds are available for use at the discretion of the Trustees in furtherance of the general objectives of the Group and which have not been designated for other purposes. Designated funds comprise unrestricted funds that have been set aside by the Trustees following the transfer of assets from UKRI-NERC on independence and internal investment in capital.

Restricted funds are funds which are to be used in accordance with specific restrictions imposed by donors or which have been raised by the Group for particular purposes. The costs of raising and administering such funds are charged against the specific fund. Restricted capital funds are funds

provided from third parties for sole use of purchasing capital items. The expenditure is the subsequent depreciation of these assets. Many projects classified as restricted are not funded at full cost. UKCEH decides to undertake these projects because of their scientific importance and deliberately 'co-fund' them using unrestricted funding. The fund transfer between unrestricted funds and restricted funds represents the allocation of co-funding to support these projects.

15. Pension schemes

UKCEH staff that joined before 1 December 2019 were employed by UKRI-NERC up to 30 November 2019, when they transferred employment to the Institute under TUPE.

Transferred employees retain their membership of the Research Council Pension Scheme (RCPS), which is administered by the Joint Superannuation Services (JSS).

The RCPS Pension Scheme is a multi-employer scheme. UKCEH accounts for the scheme as if it were a wholly defined contribution scheme. As a result, the amount charged to the income and expenditure account represents the contributions payable to the scheme in respect of the accounting period. Liabilities for the payment of future benefits are the responsibility of the RCPS and accordingly are not included in these Financial Statements. The employer contribution rate during the year was 26% (2021: 26%).

UKCEH employees that joined after 30 November 2019 are eligible to join a defined contribution scheme.

The total pension charge for the year was £4,215k (2021: £4,259k).

16. Related party transactions

UK Centre for Ecology & Hydrology has one subsidiary: UK Centre for Ecology & Hydrology Enterprise Limited. This is a wholly owned subsidiary with which the following transactions took place during the year:

	2021	2021
	£000	£000
Paid to UKCEH:		
Management charge to cover licensing staff costs and intellectual property charge	223	231
Science staff cost for research project	308	208
Gift aid donation	348	351
	879	790

At 31 December 2021 UK Centre for Ecology & Hydrology Enterprise Limited owed UKCEH £434,634 (2021: £487,258).

UKRI-NERC

UKCEH is strategically funded, by UKRI-NERC. UKRI-NERC supports UKCEH via strategic funding programmes, competitively won project grants and capital funding for infrastructure and technology investments.

UKCEH is strategically funded by UKRI-NERC. UKRI-NERC funds scientific research and equipment purchases for the Group. Funding for the year was £31,764k as shown in note 2. (2021: £34,269k)

17. Operating lease obligations

	2022	2021
	£000	£000 Restated
Less than 1 year	1,591	1,585
1-5 year	6,309	6,285
More than 5 year	25,409	26,969
	33,309	34,839

These amounts relate to rent on land and buildings.

	2022	2021
	£000	£000
Lease expenditure in the period:		
Hire of equipment	16	20
Rent of land and buildings	1,584	1,584
	1,600	1,604

2022

THE YEAR IN NUMBERS

These numbers indicate the size, scale and excellence of the science we deliver in support of a world where people and nature prosper

1,600+
datasets (6.9 Tb) are now freely available via the Environmental Information Data Centre



2.2 million+
records were received by the Biological Records Centre, including nearly 1.5 million images



We established over **50km** of flower-rich field margins to support pollinators through the ASSIST programme



We won **218** grants and contracts worth more than **£43m**



Our researchers published over **480** peer-reviewed journal papers



We invested over **>£3.5m** in IT and science infrastructure



We used satellite data to map crops in over **1.5m** fields, supporting the reduction of water pollution from agriculture



We analysed **>450** soil samples through the UKCEH Countryside Survey



Data was downloaded from our Flood Estimation Handbook Web Service over **16,000** times by c.800 users



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The UK Centre for Ecology & Hydrology (UKCEH) is a registered Charity in England & Wales (number 1185618) and in Scotland (number SC049849), and a registered Company Limited by Guarantee in England & Wales (number 11314957).

The Centre owns a registered trading subsidiary, the UK Centre for Ecology & Hydrology Enterprise, a Company Limited by Shares (number 12251749), which supports our charitable purpose.

The registered office of the UK Centre for Ecology & Hydrology is at the Maclean Building, Benson Lane, Crowmarsh Gifford, Wallingford, Oxfordshire, OX10 8BB, UK.



INVESTORS IN PEOPLE
We invest in people Silver

