



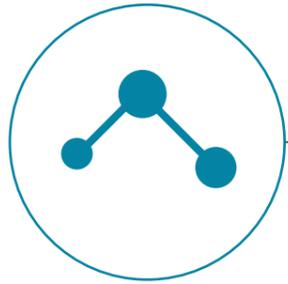
ANNUAL REPORT AND ACCOUNTS 2021



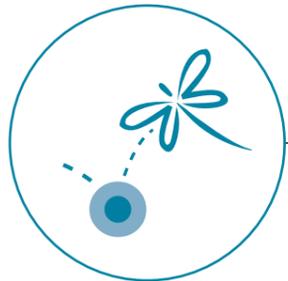
UK Centre for
Ecology & Hydrology

2021 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.



1,400+ datasets (5.6 Tb) are now freely available via the Environmental Information Data Centre



2 million+ records were received by the Biological Records Centre via iRecord, including **1 million+** images



The equivalent of **3,500+** years' worth of data in the National River Flow Archive were reviewed and improved



31 early-career research associates joined UKCEH, giving us **92** research associates in total



Our annual turnover was **>£50 million**



We won **36** international bids across **27** countries



3/4 of our outputs were rated world-leading or internationally excellent



5 UKCEH scientists were named on the Highly Cited Researchers 2021 list



Our scientists jointly supervised **188** doctoral researchers



Our researchers published over **450** peer-reviewed journal papers



The largest survey of pollinator abundance in Wales to date, carried out by UKCEH and Butterfly Conservation Wales, found that woodland and hedgerow creation can play a crucial role in reversing declines in insects that are essential for crop yields and other wildlife.

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

INTRODUCTION FROM THE CHAIR AND THE EXECUTIVE DIRECTOR



**Lord Cameron of Dillington,
Chair**

**Professor Mark J Bailey,
Executive Director**

2021 was an exceptional year for us in many ways. We participated in two key environment summits. At the UN Climate Conference COP26 in Glasgow, we joined forces with other leading climate science institutes to launch the UK National Climate Science Partnership, an alliance that will strengthen the UK's research capability and generate climate solutions for society. Meanwhile our Science Director Professor Alan Jenkins addressed delegates at the UN Biodiversity Conference COP15 in Kunming on the subject of nature-based solutions, stressing that the demand for informed, integrated, international environmental science is greater than ever.

During the year, we were successful in obtaining public funding to strengthen our science infrastructures. Many of our science infrastructures have a combination of characteristics that make them unique in the UK, and they generate some of the longest

and most comprehensive environmental records anywhere in the world. Through the UK Research and Innovation (UKRI) World Class Laboratories programme, we invested in state-of-the-art field monitoring equipment and laboratory facilities, ensuring that both UKCEH scientists and the broader research community are equipped to deliver excellent environmental research for the future.

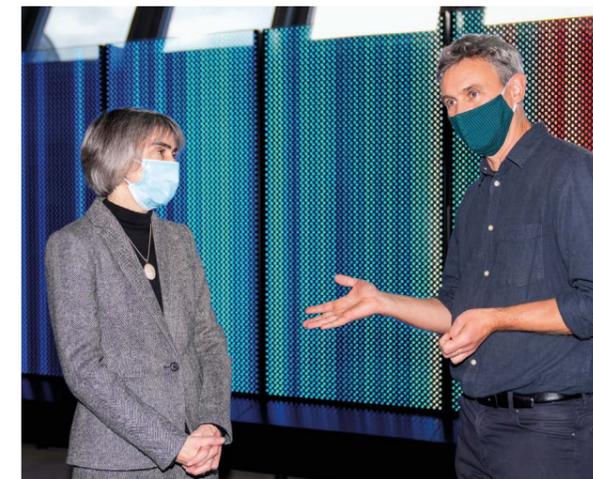
Through our portfolio of programmes supported by National Capability funding from UKRI-NERC, we continued to provide underpinning science to facilitate cutting-edge research into the integrated land, air and water system on which life depends. We have now made over 150 digital assets freely available to the research community through the UK-SCAPE programme, including online catalogues, data portals and maps; and working with the UK hydrological community through the Hydro-JULES programme, we co-designed a new open-source model of the terrestrial water cycle.



We upgraded instrumentation in the BT Tower Atmospheric Observatory for tracking London's emissions.



Presenter Liz Bonnin chaired a debate on 'the right and wrong routes to net zero' at our stakeholder event in Westminster.



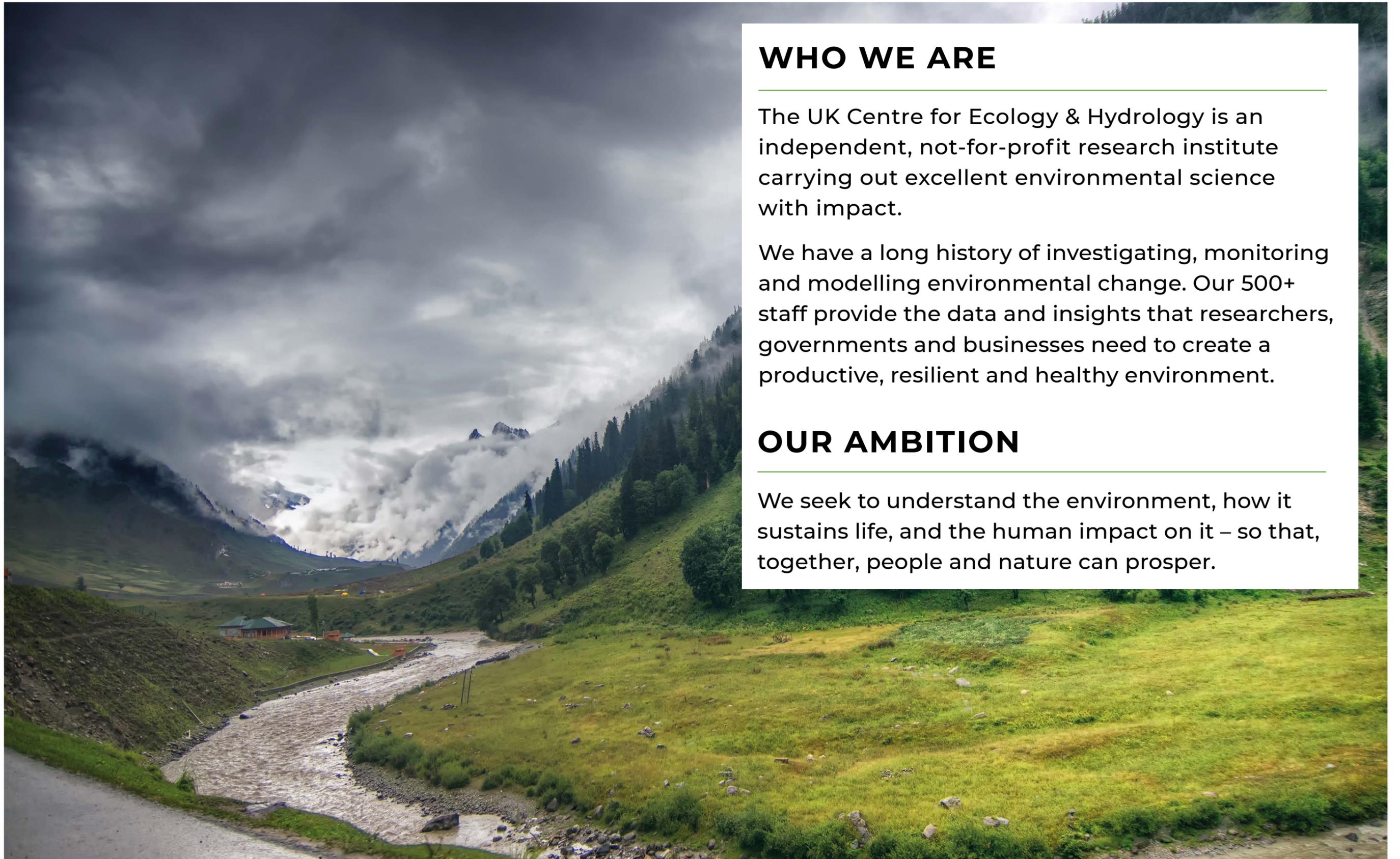
Professor Chris Taylor spoke to Professor Dame Ottoline Leyser at the UN Climate Conference COP26 in Glasgow.

We also saw an increase in other sources of funding during 2021. To meet the growing demand for expert environmental science, in December we launched a recruitment campaign to hire 20 additional scientists. At the same time, we provided increased training for the next generation of environmental scientists, supporting 188 doctoral researchers and 92 research associates over the course of the year.

We would like to thank all our staff, partners and funders for their ongoing flexibility and support during the pandemic. Despite the difficulties this has presented for our fieldwork and our international work, we have continued to deliver the data and insights that enable researchers, businesses and governments in the UK and around the world to solve complex, interrelated environmental, social and economic problems.



Professor Mark J Bailey gave the first international master lecture of the Chinese Academy of Environmental Sciences.



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 have a long history of investigating, monitoring and modelling environmental change. Our 500+ staff provide the data and insights that researchers, governments and businesses need to create a productive, resilient and healthy environment.

OUR AMBITION

We seek to understand the environment, how it sustains life, and the human impact on it – so that, together, people and nature can prosper.

The Hydrological Status and Outlook System (HydroSOS), a global initiative led by the World Meteorological Organization (WMO) and coordinated by UKCEH, will enable communities across the world to better adapt to our changing water cycle.

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 research facilities enable us to test the role of different drivers of environmental change and the outcomes of novel interventions to manage the environment. We provide and operate experimental platforms and research infrastructures supporting national and international collaborations.



Data science and modelling

We have developed models to forecast and predict aspects of the environment at different spatial and temporal scales. They include: models of national and international importance for assessing air quality; GHG emissions inventories; land use and environmental impact modelling; the UK's sole land surface model; nationwide, real-time flood forecasting; and water resource outlooks.

Our charitable objects

- 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.

OUR STRATEGY

In April 2020, we published our *Strategy 2025: Research and Innovation*. Our strategy sets out the role of UKCEH in addressing three major environmental and societal 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:



BIODIVERSITY



FLOOD AND DROUGHT IMPACTS



CHEMICAL RISKS



NET ZERO GREENHOUSE GAS EMISSIONS



CLEAN AIR



SOIL HEALTH



CLIMATE AND LAND



SUSTAINABLE AGRICULTURE



ECOSYSTEM RESTORATION AND RESILIENCE



WATER QUALITY AND RESOURCES



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

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

HIGHLIGHTS



New biodiversity toolkit for housing developers

Urban development is one of the causes of habitat loss, deterioration and fragmentation of natural areas. Responding to this challenge, ecologists at UKCEH launched a biodiversity toolkit to enable housing providers and residents to support wildlife on their estates. The toolkit, developed in conjunction with Southern Housing Group and other partners, provides over 20 options to improve biodiversity on housing estates. These options can be tailored according to housing density, budget and the level of maintenance that is possible.

Latest technology to improve biodiversity alongside thousands of miles of rail track

Our scientists used high-resolution satellite imagery to produce a detailed national map of all the habitats found alongside Britain's 20,000-mile rail network, as part of Network Rail's new action plan for sustainable vegetation management. By combining this information with millions of records of species, they predicted what animals and plants are likely to be present in these lineside habitats including grasslands, heathlands and woodland. This initiative is part of Network Rail's new Biodiversity Action Plan, drawn up in collaboration with UKCEH.

Preventing the spread of the Asian Hornet in Europe



The Asian hornet is a highly aggressive predator and poses a significant threat to honey bees and other pollinators across Europe. We produced an IUCN (International Union for Conservation of Nature) report for the European Commission on the effectiveness of rapid eradication attempts in preventing the spread of the Asian Hornet in Europe. IUCN provides technical and scientific support to the EC for the implementation of the EU Regulation on Invasive Alien Species. The report will inform future approaches to managing this invasive species.

Research into insect populations leads to changes in street lighting

Research into the impact of low-energy LED streetlights found that the lights were more harmful for insect populations than the traditional sodium bulbs they replaced. Almost all previous research on light pollution has focused on adult insects, but by studying moth caterpillars, which are a lot less mobile, researchers were able to get more precise estimates of the impacts of street lighting on local populations. The large diversity of moths means they are broadly representative of nocturnal insects. Widespread media coverage of the study contributed to some councils changing their street lighting.



▶▶ FORWARD LOOK

- UKCEH scientists will join partners in a new project called TickSolve, which will determine whether climate change and woodland expansion are likely to increase tick-borne infections in the UK.
- A multidisciplinary research team, led by UKCEH, will investigate how quickly tree species can adapt to environmental pressures, specifically changing climate, pests and diseases.
- A separate project involving UKCEH will improve our understanding of the value of trees to society, including benefits for people's wellbeing, cultural heritage and wildlife.

Picture credit: Gilles San Martin



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 seek to determine the effects of these pollutants across multiple scales, ranging from genes to populations.

HIGHLIGHTS

Improved methods for assessing the environmental safety of nanomaterials

UKCEH researchers streamlined the testing requirements for assessing the environmental risk posed by nanomaterials. Through EU-funded projects and work with the OECD (Organisation for Economic Co-operation and Development), we delivered several key pieces of science to improve the methodology for assessing the risk of these substances causing harm to the environment. This work will reduce testing requirements significantly, including the need for animal testing.

Bloomin' Algae app helps public and pets enjoy the environment safely

We released a new version of the Bloomin' Algae app, which enables UK and Irish citizens to submit photos of possibly harmful algal blooms, so that the risk from hazardous toxins to people and animals can be gauged. The new version enables users to see records for their area, and provides a quick notification service to local authorities. We worked with regional media to increase public engagement with the app, and targeted dog walkers and wild swimmers who are among those likely to contribute.



Estimating the number and spread of COVID-19 cases from wastewater

Our scientists led the research community in the UK in developing and optimising wastewater-based epidemiology (WBE) in order to improve the four nations' responses to the COVID-19 pandemic. We contributed to an innovative investigation into the feasibility of conducting WBE within specific locations such as primary and secondary schools, prisons and care homes; and we chaired the Home Office's Accelerated Capability Environment Expert Advisory Group, which led the creation and scaling up of WBE capability.

Updated tool for assessing the risk of radiation to wildlife



UKCEH and its predecessor institutes have carried out research in the Chernobyl Exclusion Zone for 30 years.

The ERICA Tool is the most widely used model for evaluating the risk of anthropogenic ionising radiation to wildlife. In 2021, UKCEH released the most significant update to the tool since its launch in 2007. The new version has updated parameters, new functionality, and now applies the International Commission on Radiological Protection's latest approach to dosimetry. We also provided training for regulators, industry and other assessors on how to use the updated tool to estimate risks to selected animals and plants.

▶▶ FORWARD LOOK

- In 2022, we will report to UKWIR (UK Water Industry Research) on micro- and nanoplastic contamination of the whole drinking water system, from treatment works through to service reservoirs and household taps.
- We will develop a model to describe and predict plastic fragmentation and degradation in the environment, applied across a broad range of polymers and environmental conditions.
- We will produce long-term time series data (1750-2100) of nitrogen and metal inputs to soils from atmospheric deposition and agricultural activities in the UK. We will use a range of shared socio-economic pathways to model these into the future.



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

Identifying the sources of Delhi's poor air quality

Delhi continues to rank amongst the most polluted cities for which measurement data exist. In 2021, we co-published seven papers that analyse the sources of air pollutants in the city, the origin of particulate matter, and predict the responses of pollutants to emission changes. The work put regional agricultural residue burning, often blamed for Delhi's poor air quality during the post-monsoon period, in the broader context of urban emissions from vehicles, and the burning of solid fuels and municipal waste. This research was carried out as part of DelhiFlux, a collaborative project led jointly by UKCEH and the Indian Institute of Technology Roorkee.



Informing the development of England's new air quality targets

The UK Government's Department for Environment, Food & Rural Affairs (Defra) is developing new targets for reducing PM_{2.5} (fine particulate matter) for England, which will transcribe the ambitions of the Clean Air Strategy and Environment Bill into secondary legislation. UKCEH supported this process by modelling future PM_{2.5} concentrations that would be expected under a range of emission scenarios, and their response to meteorological year-to-year variability. UKCEH also fed scientific evidence into a number of outputs from Defra's Air Quality Expert group, providing independent advice to government.

Upgrade of the BT Tower Atmospheric Observatory for tracking London's emissions



UKCEH, in collaboration with the Universities of Reading and York, has been measuring London's emissions from a unique installation on top of the BT Tower since 2006. In 2021, NERC's World Class Labs infrastructure investment programme enabled us to upgrade the core measurement on the tower to a new state-of-the-art analyser for carbon monoxide, nitrous oxide, methane and ethane. In addition, we conducted intensive measurements of the fluxes occurring at specific times of year, generating data that will shed light on the quality of emissions inventories and help to identify underestimated sources.

New research shows reducing ammonia emissions to improve air quality is cost-effective

New research published in the journal *Science* showed that action to reduce ammonia emissions would be a cost-effective way to improve air quality and health. The study estimated the global impact of nitrogen air pollution and also the potential economic benefits of implementing measures to reduce emissions. The international research team, which was led by Zhejiang University and included UKCEH scientists, calculated that, on a global scale, every US\$1 spent reducing ammonia emissions would result in preventing US\$4 of health damage, and in the UK this ratio rose to 23:1.

▶▶ FORWARD LOOK

- In 2022, we will build the first UK Community Emission Modelling System funded by the UKRI Strategic Priority Fund on Clean Air, working with the Met Office and research partners.
- We will quantify the impact of emission control measures in agriculture and changes in diets on UK emissions of atmospheric pollutants and benefits for human health.



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 therefore 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

Launch of new UK National Climate Science Partnership at COP26

During the UN Climate Conference COP26 in Glasgow in November, we announced that we were joining forces with the Met Office and other NERC-supported research centres to develop a new national alliance focused on climate solutions for society, called the UK National Climate Science Partnership. The Partnership will support the UK Government in developing solutions to the challenges of mitigating and adapting to climate change, and will work with the public and private sectors to make sure they have access to the climate information they need.

Contribution to IPCC report on climate change impacts

UKCEH scientists contributed to a hard-hitting IPCC report on Climate Change 2021, which showed how climate change caused by human activities is having many unprecedented effects globally, including intense heatwaves and rainfall, Arctic melting and sea level rises. The report presents an impartial summary of what climate data, simulations and theory from across the world currently tell us.

New integrated water cycle model to underpin future hydrological research

We released the first version of the Hydro-JULES modelling framework. Hydro-JULES is a five-year national capability programme to develop an integrated water cycle model, which will underpin future hydrological research in the UK. The model will contribute towards better early warning systems for floods and droughts and ensure reliable water supplies. The first version of the new open-source software platform is now available to the entire hydrological community. We also delivered training and internship programmes to support the use of the new framework.

New research improves early warning of megastorms

New knowledge on how the surface temperatures of the land affect storms was used to co-develop satellite-based tools with African meteorological agencies to help predict where rainfall is likely in the next six hours, helping communities protect themselves from flooding. In 2021, our partners in Senegal used the tools to issue a severe weather warning to two million people by text message.



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Climate and socio-economic scenarios support future projections

UKCEH launched a unique set of climate and socio-economic scenario products in 2021, developed with partners. Drawing on the most recent set of widely applied scenarios for investigating climate change risk and resilience, we developed downscaled and enriched climate and socio-economic datasets and products specifically for the UK. These will be used in 2022 to create consistent projections of land-use change, pollution and biodiversity risk.

▶▶ FORWARD LOOK

- We will develop new attribution tools to improve understanding of the influences of climate and human drivers on the occurrence of extreme wildfire events around the world.
- We will produce new field datasets to establish nutrient fluxes and fates from various land-based sources to the sea to better inform land surface models.



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

Passive rewilding can expand UK woodland rapidly at no cost

A long-term passive rewilding study at Monks Wood in Cambridgeshire showed that natural regeneration could make a significant contribution to meeting the UK’s ambitious woodland expansion targets – potentially at no cost and within relatively short timescales. While natural regeneration is not suitable for all sites, the study shows that incorporating passive rewilding into national planting targets could result in significant cost savings.



Woodland and hedgerow creation will be crucial to support pollinators in Wales

The largest survey of pollinator abundance in Wales to date found that woodland and hedgerow creation can play a crucial role in reversing declines in insects that are essential for crop yields and other wildlife. UKCEH and Butterfly Conservation Wales carried out the survey, in conjunction with the Welsh Government and more than 1,000 landowners across the country. The findings show that carefully managed woodland and hedgerow creation could play a key role in land management incentive schemes, alongside other actions such as restoring wildflower meadows, organic farming and planting mass-flowering crops.

Zoning of Lake Victoria is key to its sustainable use

Lake Victoria, the largest lake in Africa, is an important source of food, energy and income security for local people. To feed growing numbers of people, cage fish farms are being developed on the lake. However, these can cause environmental damage by polluting the water and damaging the breeding grounds of the natural fish population. Working with the Kenya Marine and Fisheries Research Institute, UKCEH developed a map of the Kenyan part of Lake Victoria, which indicates the levels of suitability of different areas for developing cage fish farms. Fish farmers can access the map via a mobile phone link.

Decline in seabirds’ breeding success indicates deteriorating ocean ecosystems



The first global analysis of seabird breeding success in relation to climate found many species are struggling to produce offspring as ocean temperatures rise. The study, published in the journal *Science*, was carried out by an international team, including UKCEH scientists. Seabird breeding success depends on the availability of food sources, which is being affected by rising ocean temperatures.

▶▶ FORWARD LOOK

- A series of pilot projects led by UKCEH will pave the way for investment in restoring the UK’s saltmarshes in order to mitigate climate change and reduce flood risk.
- We will explore, demonstrate and promote innovative approaches to restore, or protect from further degradation, valuable freshwater ecosystems such as lakes, rivers and wetlands.



FLOOD AND DROUGHT IMPACTS

THE CHALLENGE

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

OUR ROLE

Combining expertise in hydro-meteorology 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

Scoping a new flood and drought research infrastructure for the UK

UKCEH led the scoping and consultation phase of a new transformative Flood and Drought Research Infrastructure (FDRI). The FDRI team sought views from a broad range of stakeholders across research, business, major landowners, government departments and regulatory agencies via a series of surveys, webinars and workshops. We prioritised the requirements of this community, which then formed part of the business case submitted to the Department for Business, Energy & Industrial Strategy (BEIS) to support future FDRI investment. The primary objective of the FDRI is to increase the UK’s resilience to floods and droughts through a transformational research capability, which will dramatically improve the UK’s flood and drought forecasting, planning, incident response and management.

New guidance on global drought monitoring

UKCEH developed Good Practice Guidance for monitoring drought hazard, exposure and vulnerability. The guidance was published by UNCCD, the UN Convention that brings together 197 signatories to address desertification and land degradation and mitigate the effects of drought. The Guidance balances state-of-the-art methodologies and data availability with the need for simplicity and global applicability.



New global system will enable communities to adapt to our changing water cycle

Following the successful completion of a UKCEH-led pilot, The World Meteorological Organization (WMO) approved the global implementation of the HydroSOS initiative, a system for assessing hydrological conditions. The system will provide regular data on the status of water resources – including groundwater levels, river flows, reservoirs, lakes and soil moisture – in local catchments across the world. It will also assess whether these measurements are normal for the time of year and predict whether the situation is likely to get better or worse over coming weeks and months, supporting effective management of water supplies, guiding farming practices and helping countries prepare for natural disasters.

Improving projections of extreme tropical rainfall

Our scientists devised new methods for predicting extreme tropical rainfall as a result of climate change, in order to better protect vulnerable communities from future flooding. A study led by UKCEH found that traditional climate models used to inform international research and policy could be underestimating the hourly rainfall during extreme weather events in the coming decades by up to 25 per cent. Reliable information is essential to guide the planning of urban development, water and energy infrastructure, flood resilience measures and sustainable agricultural practices.

▶▶ FORWARD LOOK

- UKCEH will work with the WMO to assess the needs of countries who would like to implement the HydroSOS system and design projects that can meet such need.
- We will develop a hydrological module within the UKCEH City Explorer tool that will simulate the local and downstream effects of nature-based solutions in urban areas on runoff and peak flows, facilitating urban planning.



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

Landmark report outlines how greenhouse gas removal could help UK achieve net zero

The UK Government’s Department for Business, Energy and Industrial Strategy (BEIS) commissioned UKCEH and low carbon energy consultants Element Energy to analyse the costs and deployment potential of engineered and land-based greenhouse gas removal options in the UK. Our assessment, published in October 2021, sets out different scenarios that would enable the UK to reach net zero by 2050.

Improved management of farmed peatlands could cut 500 million tonnes of CO₂

Substantial cuts in global greenhouse gas emissions could be achieved by raising water levels in agricultural peatlands, according to a new study published by UKCEH scientists in the journal *Nature* in April 2021. Concerns over the economic and social consequences of rewetting agricultural peatlands have prevented large-scale restoration to date, but our study shows that the development of locally appropriate mitigation measures could deliver substantial reductions in emissions.



UKCEH’s greenhouse gas monitoring network extended

UKCEH, together with partner organisations, operates a network of greenhouse gas monitoring sites across the UK. During 2021, we extended the network to comprise around 35 sites, establishing new sites in Northern Ireland for the first time. In November, our flagship site at Auchencorth Moss, became the first such monitoring station in the UK to receive Integrated Carbon Observation System (ICOS) labelling, having passed a rigorous quality assurance process.

Lake restoration could reduce greenhouse gas emissions

Lakes are important sources of greenhouse gas emissions, with polluted tropical and subtropical lakes being particular hotspots. New UKCEH research into specific urban lakes in India suggests that restoration of these lakes has the potential to reduce methane emissions significantly.



Picture credit: Laurence Carvalho

▶▶ FORWARD LOOK

- We will work with partners to investigate large-scale nature-based removal of GHGs through four new projects funded by UKRI.
- Using new data science methods for integrating computer models and data streams, we will scale up our greenhouse gas observational network to cover the whole of the UK.
- We will provide the first national-scale estimates of GHG emissions from inland waters, and of fluxes of carbon dioxide, methane and nitrous oxide across the land-ocean-atmosphere continuum.



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

Evidence to underpin EU transition to healthy soils

A review of evidence on soil health across Europe, led by UKCEH, concluded that 60 to 70 per cent of soil is currently unhealthy. The review supported the adoption of the EU mission 'A Soil Deal for Europe', which presents an ambitious vision for delivering healthy soils by 2030. In support of this mission, UKCEH also collated evidence on effective soil management practices that could be adopted more widely across Europe.



Quantifying and understanding soil carbon

Our scientists continued their work to quantify and understand how soil carbon stocks are changing across the UK, and created the first ever national inventory of saltmarsh soil carbon stocks. A new study explored how current models differ in their predictions of soil carbon across the landscape. The study highlighted that the greatest uncertainty surrounds carbon rich soils, and identified these as a target for improving monitoring and assessment in future.



New remote sensing approaches for tracking soil erosion and damage

A new report for Welsh Government, delivered in collaboration with the British Geological Survey, demonstrates the potentially powerful use of remote sensing for assessing the extent of soil erosion and damage across the landscape. The report shows how remote sensing can identify numerous features indicating threats to soil from inappropriate management and breaches of current regulations. This approach has the potential to provide real time alerts, providing a potentially cost effective approach to improving regulatory monitoring.

New approach to tracking global land degradation

A new study proposed a 'debt-based' global approach to tracking land degradation. The approach provides more robust and equitable ways to recognise long-term historical degradation in areas such as Europe and North America, as well as in areas where rapid change is occurring such as Southeast Asia. The method uses recent advances in remote sensing, machine learning, and computational resources, which can now be implemented in a straightforward manner at a global scale.

▶▶ FORWARD LOOK

- We will work with partners to develop a new national soil classification scheme and guidance on how to assess soil structure, to support critical soil functions such as plant growth, drainage and nutrient cycling.
- We will release a new dynamic soil carbon model to explore carbon storage and change at a national scale. The model will be based on understanding built up through our 40-year rolling soil monitoring programme.
- A further model currently in development will facilitate prediction of the impact of land use and soil type on earthworm populations.

© Simon Butterworth



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

We work with farmers to monitor the impact of agriculture on the environment, understand the limitations of food production, and develop new sustainable farming systems that are resilient to climate change and protect biodiversity.

HIGHLIGHTS

Supporting the development of a new agri-environment scheme in Wales

UKCEH led the creation of a set of reports for Welsh Government, applying the newly developed ERAMMP Integrated Modelling Platform (IMP) to explore environmental and economic impacts of various designs of the new Sustainable Farm Scheme in Wales.

Free E-tools support sustainable farming

UKCEH has created a series of free digital tools (E-Tools) to support farmers and land managers in planning and delivering environmental management actions. The E-Planner, E-Surveyor and E-Viewer will help farmers maintain efficient food production while delivering increased environmental benefits. The BASF Group's xarvio Field Manager app was also enhanced with functions from UKCEH's E-Planner tool to enable farmers to improve biodiversity and crop yield.

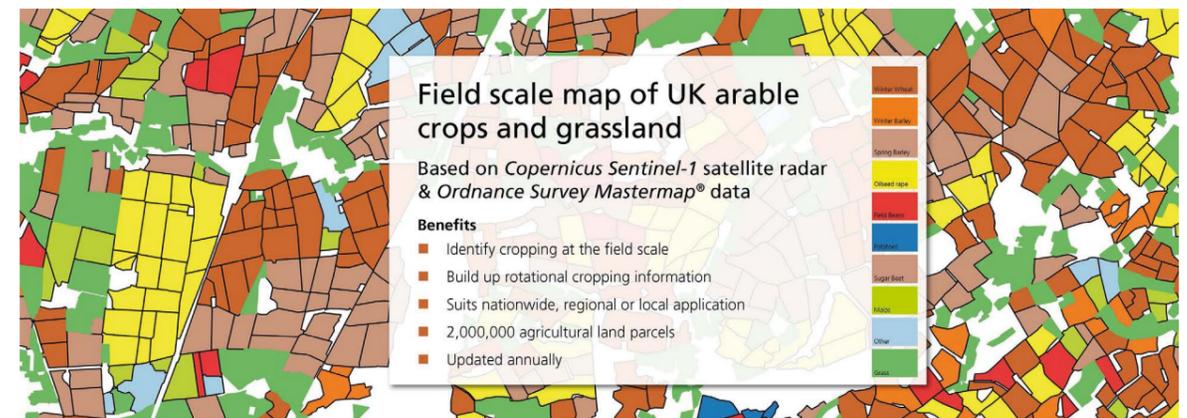


Exploring future farming in virtual reality.

Land Cover Maps provide greater detail about the British landscape than ever before

UKCEH has used high-resolution satellite technology to map the landscape throughout Great Britain in more detail than ever before. We have produced the first land cover map to identify broad habitats at a resolution of 10 metres across the UK. The latest UKCEH Land Cover Map, based on data from the year 2020, identifies 21 types of broad habitats, including grasslands, arable, water, woodlands, urban and suburban. These maps inform policy, research, planning, land use, agriculture and forestry, among other uses.

Crop map data and crop yield models will inform future farming



Since 2015, UKCEH has used satellite-derived imagery to identify crop types grown across 1.7 million agricultural fields in Great Britain each year, producing annual UKCEH Land Cover® plus: Crop maps. With six sequential years of the crop map now available, we have a unique and highly informative dataset for exploring changes in cropping patterns over time and space, which can inform future farming policy and research. We have now also linked the Met Office future climate change scenarios (UKCP18) to our crop yield models for winter wheat, which is the dominant UK crop. This has enabled the production of national, high resolution predictions of future crop yields to 2080 to inform climate change risk assessment and adaptation strategies.

▶▶ FORWARD LOOK

- Working with the farming industry and research partners, our scientists will assess the trade-offs between GHG emissions, food production, biodiversity and the wider environment, through a new programme of work.
- UKCEH's work linking the Met Office's UK Climate Projections 2018 future climate change scenarios to our crop yield models will be extended to cover other major arable crops, such as oilseed rape and grass.



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 sustaining flows and quality for 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

Data to support the resilience of the UK water sector to drought

The enhanced Future Flows and Groundwater (eFLaG) project delivered a high quality, accessible, nationally consistent dataset of river flow projections for 200 rivers and 54 groundwater boreholes using the latest UK Climate Projections (UKCP18). The project also created water industry demonstrators to support use of the new dataset. As well as being valuable to the water industry, the data have a wide range of applications in research and in sectors such as farming, energy and transport.

Mitigating the threat posed by climate change to the UK's upland drinking water sources

Rising concentrations of dissolved organic matter (DOM) in upland drinking water sources due to climate change are a major concern for the water industry, since DOM concentrations can lead to the production of toxic substances if not treated. Through the UKRI Climate Change Resilience Programme, UKCEH, in collaboration with researchers at the University of Leeds and the water industry, detailed the threat that climate change poses to upland drinking water supply, and reviewed a range of potential options for mitigating or adapting to this threat.

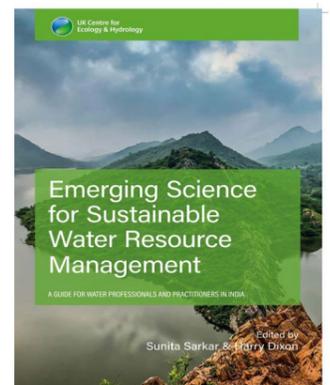


Lake heatwaves will be hotter and longer by the end of the century

Lake ecosystems, and the organisms that live within them, are vulnerable to temperature change. UKCEH and partners used satellite observations and a numerical model to investigate changes in lake heatwaves – prolonged periods of warm surface water temperature – for hundreds of lakes worldwide from 1901 to 2099, showing that these events will become hotter and longer by the end of the twenty-first century. The research, published in *Nature*, highlights emerging water pollution in some of the world's least disturbed lakes on the Qinghai-Tibetan Plateau.

New science to support sustainable water resources management in India

A new book published by UKCEH shows how emerging scientific knowledge and new technologies can support sustainable management and use of freshwater resources. Called 'Emerging Science for Sustainable Water Resources Management', the book is written for water professionals and practitioners in India, and is the result of research collaboration between scientists in India and UKCEH.



▶▶ FORWARD LOOK

- We will advance national and global capabilities in seasonal hydrological prediction, working on climate services initiatives such as the UK Hydrological Outlook and the WMO HydroSOS framework.
- We will improve resilience to extreme droughts by providing evidence-based guidance to policy- and other decision-makers, through our involvement with the WMO-GWP Integrated Drought Management Programme and the UNCCD, among other initiatives.
- A proof-of-concept monitoring innovation project for the European Space Agency will test the possibility of measuring river flow velocities from space using high-resolution video.

NATIONAL CAPABILITY

As a strategic delivery partner for UKRI-NERC, UKCEH delivers impartial environmental science to benefit the UK research community, governments, businesses, and wider society. UKCEH's portfolio of programmes supported by national capability funding provides underpinning science to facilitate cutting-edge research into the integrated land, air and water system on which life depends. The work delivered through these programmes enables UK researchers to deliver excellent research, and puts the environment at the heart of critical policy and business decisions.

HIGHLIGHTS

ASSIST: Achieving sustainable agricultural systems

The ASSIST programme partners created a forum for the research and farming communities to work together to address critical issues relating to sustainable agriculture in the UK. A new commercial study farm network enabled the testing of innovative farming systems that benefit soil health and support natural processes underpinning food production, such as pollination and pest control. Working with the farming industry, ASSIST produced planning tools to target the most suitable sites for the creation of a range of habitats on farms (see page 28).

Hydro-JULES: Next generation land-surface and hydrological predictions

Hydro-JULES delivered UK open-access data sets on rainfall, water flows and abstractions for current and future climates. Working with the UK-wide hydrological modelling community and diverse stakeholders, we co-designed a modelling framework of the terrestrial water cycle. Outputs from the HydroJULES programme have been used by the wider UK research community in proposals that have generated over £10 million in funding for new science. The programme team engaged stakeholders and the public by running a series of community workshops and webinars, hosting winter and summer schools, and producing enrichment materials for schools.

LOCATE: Land ocean carbon transfer

The LOCATE programme, led by the National Oceanography Centre, brought together the freshwater and marine community, and established a unified approach to assessing flows of carbon from the land, through freshwater to the ocean. As a result, the international scientific community now has access to a single model that represents land-freshwater-ocean carbon transfer and processing, addressing an important knowledge gap identified by the IPCC. In addition, the UK water industry is now better equipped to respond to rising dissolved organic matter concentrations that threaten drinking water quality and increase treatment costs (see page 30).

SUNRISE: Sustainable use of natural resources to improve human health and support economic development

This four-year programme, which concluded in 2021, contributed to the UK's Overseas Development Assistance efforts by conducting research to reduce vulnerability to environmental risk, improve environmental quality and provide more reliable sources of food, water and other ecosystem services. Our scientists worked closely with local stakeholders in sub-Saharan Africa, South Asia and South-East Asia to generate solutions to complex regional-scale problems.

The programme's many achievements in 2021 included: the delivery of the new WMO HydroSOS system, which provides short- to medium-term seasonal predictions of floods, droughts and water resources globally and regionally, enabling better early warning and emergency response; new methods to improve smallholder land, crop and forestry management practices in Indonesia, Malaysia and Kenya; and remote training to health practitioners in India on participatory approaches, policy analysis and earth observation methods to help tackle problems associated with zoonotic diseases.

UKESM: UK Earth System Model

The UKESM programme, led by NERC and the Met Office, worked with the UK land surface and Earth system modelling community to enhance the representation of complex interactions of the land system in the next generation of UK climate and Earth system models, developed jointly with the NERC-supported research centres and the Met Office. In particular, the UK Earth System Model (UKESM1) provided outputs to the sixth World Climate Research Programme's Coupled Model Intercomparison Project (CMIP6), which underpins the IPCC's sixth assessment of how climate change is impacting the world.

UK-SCAPE: UK status, change and projections of the environment

During 2021, the UK-SCAPE programme continued to provide insight into the status and dynamics of the natural environment through long-term monitoring. Using our sensor networks and surveys, both experts and citizen scientists contributed to monitoring over 20 different aspects of the terrestrial system, from biodiversity to air quality, and from land use to soil moisture. We used models and methods to interpret the data generated in order to drive increased integration across science disciplines. We also made substantial progress in making this information more readily available to the UK research community through the production of new resources such as catalogues, maps, data portals and phone apps. Over 150 digital assets from the UK-SCAPE programme are now available online.



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 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.

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 by the Board
- Ensuring UKCEH adheres to the principles of the charity governance code to underpin its governance framework and support high standards of governance.

Our Trustees

Directors

Professor Mark Bailey, Executive Director
 Ewen Cameron, Lord Cameron of Dillington, Chair
 Lynette Eastman (appointed 11 January 2021)
 Will Galgey
 Professor Iain Gillespie
 Professor Sir Charles Godfray (appointed 19 August 2021)
 Linda Naylor
 Benet Northcote
 Neil Scragg
 Alexia Tye
 Sam Bullen was appointed Company Secretary on 19 April 2021.

Board meetings

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

	03/03/21	09/06/21	29/09/21	01/12/21
Ewen Cameron	✓	✓	✓	✓
Mark Bailey	✓	✓	✓	✓
Lynette Eastman	✓	Apologies	✓	Apologies
Will Galgey	✓	✓	✓	✓
Iain Gillespie	✓	✓	✓	Apologies
Charles Godfray (appointed 19.08.21)			✓	✓
Linda Naylor	✓	✓	✓	✓
Benet Northcote	✓	✓	✓	✓
Neil Scragg	✓	✓	✓	✓
Alexia Tye	✓	✓	✓	✓

Victoria McMyn, Chief Operating Officer for NERC, attended our Board of Trustees meetings as an Observer.

Sub-committees of the Board

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

- The Finance and Audit Sub-committee, which oversees and reviews all financial aspects and advises the Board accordingly, and evaluates the budget before Board approval. The committee met five times during this accounting year.
- The Remuneration and Appointments Sub-committee, which reviews the levels of, and rationale for, any remuneration of Trustee Directors, recommends a level of remuneration for the Executive Director to the Board, taking account of performance reviews, and ensures that payments are set at a level reasonable for the work being carried out. The Sub-committee also oversees the recruitment and selection of new Trustees and the Executive Director.

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

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.



Picture credit: Dr Adi Jaya from the University of Palangka Raya

Working with Indonesian researchers, companies, NGOs and farmers, our scientists are exploring options to reduce greenhouse gas emissions from peatlands by raising water levels.

Key management personnel

The key management personnel of the organisation comprise the Executive Board and Science Board.

The members of the Executive Board are:

Professor Mark Bailey
 Sam Bullen (from April 2021)
 Jaqui Dingle (to April 2021)
 Professor Alan Jenkins
 Gill Lay (from April 2021)
 Dr Nick Wells
 Dr Doug Wilson (joined 2022)

The members of the Science Board are:

Professor Gordon Blair (joined UKCEH 2022)
 Dr Eleanor Blyth
 Professor Harry Dixon (joined Science Board 2022)
 Professor Bridget Emmett
 Professor Alan Jenkins
 Professor Richard Pywell
 Dr Gwyn Rees
 Professor Stefan Reis
 Nick Reynard
 Dr Claus Svendsen
 Dr Doug Wilson (joined UKCEH 2022)
 Dr Nick Wells

Remuneration for key management personnel

As described in the Board Sub-committees section above, 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. As for all staff, benchmarking data from comparable organisations is used when reviewing and setting pay levels.

Subsidiaries

UKCEH has one wholly owned registered trading subsidiary, the UK Centre for Ecology & Hydrology Enterprise, a Company Limited by Shares (number 12251749). The principal activity of UKCEH Enterprise is to increase the impact of UKCEH science through the commercialisation of research outputs, and the delivery of commercial research contracts and services in support of UKCEH's charitable purpose.

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.

UKCEH Enterprise directors and officers

The directors and officers of UKCEH Enterprise are:

Sam Bullen was appointed Company Secretary on 19 April 2021

Professor Alan Jenkins, Executive Director

Linda Naylor, Chair and Non-Executive Director

Ian Reid, Non-Executive Director

Dr Nick Wells, Managing Director

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

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 charitable objects and the ways in which we have met our charitable objects are set out in the Strategic Report. In addition, we currently make over 1,400 datasets freely available via the Environmental Information Data Centre.

How we work with stakeholders

We engage key stakeholders through a range of mechanisms at organisational and research programme levels, including:

- Inviting researchers from Higher Education Institutes across the UK and beyond to engage with the design and delivery of our National Capability programmes and other collaborative research initiatives, including advisory panels
- Organising stakeholder engagement events and holding regular bilateral meetings with specific stakeholders, for example government chief scientists
- Providing regular communications to our key stakeholders, including via regular and one-off email newsletters
- During the pandemic, we communicated regularly with our stakeholders, including by posting operational updates on our corporate website and promoting them via social media.
- Periodic stakeholder perception surveys.

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.

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 2021, we worked to integrate public engagement into our bid process and improved the resources available to scientists carrying out public engagement. In 2022, we will develop and deliver bespoke training for our scientists on how to design, carry out and evaluate excellent public engagement with research.

Our volunteers

We work with volunteer citizen scientists. The Biological Records Centre at UKCEH has been supporting expert volunteers to contribute records of wildlife for over 50 years. Other volunteers have been involved in monitoring environmental changes as part of a range of schemes including but not limited to the National Plant Monitoring Scheme, the National Honey Monitoring Scheme, the UK Pollinator Monitoring Scheme, and the Predatory Bird Monitoring Scheme.

Our people

We take a proactive, consultative approach with our people. We engage with all our people via regular employee engagement meetings and formal union meetings of the Joint Consultation and Negotiation Committee (JCNC).

UKCEH management supports trade union membership and recognises the following trade union bodies as the employee representative with which it will consult and

negotiate, and the body representing its employees for the purposes of information and consulting the workforce:

- Prospect for employees on legacy terms and as the sole recognised trade union for new Company Limited by Guarantee terms
- PCS for employees on legacy terms only.

Professor Mark Bailey presents quarterly updates online to all our people, with additional directors updates monthly. These cover scientific and funding achievements, information on new policies and procedures and address organisational issues.

We constantly review our approach to remuneration so we can be as competitive as possible to ensure we can attract and retain the high quality researchers and professionals we need to create a vibrant, dynamic and intellectually nurturing environment for scientific discovery. We aim to pay competitively within the context of affordability and benchmark our salaries and benefits against other appropriate organisations and in accordance with job families.

We have created more digital communications channels and are constantly seeking feedback from our people through formal and informal meetings. All directors engage with people at our four sites on a regular basis, and travel to all four sites regularly while abiding by extant Covid restrictions. We seek to ensure all our people feel valued and feel a sense of belonging.

Our gender composition

The data provided here represent a snapshot of our gender composition on 5 April 2021 compared to 5 April 2020.

	Total workforce	Women	Men
2020	528 individuals	263	265
2021	549 individuals	276	273

The proportions of men and women within each pay quartile

	Upper quartile	Upper middle quartile	Lower middle quartile	Lower quartile
2020	35% women 65% men	42% women 58% men	53% women 47% men	70% women 30% men
2021	33% women 67% men	44% women 56% men	54% women 46% men	67% women 32% men

Equality, diversity and inclusivity

We recognise the value of a diverse workforce and believe that a fair and equitable working environment is key to both a productive workforce and delivery of UKCEH strategy. We are committed to achieving equality, diversity and inclusivity (EDI) and support this commitment through our participation in the Investors in People and Athena SWAN accreditation schemes. We aim to review our scheme memberships in 2022, to ensure that we are using the right tools to audit and challenge ourselves in this area.

UKCEH culture embraces the principles of flexibility that provide for family-friendly working opportunities, while at the same time demonstrating a commitment to career development for all employees. We aim to promote equality of opportunity and equitable treatment for all employees, job or studentship applicants and other stakeholders and eliminate discrimination on the grounds of protected characteristics. UKCEH believes it is the responsibility of all our employees in their daily actions, decisions and behaviour to promote this ethos and to ensure we feel empowered to challenge each other appropriately.

UKCEH has procedures in place should staff have concerns that the standards set out in the EDI policy have been breached. This includes the grievance, whistleblowing and harassment and bullying procedures. UKCEH provides mandatory EDI e-learning to all staff and students and in 2021, we carried out an EDI consultation through our staff representative panel. We attained Disability Confident Employer status renewal and added EDI questions to our Investors in People staff survey and annual postgraduate student survey.

Postgraduate and early career researchers

We play an important role in training the next generation of environmental scientists. Over the past year, our scientists have supervised 188 postgraduate researchers, who benefit from access to our laboratory facilities, field sites and data centres. Postgraduate training and development has been carried out in partnership with NERC-funded Doctoral Training Partnerships and Centres for Doctoral Training. UKCEH has also supported 92 Research Associates in specialist posts where around 10 per cent of their time is dedicated to individual professional and career development. We delivered 64 coaching sessions to research associates during 2021.

Research integrity

UKCEH operates to UKRI's Good Research and Trusted Research Policies and Processes. To complement this, we also have a Code of Ethics extending to all aspects of governance, policy, operations and administration. No claims of scientific misconduct were received or investigated in 2021. In 2022, we will put in place in-house research ethics committees.

Health and safety report

UKCEH operates within a certified Safety Management System which we successfully transitioned from OHSAS 18001 to the ISO 45001 standard in March 2021. During the year we made progress against our corporate safety objectives, while adjusting deadlines to account for COVID-19 impacts on working practices.

Accident reporting

Over the 12-month period there were 54 Accidents, 23 Incidents and 17 Near-misses (AINMs) reported across UKCEH. There were no RIDDOR reportable events.

Throughout the COVID pandemic, health surveillance has continued across UKCEH using remote support from occupational health providers, with face-to-face surveillance resuming towards the end of the year.

The figure below shows the breakdown of Accidents, Incidents and Near-misses reported by type.

Accident, Incidents and Near-miss Type	2020	2021
Allergic reaction	2	
Burns / scalds	1	1
Cuts / grazes	4	9
Display screen equipment use	39	23
Exposed to hazardous substance	6	8
Falling or flying object	1	1
Fire alarm activation	4	9
Lone working	1	1
Slips / trips / falls	8	7
Vehicle damage	7	17
Sprain or strain		2
Manual handling		1
Environmental		1
Animal / insect		3
Electrical safety		2
Non-occupational illness		7
Not following procedure		2

In 2021, we made substantial improvements to worker access to relevant health and safety information and training resources. We also partnered with ISOS to provide a Global Assistance Programme for UKCEH people once business travel resumed.

We have seen a clear downward trend in 2021 regarding DSE issues reported, suggesting the improvements implemented to date have been successful.

Environment report

Creating a resilient and healthy environment is at the core of our science, and UKCEH is committed to applying the same ethos to the way we run the organisation. We will achieve net zero greenhouse gas operational emissions by 2040, seek new ways to reduce our reliance on energy derived from fossil fuels and investigate alternatives to business travel to mitigate our emissions. We continue to operate an environmental management system, certified to the ISO 14001 standard.

In 2021, we surveyed staff to inform sustainable travel planning, and made improvements to habitats on our office sites to encourage biodiversity. We also submitted requests for planning permission to provide solar PV generation on two of our sites and will progress this work further in 2022.

No specific new energy efficiency measures were implemented on UKCEH sites in 2021. During the year, electricity provision on our owned sites temporarily ceased to be provided from renewable sources, and this resulted in an increase in greenhouse gas emissions for 2021. This has been rectified for 2022. Energy usage and greenhouse gas emissions also increased in 2021 due to the resumption of on-site working after Covid restrictions were lifted.

UK Government Greenhouse Gas Conversion Factors for 2021 have been used to calculate the following data, in line with the UK Government Environmental Reporting Guidance.



Our scientists devised new methods for predicting extreme tropical rainfall as a result of climate change, in order to better protect vulnerable communities from future flooding.

Table 1: Summary energy use and associated greenhouse gas emissions for year 2020 and 2021.

Overall UKCEH energy use and associated GHG emissions	1 January 2020 - 31 December 2020	1 January 2021 - 31 December 2021
UK energy use ¹ (kWh)	6,309,790	8,101,470
Associated GHG emissions ² (tonnes CO _{2e})	813.68 (1394.90)	1403.52 (1685.19)
Intensity Ratio Energy use (kWh) per £ project income ³	123.88	153.44
Intensity ratio emissions (tonnes CO _{2e}) per £ project income ³	0.03 (0.02)	0.07 (0.06)
Intensity ratio energy use (kWh) per m ² floor area (23538)	268.07	344.19
Intensity ratio emissions (tonnes CO _{2e}) per m ² floor area (23538)	0.03 (0.06)	0.06 (0.07)
Intensity ratio energy use (kWh) per average staff number (537)	11,750	15,143
Intensity ratio emissions (tonnes CO _{2e}) per average staff number (537)	1.52 (2.6)	2.62 (3.15)

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

Breakdown data contributing to Table 1 figures	1 January 2020 - 31 December 2020	1 January 2021 - 31 December 2021
UK gas use (kWh)	3,221,157	4,140,611
UK electricity use (kWh)	2,854,649	3,601,512
UK energy use associated with transport (kWh) ⁴	233,984	357,072
Scope 1 GHG energy emissions ⁴ (tonnes CO _{2e})	691.26	849.89
Scope 2 GHG energy emissions ⁵ (tonnes CO _{2e})	66.55 (647.77)	471.81 (753.47)
Scope 3 T+D emissions ⁶ (tonnes CO _{2e})	55.87	81.82

Methodology and limitations

1. 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. Where fuel purchase costs are known but not fuel quantities, the litres have been estimated from UK Government average fuel costs data.
2. Figures in brackets are calculated using mains grid conversion factors for all supplies to give best practice comparative purposes. Greenhouse gas emissions associated with 2021 energy use and personal km travelled have been calculated using UK Government 2021 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.
3. The intensity ratio for 'Project Income' has been recalculated for 2020 to exclude transfer of assets, donations and funding for capital and maintenance improvements.
4. Scope 1 emissions includes mains supplied gas use, fugitive refrigerant emissions, fleet vehicle km travelled and fuel purchased.
5. 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.
6. Scope 3 transmission includes hire car and personal km travelled for business purposes along with distribution emissions relating to mains electricity use. These figures are presented voluntarily.



Dr David Fletcher participated in a Space4Climate / European Space Agency exhibition at COP26, focusing on Earth Observation.



Picture credit: Richard Pywell, UKCEH

UKCEH has created a series of free digital tools to support farmers and land managers in planning and delivering environmental management actions.

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 2021, UKCEH maintained its Cyber Essentials accreditation 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.

Complaints and feedback

We have policies and processes in place for external complaints and customer satisfaction, supporting the requirements of our quality management system, certified to ISO 9001 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 every eighteen months. The Executive Board review this feedback and oversee the external complaints process. All complaints made in 2021 have been resolved. The Board of Trustees also have an overview of both processes.

RISK MANAGEMENT

The Trustees 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 how risks are identified and managed.

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.

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

This approach is supported by an organisation-wide audit schedule, approved by the Executive Board, with audit findings supporting a culture of continuous improvement. UKCEH's risk management approach is defined within the Quality Management System, certified to the ISO 9001 standard. 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.

The current highest ranked risks to the organisation, and associated mitigating actions are:

- Risk of widespread disruption affecting UKCEH operations, from an external event such as a pandemic. Following the pandemic, we are reviewing our incident response and business continuity plans.
- Risks related to overseas working, including reputational risks and adhering to sanctions. UKCEH has a robust due diligence process in place and monitors overseas activity closely.
- Risks associated with a cyber-attack, including loss of data and financial loss. Over the last two years, we have significantly invested in our information security capabilities to address cyber risk and have further actions planned for 2022.



Picture credit: ©FAO/Valerio Crespi

Working with the Kenya Marine and Fisheries Research Institute, UKCEH developed a map of the Kenyan part of Lake Victoria, which indicates the levels of suitability of different areas for developing cage fish farms.

OUR FINANCES

The statements of financial activities for the year ended 31 December 2021 are contained in this report and show that the organisation had a net income for the year of £8.4m. This included income related to capital grants of £4.5m.

The net income for the previous 13-month period ended 31 December 2020 was £11.4m, which included a one-off capital grant of £6.4m and a £2m contribution to reserves on independence from UKRI-NERC. When these items are excluded, there has been an underlying increase in net income from 2020 to 2021. This reflects UKCEH's success at winning and delivering competitive grants in the year, and also includes some timing effects. In particular £1.5m of Covid Support Funding was received from UKRI-NERC in 2021, which mitigated Covid-related costs incurred throughout the pandemic.

Principal funding sources and income

UKCEH's total income for 2021 was £56.7m. The majority of this income came from UKRI in the form of awards, grants, and agreements for scientific research activities of £29.7m. Grants for capital and maintenance of £4.5m were received from UKRI during the year. Other government departments and the public sector accounted for a further £11.2m of research income, while £1.4m was received in EU grants.

Income from other trading activities derives principally from UKCEH's trading subsidiary UKCEH Enterprise and from rental income.

Income £m	12 months ended 31 December 2021	13 months ended 31 December 2020
Transfer of assets from UKRI on independence	-	6.4
Donation from UKRI on independence	-	1.5
UKRI grants for capital and maintenance	4.5	3.2
UKRI scientific research income	29.7	32.4
Other government departments and public sector	11.2	9.6
European Commission	1.4	2.1
Universities	1.9	2.0
Private sector	4.5	3.0
Other income	3.4	1.9
Total income	56.6	62.1

Expenditure

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

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

Expenditure £m	12 months ended 31 December 2021	13 months ended 31 December 2020
Science staff cost	18.2	18.7
Science direct costs	12.4	13.4
Depreciation	1.9	2.5
Support costs	15.3	14.7
Other resources expended	0.5	0.1
Total expenditure	48.3	50.7



Picture credit: Frank Vassen

Our scientists used high-resolution satellite imagery to produce a detailed national map of all habitats found alongside Britain's 20,000-mile rail network.

Reserves policy

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 trustees have created an unrestricted designated capital fund. The balance at the end of the year was £3.9m, which largely results from the transfer of assets from UKRI-NERC on independence and internal investment in capital. It will be used at the discretion of the trustees for future capital expenditure.

The restricted capital fund had a balance of £7.2m at the year end and it represents funding the organisation has received where the use is capital in nature and has been specified by the donor.

The restricted fund had a balance of £(0.9)m at the year end and this represents project funding and costs in respect of specific research projects. The negative balance on this fund is largely driven by timing and accounting treatment impacts on certain projects, whereby cost has been recognised in 2021, but the related income will be recognised in a future period. It is therefore expected to go into surplus in 2022. The Trustees also acknowledge that it may in future be necessary to transfer some unrestricted funds to restricted funds to enable UKCEH to take part in scientifically important projects, closely tied to our charitable goals, that would otherwise result in a project level deficit.

The unrestricted fund had a balance of £9.6m at the year end and represents the funds which are available for use at the discretion of the trustees in furtherance of the general charitable objectives of the organisation.

On independence from UKRI-NERC, UKCEH had an initial reserve of £2m. On independence, our reserves policy set a free reserve target of £5m to cover operational risk. The current free reserves of £9.6m includes £2.1m of UKRI institutional funding received in advance of 2022, as well as amounts already allocated to organisational improvement activities in 2022.

The Trustee Board and the Finance and Audit Sub-committee review the reserves policy and the level of reserves required on a regular basis.

No financial investments were made in 2020 and 2021. 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.

Trading subsidiary

UKCEH has a wholly owned trading subsidiary, UKCEH Enterprise Limited, a company limited by shares. In the year ended 31 December 2021, the trading subsidiary reported a profit before tax of £0.35m. The trading subsidiary's significant areas of activity include intellectual property and the delivery of research contracts and commercial services. The Chair of UKCEH Enterprise Limited is also a member of the UKCEH Board of Trustees.

Fundraising

The organisation does not carry out any fundraising activities with the general public and no donations are sought from the public. The charity had no fundraising activities requiring disclosure under S162A of the Charities Act 2011.

Going concern and the impact of Covid-19

The Trustees of UKCEH consider the organisation to be a successful going concern. UKCEH was established on 1 December 2019 as a not-for-profit research organisation, a Company Limited by Guarantee with charitable status. As described above, the organisation has had a positive net income in its first two years of trading, and has reached its free reserve target of £5m sooner than planned.

UKCEH has been able to mitigate adverse impacts on its activity relating to the Coronavirus pandemic. In 2021, we received an Institute Support Fund award from UKRI to support short-term stability, and to avoid deterioration of strategic, national scientific capability as a result of impacts of the pandemic. These funds have been used to both cover Covid-related costs incurred in 2020 and 2021, and to increase reserves for longer-term sustainability and investment.

A £4.5m capital grant from UKRI under the World Class Laboratories programme has further enabled UKCEH to invest in scientific and IT equipment for the long term.

The Board of Trustees reviewed and approved the 2022 UKCEH plan in December 2021. This plan showed a small surplus for 2022 with a high degree of confidence in income levels. UKCEH continues to be very successful in bidding for funding and, as at May 2022, had secured in excess of 100% of its planned income for 2022, and the majority of that planned for 2023.

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

OUR FUTURE PLANS

We will build on our success in meeting the rising demand for excellent environmental science by increasing the economic, societal and environmental impact of our work, and by increasing our research capabilities and capacities. Specific areas of focus will include:

- Continued commitment to the three global science challenges that underpin 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.
- Increased investment in our research infrastructures for environmental monitoring, measurement, and observation. These infrastructures include environmental observatories, experimental platforms, digital infrastructures, and environmental analysis laboratories, complemented by our expertise in data science for analytics, forecasting and projection. A particular focus will be on supporting the evidence base for climate adaptation and mitigation, and solutions to meet the net zero plus agenda.
- Greater collaboration with the UK research community to ensure they derive maximum benefit from the underpinning science and science infrastructure we provide; and greater collaboration with partners and funders internationally, which will be supported by the appointment of a new Associate Director of International Research and Development.
- By the end of 2022, we will have developed a long-term business plan, which will further underpin delivery of our *Strategy 2025: Research and Innovation* and support current and future research and innovation activities.



Investment in people and skills

People are at the heart of UKCEH science excellence and impact and so it is essential that we attract and retain the right talent and expertise for the long-term success of the organisation. We will review our reward and recognition programme, staff development, and improve our workforce planning, while also building a more diverse and inclusive research environment. We will continue to expand our expertise in climate research and our technical capabilities in environmental data collection and analysis.

Environmental sustainability

UKCEH's environmental performance in 2021 is set out on pages 44-46. In 2022, we will define the operational actions that will enable us to meet our objective of achieving net zero greenhouse gas emissions by 2040.

We recognise that, from April 2022, the UK has mandated that the largest businesses disclose their climate related risks and opportunities, in line with the Taskforce on Climate-related Financial Disclosures recommendations. While not mandated for UKCEH, we will nonetheless routinely assess the benefit of voluntarily adopting some of these disclosures. This will also apply to any future recommendations made by the Task Force on Nature-related Financial Disclosures for which UKCEH is a member of the multi-disciplinary consultative forum.

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

29 June 2022

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 12 months ended 31 December 2021, 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 period ended 31 December 2021 and of the group's income and expenditure, for the period 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 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

30 June 2022

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.

Consolidated statement of financial activities for the year ending 31 December 2021

Incorporating an income and expenditure account

		Unrestricted funds	Restricted funds	Unrestricted designated capital funds	Restricted capital funds	12 months to 31 Dec 2021 Total	13 months to 31 Dec 2020 Total
	Note	£000	£000	£000	£000	£000	£000
Income							
Donations							
Other donations		-	-	-	-	-	1,500
Assets transferred from UKRI		-	-	-	-	-	6,442
Income from charitable activities							
Scientific research		7,418	39,753	-	-	47,171	48,542
Capital and maintenance grants		-	-	-	4,539	4,539	3,200
Education and training		-	1,567	-	-	1,567	567
Income from other trading activities							
Trading income		985	-	-	-	985	732
Other income		2,055	357	-	-	2,412	1,093
Total Income	2	10,458	41,677	-	4,539	56,674	62,076
Expenditure							
Charitable activities		2,518	28,109	1,476	454	32,557	34,623
Raising funds		-	1,156	-	-	1,156	1,233
Other		1,031	13,543	-	-	14,574	14,866
Total Expenditure	3	3,549	42,808	1,476	454	48,287	50,722
Net income for period before transfers		6,909	(1,131)	(1,476)	4,085	8,387	11,354
Transfer between funds		(670)	-	670	-	-	-
Net movement in funds in period		6,239	(1,131)	(806)	4,085	8,387	11,354
Fund balances at beginning of period		3,345	198	4,679	3,132	11,354	-
Fund balances at 31 Dec 2021	14	9,584	(933)	3,873	7,217	19,741	11,354

All income and expenditure derives from continuing activities

Results of the charitable company for the year were total income £56,271k and surplus £8,387k

Consolidated balance sheet as at 31 December 2021

Company Registration No: 11314957

		2021 Charity	2021 Group	2020 Charity	2020 Group
	Note	£000	£000	£000	£000
Fixed assets					
Tangible assets	7	7,560	7,560	5,597	5,597
Investments	8	50	-	50	-
Total fixed assets		7,610	7,560	5,647	5,597
Current assets					
Debtors	9	8,492	8,286	9,084	8,733
Cash at bank and in hand	10	29,818	30,182	16,216	16,695
Current liabilities					
Creditors falling due in one year	11	26,179	26,287	19,593	19,671
Net current assets		12,131	12,181	5,707	5,757
Net assets		19,741	19,741	11,354	11,354
The funds of the charity					
Unrestricted funds					
Unrestricted funds		9,584	9,584	3,345	3,345
Unrestricted designated capital funds		3,873	3,873	4,679	4,679
Total unrestricted funds		13,457	13,457	8,024	8,024
Restricted funds					
Restricted funds		(933)	(933)	198	198
Restricted capital funds		7,217	7,217	3,132	3,132
Total restricted funds		6,284	6,284	3,330	3,330
Total charity funds	14	19,741	19,741	11,354	11,354

The financial statements on pages 66 to 82 were approved by the board and authorised for issue on 29 June 2022 and signed on its behalf by:



Ewen Cameron
Lord Cameron of Dillington, Chair

Consolidated cash flow statement for the year to 31 December 2021

	12 months to 31 Dec 2021 Company	12 months to 31 Dec 2021 Group	13 months to 31 Dec 2020 Company	13 months to 31 Dec 2020 Group
	£000	£000	£000	£000
Cash flows from operating activities				
Net income and net movement in funds for the year	8,387	8,387	11,354	11,354
Interest receivable	(2)	(2)	(6)	(6)
Interest payable	4	4	3	3
Depreciation	1,930	1,930	2,503	2,503
Capital grants receivable	(4,539)	(4,539)	(9,642)	(9,642)
Increase / (decrease) in debtors	592	447	(9,084)	(8,733)
Increase in creditors	6,586	6,616	19,593	19,671
Net cash provided by operating activities	12,958	12,843	14,721	15,150
Cash flows from investing activities				
Interest received	2	2	6	6
Investment in subsidiary	-	-	(50)	-
Purchase of tangible assets	(3,893)	(3,893)	(1,658)	(1,658)
Capital grants received	4,539	4,539	3,200	3,200
Net cash provided by investing activities	648	648	1,498	1,548
Cash flows from financing activities				
Interest payable	(4)	(4)	(3)	(3)
Net cash used in financing activities	(4)	(4)	(3)	(3)
Change in cash and cash equivalents in the reporting period	13,602	13,487	16,216	16,695
Cash and cash equivalents at the beginning of the period	16,216	16,695	-	-
Total cash and cash equivalents at the end of the year	29,818	30,182	16,216	16,695

Notes to the consolidated financial statements

1. Accounting Policies

a. Basis of preparation

UK Centre for Ecology & 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 84. The Charity began trading on 1 December 2019, and the first reporting period covered 13 months to 31 December 2020. The comparative information provided in this report covers 13 months. 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 2021. 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 where income, expenditure and cashflow are forecast for the following 3 (three) 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 licencing 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.

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. A fixed assets reserve has been established within unrestricted reserves representing the net book value of fixed assets funded from unrestricted reserves. Unrestricted reserves that have been designated by the Trustees for specific purposes are shown in separate designated reserves.

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:

- Plant and machinery - 8 to 10 years
- Fixtures and fittings - 8 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	12 months to 31 Dec 2021 Total	13 months to 31 Dec 2020 Total
	£000	£000	£000	£000	£000
Donations					
Other donations	-	-	-	-	1,500
Transfer of assets from UKRI-NERC	-	-	-	-	6,442
Total donations	-	-	-	-	7,942
Income from charitable activities					
Grant and contract income					
UKRI	28,317	1,413	-	29,730	32,352
Other government departments and public sector	11,210	-	-	11,210	9,638
European Commission	1,400	24	-	1,424	2,105
Universities	1,838	66	-	1,904	1,968
Charities	592	22	-	614	665
Private sector	3,814	42	-	3,856	2,381
Total grant income	47,171	1,567	-	48,738	49,109
Capital and maintenance grants					
UKRI					
Repairs and maintenance	-	-	-	-	827
Capital expenditure	4,539	-	-	4,539	2,373
Total capital grants	4,539	-	-	4,539	3,200
Total income from charitable activities	51,710	1,567	-	53,277	52,309
Income from other trading activities					
Trading income	-	-	985	985	732
Rental income	-	-	202	202	217
Training income	-	126	-	126	111
Other income	-	-	2,082	2,082	760
Investment income	-	-	2	2	5
Total income from other trading activities	-	126	3,271	3,397	1,825
Total income	51,710	1,693	3,271	56,674	62,076

3. Analysis of expenditure

Analysis of resources expended

	Research activities	Education and training activities	Other activities	12 months to 31 Dec 2021 Total	13 months to 31 Dec 2020 Total
	£000	£000	£000	£000	£000
Direct charitable expenditure:					
Science staff cost	18,233	-	-	18,233	18,724
Science direct costs	12,394	-	-	12,394	13,393
Depreciation	1,930	-	-	1,930	2,506
Expenditure on charitable activities	32,557	-	-	32,557	34,623
Governance costs	-	-	57	57	35
Support costs	14,025	90	-	14,115	14,713
Raising funds	-	-	1,156	1,156	1,233
Trading expenditure	-	-	402	402	118
Expenditure on other activities	14,025	90	1,615	15,730	16,099
Total expenditure	46,582	90	1,615	48,287	50,722

Allocation of support costs, governance and raising funds

	Research activities	Education and training activities	Raising funds	Governance costs	12 months to 31 Dec 2021 Total	13 months to 31 Dec 2020 Total	Basis of allocation
	£000	£000	£000	£000	£000	£000	
Senior management	1,562	10	-	57	1,629	2,102	Chargeable hours
Facilities	4,969	32	-	-	5,001	5,639	Chargeable hours
Business development and engagement	-	1	1,156	-	1,157	1,262	Activity
Finance and procurement	1,762	11	-	-	1,773	1,590	Chargeable hours
IT	3,183	20	-	-	3,203	2,682	Chargeable hours
People & skills	1,160	7	-	-	1,167	1,076	Chargeable hours
Research contracts, licensing and info services	1,152	7	-	-	1,159	1,340	Chargeable hours
Science support	237	2	-	-	239	290	Chargeable hours
Total support costs	14,025	90	1,156	57	15,328	15,981	

Analysis of governance costs

	12 months to 31 Dec 2021 Total	13 months to 31 Dec 2020 Total
	£000	£000
Audit fees		
Audit of the financial statements	15	15
Other assurance services	16	6
Trustees remuneration and expenses	26	14
	57	35

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	12 months to 31 Dec 2021	13 months to 31 Dec 2020
	Number	Number
Science	402	379
Infrastructure	158	158
Total	560	537

The aggregate payroll costs of these persons were:

Group and Charitable Company	12 months to 31 Dec 2021	13 months to 31 Dec 2020
	£000	£000
Wages and salaries	19,369	19,372
Social Security costs	1,949	2,045
Pension costs	4,259	4,769
Total	25,577	26,186

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	12 months to 31 Dec 2021	13 months to 31 Dec 2020
£60,000 - £69,999	8	13
£70,000 - £79,999	8	7
£80,000 - £89,999	1	2
£100,000 - £109,999	1	1
£140,000 - £149,999	1*	1
Total	19	24

* 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 37.

The employment costs (salaries, social security costs and pension costs) of the key management personnel for the group and charitable company were £1,312,731 (2020: £1,431,936).

Redundancy and early termination payments in the year totalled £99,418 (2020: £nil).

5. Remuneration of trustees

	12 months to 31 Dec 2021	13 months to 31 Dec 2020
	£000	£000
Salary	12	13
Expenses	8	1
Total	20	14

Lord Cameron of Dillington received remuneration of £12,438 (2020: £13,000), 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. He received no remuneration for his role as a trustee in the year. He received remuneration and benefits for his services as Executive Director of £163,905 (2020: £188,673) including employer's national insurance contribution. 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 £7,954 (2020: £1,047).

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 2021	639	5,194	226	1,588	187	266	8,100
Addition	128	2,782	29	782	-	172	3,893
Transfer	-	266	-	-	-	(266)	-
As at 31 December 2021	767	8,242	255	2,370	187	172	11,993
Depreciation							
As at 1 January 2021	(4)	(1,675)	(52)	(653)	(119)	-	(2,503)
Charged in the period	(32)	(1,286)	(49)	(519)	(44)	-	(1,930)
As at 31 December 2021	(36)	(2,961)	(101)	(1,172)	(163)	-	(4,433)
Net book value							
As at 31 December 2021	731	5,281	154	1,198	24	172	7,560
As at 1 January 2021	635	3,519	174	935	68	266	5,597

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:

	2021
	£000
	Charity
Valuation	
At 1 January	50
Acquisition	-
At 31 December	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 2021, which are included in the consolidated financial statements, are set out below:

	12 months to 31 Dec 2021	13 months to 31 Dec 2020
	£000	£000
Turnover	985	732
Expenditure	(634)	(405)
	351	327
Gift aid distribution	(351)	(327)
	-	-
Net assets at 1 January 2021	50	-
Net assets at 31 December 2021	50	50
Being:		
Current assets	644	547
Current liabilities	594	497
Net assets at 31 December 2021	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

	2021	2021	2020	2020
	£000	£000	£000	£000
	Charity	Group	Charity	Group
Trade debtors	1,570	1,664	2,971	2,973
Amounts owed from subsidiary undertaking	487	-	419	-
Prepayments and accrued income	6,386	6,573	4,051	4,117
Other debtors	49	49	1,643	1,643
Total	8,492	8,286	9,084	8,733

10. Cash and cash equivalents

	2021	2021	2020	2020
	£000	£000	£000	£000
	Charity	Group	Charity	Group
Cash at bank	19,818	20,182	16,216	16,695
Notice deposits	10,000	10,000	-	-
Total	29,818	30,182	16,216	16,695

11. Creditors

	2021	2021	2020	2020
	£000	£000	£000	£000
	Charity	Group	Charity	Group
Trade creditors	1,428	1,429	1,052	1,056
Accruals and deferred income	23,756	23,848	18,241	18,291
Payroll & expense	581	581	-	-
Taxation (VAT payable)	414	429	300	324
Total	26,179	26,287	19,593	19,671

12. Deferred income

	2021	2021	2020	2020
	£000	£000	£000	£000
	Charity	Group	Charity	Group
Deferred income at 1 January	16,196	16,196	-	-
Amounts released from previous year	(12,324)	(12,324)	-	-
Incoming resources deferred in year	16,526	16,526	16,196	16,196
Deferred income at 31 December	20,398	20,398	16,196	16,196

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

	2021	2020
	£000	£000
	Total	Total
Group and charitable company		
Contracted capital commitments at the end of the financial year not otherwise included in these accounts	921	1,482

14. Funds

Analysis of net assets between funds - current year

	Unrestricted funds	Restricted funds	Unrestricted designated capital funds	Restricted capital funds	Total
	£000	£000	£000	£000	£000
UKCEH Group					
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 net assets between funds - prior period

	Unrestricted funds	Restricted funds	Unrestricted designated capital funds	Restricted capital funds	Total
	£000	£000	£000	£000	£000
UKCEH Group					
Fixed assets	-	3	4,004	1,590	5,597
Current assets	3,923	19,288	675	1,542	25,428
Current liabilities	(578)	(19,093)	-	-	(19,671)
At 31 December 2020	3,345	198	4,679	3,132	11,354

Analysis of funds movements - current year

	Unrestricted funds	Restricted funds	Unrestricted designated capital funds	Restricted capital funds	Total
	£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

Analysis of funds movements - prior period

	Unrestricted funds	Restricted funds	Unrestricted designated capital funds	Restricted capital funds	Total
	£000	£000	£000	£000	£000
UKCEH Group					
At 1 December 2019	-	-	-	-	-
Total income and expenditure for the year	8,024	198	-	3,132	11,354
Designated capital transfers	(4,679)	-	4,679	-	-
At 31 December 2020	3,345	198	4,679	3,132	11,354

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. The deficit position at 31 December 2021 is largely due to timing impacts on individual research projects where-by cost is recognised in year but revenue will be recognised on a milestone achievement basis in future periods.

Restricted capital funds are funds provided from UKRI-NERC for sole use of purchasing capital items. The expenditure is the subsequent depreciation of these assets.

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 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. The employer contribution rate during the year was 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 £4,258,639 (2020: £4,768,694) with £62,744 (2020: nil) outstanding at year end.

16. Related party transactions

UK Centre for Ecology & Hydrology's subsidiaries for the year were as follows:
- UK Centre for Ecology & Hydrology Enterprise Limited

UK Centre for Ecology & Hydrology Enterprise Limited

UK Centre for Ecology & Hydrology Enterprise Limited is wholly owned by UK Centre for Ecology & Hydrology (UKCEH). The following transactions took place during the year:

	12 months to 31 Dec 2021	13 months to 31 Dec 2020
Paid to UKCEH:	£000	£000
Management charge to cover licensing staff costs and intellectual property charge	231	288
Science staff cost for research project	208	7
Gift aid donation	351	327
	790	622

At 31 December 2021 UK Centre for Ecology & Hydrology Enterprise Limited owed UKCEH £487,258 (2020: £418,752).

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. It funds scientific research and equipment purchases for the Group and funding for the year was £34,269k as shown in note 2 (2020: £35,552k).

17. Operating lease obligations

	2021	2020
	£000	£000
Less than 1 year	1,590	1,585
1-5 year	6,360	6,295
more than 5 year	28,681	28,683
	36,631	36,563
	12 months to 31 Dec 2021	13 months to 31 Dec 2020
	£000	£000
Lease expenditure in the period:		
Hire of equipment	20	24
Rent of land and buildings	1,584	1,703
	1,604	1,727

18. Acquisitions

There were no acquisitions during the year ended 31st December 2021.

On 1 December 2019, UKCEH acquired the trading business of Centre for Ecology & Hydrology for no cash consideration.

This transaction has been accounted for by the acquisition method of accounting as applied to a Public Benefit Entity combination.

In accordance with FRS 102 assets have been brought in at fair value resulting in an uplift in the value of fixed assets of £6,442,000.

The assets and liabilities of the Centre for Ecology & Hydrology transferred to UKCEH were:

	£000
Fixed Assets	6,442
Cash donation	2,000
Accruals	(500)
Fair value of assets transferred	7,942



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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.

