

Hutton Highlights Winter 2025



The James
Hutton
Institute

Review of landownership data and analyses contributing to the development of the Land Reform (Scotland) Bill



RESAS

Rural & Environment Science and Analytical Services



Scottish Government
Riaghaltas na h-Alba



Acknowledgements
This research is supported by the Rural & Environment Science & Analytical Services Division of the Scottish Government, via the 2022-27 Strategic Research Programme, Scotland's Land Reform Futures project (SRP-E3-1) and through associated cashless funding.

<https://www.scotland.gov.uk/>

Scotland's Land Reform
Futures project website
<https://landreform.futures.hutton.ac.uk/>

Abstract

The Scotland's Land Reform Futures project (SRP-E3-1), as well as additional policy responsive projects, have involved datasets review, integration, and novel analyses seeking to inform the development of the Land Reform (Scotland) Bill (currently passing through Parliament).

This has included work identifying and characterising large landholdings that may fall in scope of provisions set out in the Bill and explores the impact of spatial contiguity of large landholdings (at the request of the Land Reform Bill team).

Regular meetings and correspondence with the Bill team has raised awareness of the Bill, its surrounding elements of the Bill, its surrounding elements with key Scottish Government officials involved in the drafting of the Bill (several of whom have shared positive feedback on the value of this policy focussed analysis), and was cited in the Stage 1 report on the Bill by the Net Zero, Energy and Transport Committee.

Results

The selection of outputs presented here showcases the range of analyses undertaken in support of the Bill. The review outlined the fragmented nature of land ownership data in Scotland – an issue which must be addressed should the Bill come to pass.

Relying on what data there is, particularly the Info Open Scotland dataset, the research team estimated the number of landholdings in scope, explored their characteristics, looked at tenure patterns, assessed the impact of infrastructure, evaluated company thresholds, and offered a possible way forward to address the issue of fragmentation.

This has helped the Bill team understand practical issues that need to be questioned should the Bill pass.



Population – where is it in scope?



Review – does the data you need exist?



Concentration – how might this be quantified? A promising positive risk structure



Contiguity – what do you need to know?



Contiguity – what is a landholding anyway?

"This is amazing Dave, thank you. Just Brilliant."
Andy Proudfoot – Land Reform Bill Team Lead (responding to work on quantifying infrastructure widths – May 2025)

"The work that James Hutton Institute have done to support the Land Reform Bill as part of this SRP has been invaluable, and has been referenced in impact assessments, policy memorandums, and to inform policy. Keith and Dave have made a real effort to understand the policy objectives of the Bill and to present research outputs in a way that allows for policy use."
Nay Tidd – Land Reform Bill team (on the impact of the research – September 2025)

Timeline of activities with key milestones



In this issue:

Hutton Hub welcomes first visitors

**Highland Charm - the first
Scottish-bred blueberry**

**Hutton science delivers huge
economic impact**



Science connecting land and people

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Introduction

Shaping the future; science with purpose

Colin Campbell, Chief Executive of The James Hutton Institute

As we close 2025, I wish to take a moment to reflect on what has been an extremely important year for The James Hutton Institute and to look ahead to an exciting future.

Hutton Highlights showcases the breadth and depth of our work - from pioneering crop innovation and climate-positive farming, to opening our stunning new Hutton Hub in Craigiebuckler designed to harness cutting-edge technology in support of a Just Transition to Net Zero; to the report from BiGGAR economics that showed that for every £1 of Scottish Government funding received we delivered more than £15 in economic value for the UK economy, of which £9 was retained in Scotland. Each story demonstrates our unwavering commitment to our mission, our impact and how our science connects land and people.

I’m also delighted to note the launch of our first fundraising campaign, *Hutton*

Unearthed, this year. This initiative will help us build stronger connections with supporters and partners who share our vision for a sustainable future. Through philanthropic donations, we can accelerate research that addresses the climate and nature crises, ensures food, energy and water security and delivers solutions that make a real difference to communities here in Scotland and around the world.

Looking forward, 2026 will be a landmark year as we celebrate the tercentenary of James Hutton (1726-1797), after whom we are named as an inspiring scientist who changed the world. This anniversary is not just a moment to honour our namesake - it is an opportunity to reaffirm our role as a global leader in environmental and agricultural science and debate how science can change our world again. Our forthcoming **corporate plan** for the next five years will set out how we will continue to innovate, collaborate, and deliver impact at scale, ensuring that Hutton science remains at the forefront of tackling the greatest challenges of our time.

None of this would be possible without the dedication and passion of our colleagues, the trust and support of our partners and the friendship of all who champion our work. Thank you for helping us make a real difference this year. Together, we are shaping a future where land, food, water and energy are managed sustainably for generations to come.

I wish you all the very best for the festive season and in 2026.





Colin Campbell
Chief Executive, The James Hutton Institute



The James Hutton Institute is Scotland’s pre-eminent interdisciplinary scientific research institute at the forefront of transformative science for the sustainable management of land, crop and nature resources that support thriving rural communities in Scotland and across the globe.

The James Hutton Institute magazine team:
editor@hutton.ac.uk

 @JamesHuttonInst  @JamesHuttonInstitute  @JamesHuttonInstitute  @james-hutton-institute  @JamesHuttonInst

Highlights

Mean Steam Machine

An innovative machine developed by the Hutton in collaboration with Powerwasher Services Ltd, was awarded a commendation by the Royal Highland Agricultural Society of Scotland in the summer.

The commendation for the Mean Steam Machine, which controls weeds with steam only, was awarded by the Royal Highland Show's Innovation Awards, previously known as the RHASS Technical Innovation Awards. The name was revised in an effort to broaden the scope of the competition beyond technology, with new categories to highlight the incredible innovations across all sectors of the agriculture industry.

Based on pressure washer technology, the innovation is designed around the needs of agriculture and horticulture, with the tractor providing the services

to run the steam generator (hydraulics for the pump and 12-volt circuit for the burner), matched with a trailed tank for water supply.

The steam machine superheats water to 150°C, delivering large volumes of saturated steam through a covered applicator to kill plant tissue under the hood on contact, within a 'kill zone' of 98°C.

Steam released from the hood quickly dissipates heat, changing to water vapour rendering it harmless to surrounding non-target plants, focussing weed control in a narrow band below the applicator.

The machine comes with different accessories, that have been trialled in different settings, including a full width canopy with roller for grass and arable

and a handheld lance for more detailed work, but has shown most potential in fruit plantations as pictured.

The prototype has been put through its paces in the berry drills at our Invergowrie site and the machine is now available from Powerwasher Services, with interest shown from fruit industry partners and local farmers. It can be produced in different sizes so can be adapted for a range of uses including large scale plantations, polytunnels or smaller scale ventures.



SULA prize for Gwendolyn Kirschner

Congratulations to Gwendolyn Kirschner, Plant Molecular Biologist and Marie Curie Postdoctoral Fellow, who has won a prestigious postdoctoral prize from the Scottish Universities Life Sciences Alliance (SULSA) for her work on the control of root angle in barley.

The prize allows Gwendolyn to raise her profile in Scotland by visiting three Scottish universities to meet staff and deliver a seminar. She also received flexible funding to be used for further career development.

She has chosen to present her research at the universities of the Highlands and Islands, Edinburgh and Glasgow, and said, "This prize gives me an ideal opportunity to meet the plant research community, explore collaborations and learn more about the local resources in Scotland, for example local barley varieties."

Gwendolyn's research asks the question, how do plant stems and branches grow upwards, but roots grow downwards? It is because plants can sense gravity

and orient their growth in relation to it. Scientists already know how roots can sense and react to a gravitational stimulus, such as a rotation, but they don't yet know how roots maintain growth angles over time, and how they maintain angles that are different from vertical.

The seminal roots of barley, the first roots that are established after germination, are an excellent model to study root angle, because all seminal roots have a similar age and similar developmental stage, but they grow at different angles.

This project compares the signalling pathways that take place in roots with different angles to understand if the angle set-point is regulated on the level of gene expression or proteins, and which key players regulate the angle.

The root angle is important because it determines plant root architecture within the soil and thereby the plant's access to water and nutrients. Roots with a very steep angle are positioned

deep in the soil and reach deep-soil water and mobile nutrients such as nitrate, while roots with a more shallow angle cover space at the soil surface and can take up immobile nutrients such as phosphate.

With a better understanding of root angle regulation, scientists can improve plant yields by modifying the root system architecture to increase access to water and nutrients in the soil and in response to adverse environmental conditions, such as drought, ultimately leading to crop varieties that are resilient to climate change and that can thrive in low input systems.

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The Hutton helps farmers in Ghana to adopt climate-smart, regenerative agricultural practices

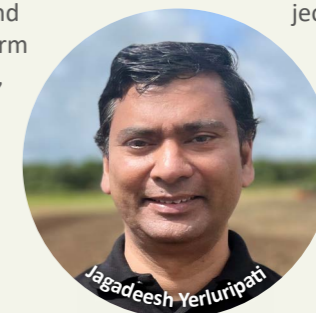
Our scientists are helping farmers in Ghana to adopt climate-smart, regenerative agricultural practices to address the challenges of poor soil health and the increasing impacts of climate change, both of which threaten food security and rural livelihoods.

CarbonXtras was awarded £100,000 from Innovate UK Business Connect and offers an innovative and sustainable alternative to existing practices by helping farmers restore their soil, increase crop yields and access new revenue through carbon-friendly farming.

The project team joined forces with Aberdeen-based Sonavision to design and scale up a low-cost, farmer-

friendly retractable soil sensor. The data captured by this cutting-edge technology will feed into a real-time Monitoring, Reporting and Verification (MRV) platform developed at the Hutton, enabling the prediction of changes in soil carbon and overall soil health when farmers implement regenerative practices such as cover cropping, crop rotation, and reduced tillage.

Jagadeesh Yeluripati, senior scientist at the Hutton explains more: "Many farmers in Ghana struggle to maintain crop productivity due to soil degradation and unpredictable weather patterns.



"Some are resorting to gold mining on their farmlands as a last option, which further damages the soil and jeopardises long-term food production.

"This MRV digital tool, will be tested for its robustness and efficacy in four field trials covering different climate and soil conditions in Ghana, collecting data from farms using specially designed soil sensors and mobile applications, tracking soil health, greenhouse gas emissions and carbon storage. It will provide farmers with tailored advice on improving their practices and adapting to climate risks."

Researchers identify indicators for assessing blue and green space quality

In recent years, green and blue spaces such as parks, woodlands, rivers and lochs have proven themselves as vital tools for tackling global crises such as climate change, biodiversity loss and economic divides.

As well as benefitting the health and wellbeing of those who visit them, studies have shown that these spaces provide vital refuges for threatened species, store carbon, reduce temperatures and offer free places to exercise and socialise.

However, much of the recent research into green and blue spaces has focused on their availability and impact, neglecting variation in quality. Work has shown that the quality of green and blue spaces is much more important than the quantity; however, little has been done to create a method for measuring this quality – until now.

In a recent study, Hutton researchers laid out 72 indicators of green and blue space quality which can be applied in Scotland. These indicators account for the benefits provided to the environment, people, communities and businesses around a space, giving a clear insight into its value and utility.

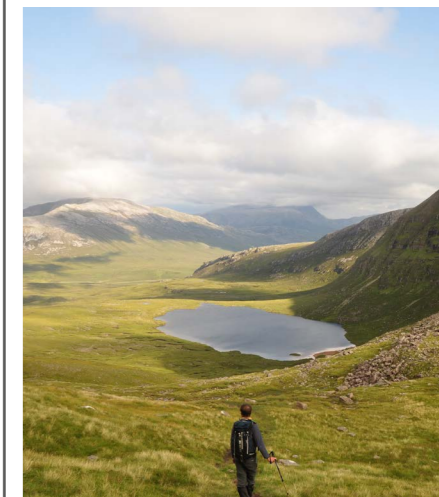
The researchers found a wider range of indicators for people and the environment when compared to communities and businesses, and the indicators used most often when assessing spaces in Scotland weren't always those considered most important by practitioners and stakeholders. This suggests that there's a trade-off between what can be measured (or needs to be measured for reporting) and what is most beneficial to the quality of green and blue spaces.

The indicators were identified using the Four Capitals framework - a method focusing on how a space contributes to natural capital, human capital, social capital and produced capital. Researchers carried out a literature review and conducted both an online survey and workshops in Perth and Aberdeen to gather opinions on the importance of different indicators.

Michaela Roberts, an environmental economist at the Hutton and co-author of the paper, said, "Scotland's green and blue spaces are important for people's health and wellbeing, as well as providing valuable community spaces, opportunities to experience nature, and spaces for business."

"However, the benefits provided by green and blue spaces rely on their quality. We hope that a better understanding of the dimensions of quality of green and blue space in Scotland will help facilitate improvements to quality, and therefore the extent of benefits felt by communities."

The paper, titled *Examining indicators of quality green and blue space: A mixed method study investigating multifunctionality*, was published in Environmental Science and Policy and can be read in full on ScienceDirect.





Events roundup

Plotting the future: A cereal walk

In July, we held three one-hour cereal walks at Balruddery Farm, which is home to over 5,000 field plots demonstrating the wide range of research projects that are part of its International Barley Hub (IBH) programme.

Visitors got to find out how our scientists are exploring the possibility of retrieving valuable genetic biodiversity from wild barley species and reintroducing 'lost' genetic biodiversity into the barley breeding gene pool to future-proof this important crop.

The cereal walks also provided a chance to learn more about the research projects taking place within the IBH and the global impact of this work. Visitors heard about studies into the efficient management of nutrients and fertilisers, combatting disease, the effect of increasingly frequent weather events, reducing greenhouse gas emissions, the development of resilient and sustainable agronomic systems, approaches to refreshing the diversity of the genetically eroded barley breeding gene pool and much more.



Potatoes in Practice



We kicked off August by welcoming more than 670 attendees to our Balruddery Farm in Invergowrie for Potatoes in Practice.

Hosted in partnership with SRUC (Scotland's Rural College) and Agrii this fantastic event brought together exhibitors, farmers, agronomists, academics, students and other leading specialists from across the sector to share knowledge and collaborate in the summer sunshine.

Visitors from across the UK and further afield enjoyed four expert-led seminars

covering modern breeding methods, sustainability, free-living nematodes, and pest and disease updates, along with live field demonstrations of Sky Pin Drones' new XAG P100 Pro – a next-generation agricultural drone designed for precision spraying and spreading.

Fifty-six exhibitors, including Bayer CropScience, Restrain, Seed Potato Organisation (SPO), McCain Potatoes, the Scottish Government and Solana Seeds UK, also joined us to showcase their services and static machinery.

Aberdeen Science Festival

As part of this year's Aberdeen Science Festival, we held a trio of exciting events at our Craigiebuckler campus – bringing together virtual reality, forensic science and Lego!

Powered by Scottish STEM charity TECHFEST, Aberdeen Science Festival is a celebration of the incredible scientific research and innovation happening in Aberdeen. Two of the Hutton events, titled *From Crime Scene to Court* and *Murder at the Boutique Hotel*, focused on forensic science, biology and soil science, while the other, *Using Virtual Reality to support a Just Transition*, focused on the innovative technology in the Hub and how it can be used to aid a Just Transition.

The first was *Murder at the Boutique Hotel*, a workshop which gave children aged 12 and up a chance to try their hand at forensic science by investigating a Lego crime scene. Alongside top forensics experts, such as Lorna Dawson, our budding investigators uncovered clues and pieced together evidence brick by brick. They learned about the main types of evidence gathered by forensic scientists and how DNA profiles are used to identify suspects.

The afternoon workshop was followed by an interactive presentation in the conference suites at our new Hutton Hub, delivered by Professor Dawson and her SCAnDi team. Titled *From Crime*

Scene to Court, this live investigation saw the expert group determine the who, what, where and when of a fictional crime while exploring the future of forensic investigation. The BBC's Fiona Stalker presented the investigation and chaired an interactive panel afterwards, giving the audience a chance to ask questions.

Later in the week, Lee-Ann Sutherland, Head of the International Land Use Centre (ILUSC), showcased the new facilities available at the Hutton Hub during an evening event. She also explained the cutting-edge research in land use and environmental science produced by the ILUSC team, and attendees got the chance to participate in scientific experiments using the Hub's virtual reality technology. The event was a great chance to explore how both the ILUSC and Hutton Hub are supporting a Just Transition for Scotland's North East.



Farming Taster Day

As part of Climate Week North East, we hosted a Farming Taster Day at our Glensaugh Research Farm in September.

This event offered visitors a chance to meet the team behind our Climate-Positive Farming Initiative, a transformational approach to farming that aims to achieve net zero or even negative carbon emissions, whilst also protecting and enhancing the natural assets of a farm and ensuring long-term financial sustainability of the farm business.

Visitors also got to tour the farm and find out more about the incredible projects that Hutton staff are working on. During the 90-minute tour, attendees crossed the stunning Glensaugh landscape and learned about climate-positive farming efforts, such as smart water management, agroforestry, peatland restoration and much more.

Two tours were held as part of the Taster Day – one beginning at 10am and the other at 2pm.

After each walk, visitors headed back indoors for a series of displays on specific research projects at the Hutton. Topics included HydroGlen, which aims to create a hydrogen-powered farm at Glensaugh, and the Climate Innovation Hub, which helps businesses and organisations collaborate with The James Hutton Institute to fast-track solutions to the climate and nature crises.

46th TB Macaulay Lecture



At the beginning of October, in partnership with the Macaulay Development Trust, we delivered the 46th TB Macaulay Lecture at the Edinburgh International Conference Centre (EICC).

This year's speaker was renowned economist and creator of the 'doughnut of social and planetary boundaries' concept, Kate Raworth. A Senior Teaching Fellow at Oxford University's Environmental Change Institute, Kate first introduced the Doughnut Economics framework in a 2012 report for Oxfam. Since then, she has expanded on the concept, and her 2017 book *Doughnut Economics: Seven Ways to Think Like a 21st Century Economist* has been translated into more than 20 languages and read by diverse audiences including

the UN General Assembly, Pope Francis and Extinction Rebellion.

Around 500 people joined us at the EICC to hear Kate explain her revolutionary concept and how it has been applied

throughout the world.

Following the lecture, attendees gathered in Cromdale Hall to enjoy refreshments and discuss the points raised by Kate during her talk.



Generating £15 for every £1 invested – economic report reveals Hutton contribution to UK economy

An independent evaluation of The James Hutton Institute’s economic impact has confirmed an increase in its real-world value – with every £1 of funding towards the Hutton now delivering £15 worth of value for the UK economy.

The impact report, which was produced by Edinburgh-based economic consultancy BiGGAR Economics, assessed the contribution of Hutton science to the UK economy across a number of sectors throughout 2023/24. It confirmed the status of the Hutton as a key component of Scotland’s research and economic infrastructure, with £9 of the £15 generated remaining in Scotland.

Additionally, £61.8 million of Gross Value Added (GVA) was retained close to the Hutton’s two main campuses – £40 million in Dundee city region and £22 million in Aberdeen city region.

The report also found that a total of 2,575 jobs were supported by the Hutton, of which 1,525 jobs were in Scotland and 740 jobs were in the Aberdeen and Dundee city regions.

Of the sectors assessed by the report, food and drink was found to benefit the most from Hutton research. In 2024, our work was worth £221.3 million to the UK food and drink sector, supporting around 1,185 jobs in the industry. A major factor in this boost to GVA is the increase in the value of commercial research contracts secured by Hutton staff. Since 2016, this figure has risen from less than £1 million to around £2.6 million, a feat made

even more impressive by the fact that this period also saw the UK leave the European Union – a development which was expected to make it much harder to secure research funding.

Another important contributor to the rise in GVA for the food and drink sector is the emergence of a thriving innovation ecosystem at the Hutton. This is due, in part, to the creation of the International Barley Hub and the Advanced Plant Growth Centre at our Invergowrie campus. Both of these additions were made possible through the Tay Cities Region Deal, which brought major investment into our Invergowrie site.

In addition to our contribution to the food and drink industry, Hutton research helps the UK adapt to and mitigate the impacts of climate change. Our expertise shapes resilient agricultural practices, preserves biodiversity, protects and restores natural habitats, reduces the carbon footprint of agriculture and enables societies to thrive in the face of a changing climate. Though these impacts are hard to quantify in economic terms, they contribute heavily to the Scottish Government’s sustainability, environment, biodiversity, climate change and net zero agendas. Additionally, they represent a huge

benefit by preventing future spending in the face of mounting costs caused by climate change. Our action-based approach, which can be seen through projects such as the Climate-Positive Farming Initiative and the HydroGlen green hydrogen farm at Glensaugh, provides a blueprint for adapting to climate change and mitigating its impacts in the rural sector.

This economic impact report demonstrates the importance of the unique research conducted by the Hutton, which brings together expertise in both natural and social sciences. The scale of the economic and societal contribution made by the Hutton is a result of its long-standing mission and focus on issues of strategic national (and international) importance, underpinned by decades of institutional experience, globally important collections of genetic resources and specialist research and demonstration facilities that have taken years to accumulate.

Speaking about the report, Colin Campbell, CEO of the Hutton said, “It’s clear that investment in our excellent

science makes an incredible contribution to the Scottish, UK and global economies and shows that science is a safe and productive investment.

“While the economic impact is large, it is most visible as the tip of the impact we have in terms of environmental, social and economic benefits.”

“We are grateful to our funders – particularly the Scottish and UK governments – who trust in our science and are rewarded with the types of figures we are reporting today. We know we are in a race against time to address the far-reaching impacts of the climate and nature crises on our economic, environmental and societal sustainability and to protect our food, energy and water security. Hutton science shows the value of understanding our world better, and providing solutions that people need and want. Increased investment in science remains critical to our shared long-term goals.”





Highland Charm – the first Scottish-bred blueberry

Our soft fruits team was delighted to announce that it has successfully bred Scotland’s first blueberry.

Highland Charm is the result of 10 years’ research, during which more than 300 unique blueberry crosses have been made and evaluated to find a selection bred from the native north American species (*Vaccinium corymbosum*) that can flourish in the Scottish climate.

Blueberry breeder, Susan McCallum, said,

“This cultivar is a real standout. It combines high yields, excellent fruit size, outstanding flavour, with a balanced sugar-acid profile and a satisfying bite, and an impressive shelf life.

“It is reliable and has performed well in our trials year after year, with consistent yield, size and taste. Growers are really excited about it.”

The new berry has been successfully trialled in the UK and the EU, constantly performing well across multiple seasons and diverse conditions. Researchers are now exploring how the cultivar fares under different growing conditions and with reduced input systems, aligning with the industry’s goals for sustainability and efficiency.

Scotland’s fertile soils, abundant clean water, and milder summer temperatures create ideal conditions for producing

high-quality berries. Cooler summers extend the ripening period of soft fruit, allowing for greater accumulation of sugars and acids, resulting in a more intense, well-balanced flavour compared to berries that ripen rapidly in hotter climates.

“This cultivar is a real standout. It combines high yields, excellent fruit size, outstanding flavour, with a balanced sugar-acid profile and a satisfying bite, and an impressive shelf life.”

UK consumers buy around 60,000 tonnes of blueberries a year but 90% of them are imported from overseas. Our researchers believe blueberry has tremendous potential for expansion. Highland Charm will meet the demands of the industry for home grown fruit, and its climate resilience represents a significant advance for growers.

Susan hopes the new berry will encourage consumers to buy in-season, local fruit. She said, “They are fresher with higher health benefits than imported berries that take six weeks to get from the field to the shelves.

“The imported fruit is often picked slightly too early and while its colour continues to develop, its flavour does not. I guarantee people will taste the difference with in-season, local fruit and will want to go back for more.”

Highland Charm is currently going through the licensing process that will declare it to be a novel and unique blueberry and should be on our supermarket shelves in around two- or three-years’ time.

We were not the only ones excited about the new blueberry. It featured on BBC’s The One Show along with several radio news items.



Hutton research suggests Scottish boar boom

Though they were once gone from Britain, wild boar have seen a resurgence in Scotland’s forests since the 1970s – and new Hutton research suggests they’re here to stay.

Also known as feral pigs, these omnivorous mammals became extinct in Britain during the 14th century. However, they have returned to the nation’s woodlands through a combination of accidental escapes and illegal reintroductions, with sightings reported throughout Scotland’s forests and glens.

Now, new modelling from The James Hutton Institute, King’s College London and the Zoological Society of London shows that these one-off releases and escapees have developed into self-sustaining populations, with numbers expected to rise dramatically over the next 50 years.

The model, which was created by PhD student Connor Lovell, predicts that Scotland’s boar population will grow from 1,472 to 2,399 by 2075. This



growth in numbers could result in boar exploring an additional 131km² of territory each year, though they’re expected to stay away from highly urbanised areas such as the Central Belt. Instead, existing populations in the West Highlands and Dumfries and Galloway are expected to grow, along with less documented populations across Perthshire, north Stirling, Moray, and Aberdeenshire.

Connor’s model is the first to provide such a detailed simulation of boar dynamics at scale across Scotland. It takes into account birth and death rates, along with movement patterns and habitat preferences. Even social behaviours, such as rutting and herd formation, are considered.

While the model does have some limitations, such not accounting for climate change, adjustments to land use, and the poorly understood behaviour of female dispersal, Connor and his team believe the program could be used in the future to support compensation schemes or even targeted boar culls. They hope to create new versions of the model which reflect the socio-economic impacts of increasing boar populations, such as crop damage costs and hunting revenues.



Though they help with ecosystems with behaviours such as rooting (digging through soil to find roots, tubers, insects and other food sources) and can support rural communities through hunting and tourism, wild boar can also bring a number of issues. Their messy search for food can cause significant damage to gardens and farmland, leaving locals with costly repairs and financial losses. They are also capable of passing diseases to livestock and can even injure pets, leading to calls for stricter control of the animals.

These concerns only increase the importance of the research being carried out by Connor and his colleagues. He said, “With wild boar back in Scotland, this model is a key step to understand where boar could go, how big their populations could be, and where they could impact ecosystems and local communities.”

The full study, titled *Projecting population dynamics and range expansion of reintroduced wild boar in Scotland using agent-based modelling*, was published in the journal Ecological Informatics and can be read in full on ScienceDirect.

Hutton Hub welcomes first visitors

A new development at the Hutton's Craigiebuckler site will provide a space for businesses, academics and the local community to work towards a Just Transition in the North East – all while grabbing a cup of coffee and a snack!

The Hutton Hub, which is now open to the public, is a multi-million-pound renovation of our campus funded by the Scottish Government's Just Transition Fund, the Macaulay Development Trust and the UK Department for Science, Innovation and Technology.

This new space was heavily inspired by nature and outdoor themes, which are reflected in the reclaimed wood and natural colours of its biophilic design. It includes cutting-edge technology and facilities such as VR and augmented reality headsets, interactive displays and touch tables, a podcasting suite, a video and sound editing suite, two spacious lecture theatres and a 360-degree Immersive Suite.

Developed in collaboration with AV One Solutions and 7thSense, this immersive space contains surround sound and nine projectors – allowing videos, graphics and images to be displayed on all four of the suite's walls. Additionally, the Immersive Suite is equipped with a media server and a games engine, creating the opportunity to construct simulated environments that completely surround the viewer.

The long-term aim of this project is to lead by example, showcasing the Hutton's technical capabilities and enabling cutting-edge research through top-of-the-range equipment and facilities. Collaboration - with businesses, the public and other

academic institutions – is a key part of this vision, and the Hub's physical and social infrastructure is being designed to attract microbusinesses focusing on net zero to relocate or emerge from within. Facilities at the Hub will be available for hire, creating a net zero-focused workspace for new organisations, community groups and spin-in/spin-out companies, and enabling easier access to specialist equipment and datasets to facilitate innovation for a range of stakeholder, industry and policy groups.

However, the Hub offers more than just technology. Along with the VR equipment, podcasting facilities and Immersive Suite, the development boasts a stimulating science café, where members of the public can stop in to learn more about the Hutton's research while enjoying a cup of coffee and a delicious meal.

With the facilities open to the local community, it is hoped that the Hub will be an epicentre for initiatives relating to just transitions, community planning and working with STEM.

Already, the Hub has wowed leaders from Aberdeen's business community. Professionals from a wide range of industries, including tech, education, oil and gas, and the media, toured the facility as part of a Business Breakfast hosted by the Hutton. Visitors got to experience the Immersive Suite and VR technology while exploring the new space and learning about some of the fascinating research taking place at our Craigiebuckler campus. Feedback was overwhelmingly positive, with many visitors expressing an interest in making use of the space for their own events – and one even remarking that the café's full Scottish breakfast might be the cheapest in Aberdeen!

Academics and policymakers have also made use of the Hub, which hosted the Scotland Land Reform Futures

Symposium in November. This two-day event brought together a host of land reform researchers and experts to showcase their work around land reform in Scotland and learn from international experience. Attendees came from as far afield as Canada, France, the Netherlands, Belgium, Germany, Italy, New Zealand, and Japan, and notable speakers included Michael Russell, chair of the Scottish Land Commission, and Mairi Gougeon MSP, Cabinet Secretary for Rural Affairs, Land Reform, and Islands. While presentations were hosted in the two conference suites, attendees also made use of the Immersive Suite to display maps, illustrate data and show films related to their work.

However, it's not just researchers who have had the chance to enjoy a film in the Immersive Suite. The same month, members of the public came along to the Hub for a screening of *Three Words for Forest*. The film, which was produced as part of the Future of UK Treescapes programme, is a recording of a verbatim play based on interviews with 30 forestry specialists working across a range of roles and locations. The play was originally performed at James Arnott Theatre in Glasgow, and our projectors and surround sound did an incredible job of recreating the live experience. After the screening, attendees enjoyed a complimentary lunch and discussed the issues raised in the play.

Our new Hutton Hub has already hosted some incredible events, and we're keen to keep the calendar full. If you'd like to make use of the facilities, or just want to learn more about this fantastic space, please email: VenueServices@hutton.ac.uk.



Lee-Ann Sutherland with Cabinet Secretary for Rural Affairs, Land Reform, and Islands, Mairi Gougeon, and Annie McKee at the Immersive Suite.





Lessons to save our soil

An opinion piece by soil scientist Roy Neilson and social scientist, Karolina Trdicova, published in the *European Journal of Soil Science*, urges us all to play our part in protecting our soil and to heed the lessons learnt from those who have been championing actions to mitigate the effects of climate change.

Soil is an often-ignored natural asset that contributes to our daily life. Soil supports food production, is core to our iconic landscapes, hosts approximately 60% of all biodiversity, helps mitigate climate change impacts and underpins our daily infrastructure such as roads and buildings.

But due to human activities, our soils are becoming increasingly degraded, and soil health and the ability of soils to fully function is declining. To address this decline and the capacity of soil to perform as a vital living ecosystem that sustains plants, animals and society, it is important that everyone comes together to help protect and improve soil health.

Karolina said, “Positive societal action for soil protection requires effective communication, so there is an opportunity for lessons to be learnt from the communication on climate change which has been arguably ineffective in generating the necessary positive action

from all members of society.”

She argues that we have the chance to avoid some of the pitfalls that may give rise to the feeling that the situation is already hopeless, and that setting ‘deadlines’ or ‘tipping points’ has not proved to be a helpful strategy in communicating the climate emergency.

The whole piece, *The Language of Soil: Learning the Lessons from Climate Change*, can be read on the British Society of Soil Science website.

The Hutton is responsible for the National Soils Database for Scotland.

Diversifying Sitka spruce woodlands could boost biodiversity and resilience

Even if you’re unfamiliar with Sitka spruce, you’re likely to have seen it before. This towering conifer, first brought to the UK from the forests of North America’s Pacific coast in 1831, has since become the most common species in the nation’s commercial forests.

Used for timber and paper production, the imported spruce was historically planted in monocultures, creating substantial forests with little to no other species. While these Sitka-dominated woodlands are productive, research has shown that they do little for biodiversity – and may be more vulnerable to threats such as climate change and disease.

A recent paper authored by researchers from The James Hutton Institute, the RSPB, the Royal Botanic Garden Edinburgh and the University of Aberdeen found that diversifying the nation’s Sitka spruce forests could provide biodiversity benefits and increase their resilience to pests, diseases and changes in climate.

To begin with, the researchers conducted a literature review and identified 564 species (12 birds, 147 bryophytes, 28 non-lichen-forming fungi, 123 invertebrates, 243 lichens and 11 mammals) that use the Sitka spruce for feeding or as a living space. While

the number seems high, many of these species are non-specialists and can survive on a wide range of trees.

The scientists then assessed 34 tree species that could be planted with Sitka spruce for their impacts on both biodiversity and ecosystem function. Species were assessed for their leaf litter decomposition traits, influence on the soil and leaf litter chemistry, as well as their ability to grow alongside Sitka spruce, support Sitka spruce-associated species and nurture additional biodiversity.

They found that diversifying Sitka-dominated forests with oak, sycamore, Scots pine, birch, beech and Norway spruce would provide the greatest biodiversity benefits, supporting both the species found on Sitka spruce

and additional biodiversity. However, aside from sycamore, all these tree species struggle to grow long-term when planted next to Sitka spruce. To solve this problem, the paper’s authors suggest planting ‘blocky mixes’ – small sections of single tree species which connect the forest like a patchwork quilt. This would provide biodiversity and resilience benefits without majorly impacting timber production.

The paper, titled *Sprucing up the UK’s Sitka spruce (Picea sitchensis) forests: can tree species diversification benefit biodiversity?*, was published in *Forestry: An International Journal of Forest Research* as part of *DiversiTree* – a collaborative project aimed at increasing woodland resilience through greater tree species diversity.



Developing sustainable alternatives to harmful pesticides

We are proud to announce the Hutton’s participation in Crop Protection Strategies for the Transition to Environmentally-Friendly Agriculture (CROPSAFE), a €4.9 million project funded by the EU’s Circular Bio-based Europe Joint Undertaking and its members (CBE JU) and led by University of Alicante.

The four-year initiative brings together research and technology organisations to develop sustainable, bio-based pest control solutions for key food crops under threat from rising pest pressures and the phase-out of toxic pesticides. It is expected to produce a new generation of bio-based pest control tools that are both environmentally friendly and economically viable, supporting the EU’s Green Deal and Farm to Fork strategies.

Plant Pathologist, Lorena Rangel, said,

“It’s exciting to be part of a collaborative effort with researchers across the UK and EU, all working toward finding effective biological alternatives to synthetic pesticides. Embracing sustainable and circular economy solutions is not just forward-thinking, it’s becoming essential.”

Plant Nematologist, James Price, who is leading one of the 10 CROPSAFE work packages, said, “This project responds to a crucial requirement to manage currently unsustainable pathogen pressures using bio-based alternatives to classic pesticides that are often associated with harmful off-target effects on the wider environment.

“Rapidly combining testing of the mode of action for these novel bio-based products with scaled up greenhouse and field trials using formulated products separates this project from many others. CROPSAFE also promises to go beyond the laboratory, disseminating results directly to stakeholders at in-field events ensuring a legacy for the project past the completion date in 2029.”

According to the United Nations Food and Agriculture Organization (FAO), approximately 40% of global food crops are lost annually due to pests and diseases. While conventional

chemical pesticides have been effective, they pose significant environmental risks, including soil degradation, bioaccumulation in non-target organisms, and contamination of water sources. Many of these substances are now labelled ‘Substances of Very High Concern’ (SVHC) or ‘Candidates for Substitution’ (CfS) by the European Chemicals Agency (ECHA) and are being progressively withdrawn from the EU market.

This regulatory shift has left many farmers without viable crop protection options. Despite this, the development

of commercial biopesticides (pesticides derived from natural organisms or substances) is lagging behind the demand, with bio-based products accounting for only 5% of the current market by value. CROPSAFE aims to fill that gap by developing cost-effective, bio-based alternatives that could increase yields by up to 20% and reduce greenhouse gas emissions associated with crop protection by as much as 75%.

The project will focus on three urgent crop-pest cases, potatoes, tomatoes and bananas.

Potatoes are threatened by potato cyst nematode (PCN). The most effective control agent, Fosthiazate (CfS), will lose its approval in 2027.

Tomatoes face up to 65% yield losses from root knot nematode (RKN). Metham sodium (CfS), widely used against RKN, will be withdrawn this year.

Bananas are increasingly impacted by *Banana Weevils (BW)*. The go-to pesticide, Lambda-cyhalothrin (CfS), is set to expire in 2026.

Complementary field trials for tomato and banana will be conducted by partners in Italy and Spain. Across all sites, results will be integrated into advanced decision-support tools to enable real-time, location-specific pest management strategies for farmers.

More information is available on the CROP SAFE LinkedIn page.





Investment for Ribena blackcurrants

Amanda Moura

The Hutton's Scientific Services announced an investment of £920,000 over the next five years from Suntory Beverage and Food GB&I (SBF GB&I) to support the development of more resilient blackcurrant varieties that deliver the iconic taste of Ribena.

This investment will accelerate work to develop new varieties of berries that produce consistent yields in the face of climate challenges. Blackcurrants will be bred to withstand extreme weather, pests and diseases, while still preserving their taste.

Amanda Moura said, "This work offers greater security and long-term sustainability to our growers and to the industry. It is a great pleasure to be part of a project like this and to contribute to a fruitful future for British blackcurrant production.

"We all know that blackcurrants are incredibly powerful for our health. Our breeding programme focuses on maintaining high natural content of vitamin C and anthocyanins and enhancing their natural sweetness."

The Hutton breeding programme, created in partnership with SBF GB&I, has several core objectives which focus on delivering consistent yields, resilience and the distinct Ribena flavour profile.

Researchers aim to support more reliable flowering and fruit set even under unpredictable weather conditions. New field-based and laboratory tools will deliver earlier and more accurate yield

forecasts, giving growers the confidence to plan around unpredictable or extreme weather events.

As plant protection products continue to be withdrawn in the UK, growers are becoming more reliant on varieties with strong natural resistance so the breeding programme will prioritise cultivars that can withstand major field pests and diseases, reducing the need for chemical control. Using molecular markers developed at the Hutton, plants resistant to these threats can now be identified early in the breeding process and are currently being trialled to support more sustainable blackcurrant production.

Every potential berry type will undergo flavour and nutritional testing to ensure that the iconic taste of Ribena is retained, while health benefits are potentially increased.

New phenotyping facility

The Hutton's new high throughput phenotyping facility was officially opened with a visit by Scottish Enterprise Chief Executive, Adrian Gillespie in October.

The cutting-edge plant phenotyping platform is designed to enable researchers to replicate current, and predicted, global crop production conditions. It will facilitate some of the most pioneering research into crop resilience being carried out anywhere in the world.

Dr Rob Hancock, Deputy Director of the Advanced Plant Growth Centre, said, "This new facility accelerates the identification of key traits for crop resilience, yield improvement and stress tolerance, climate change adaptation, sustainable agriculture and precision farming. By leveraging Hutton expertise in genetics, we will enhance industry collaboration to bring the new varieties needed to support agriculture more quickly. Moreover, the facility directly supports new developments in controlled environment agriculture (CEA) and vertical farming."



Scottish Government Ecosystem Funding to develop innovation campus

We were delighted to receive almost £40k from Scottish Government to develop a clima-tech and agri-tech innovation campus at our Invergowrie campus.

The grant, which comes from the government's Ecosystem Fund, will be used to develop a pipeline of commercial opportunities, build a broad network of stakeholders, strengthen the Hutton's image worldwide and create a business case for further investment.

The new campus will support spin-out and spin-in companies, creating new jobs and positioning Scotland as a global hub for high-growth ventures in agri-tech and clima-tech.

Along with these developments, the funding will be used to provide sector-wide introductory training in commercialisation for 100 participants, with 50 participants also receiving translational training to help turn their early ideas into defined commercial opportunities. Participants will then work together in five commercialisation teams to develop investor-ready propositions.

The final step of the training will see participants showcasing their ideas to potential investors at an industry event.

By providing training and investing in our Invergowrie campus, the Hutton will create the foundation for a cutting-edge innovation campus, incubating new opportunities in both clima-tech and agri-tech.

Dr Graeme Rogers, Innovation Manager said, "We're delighted to have been selected through the Ecosystem Fund's application process to launch a project that will catalyse the development of a clima-tech and agri-tech innovation campus at The James Hutton Institute.

"This funding will enable us to deliver commercialisation and translational training to early-stage innovators, build a strong pipeline of investment-ready opportunities, and grow a dynamic network of partners across academia, industry, and the investment community.

"It's an exciting step towards establishing a globally recognised hub for climate and agriculture innovation in Scotland."

Hutton Scientific Services to open Scotland's first lab for anaerobic digestate analysis

We're always looking to improve the range of customer services we offer through Hutton Scientific Services, the commercial wing of The James Hutton Institute. Already, our scientists provide world-class research and technical expertise in agriculture, food security and the environment to clients around the world – and a new service could soon be available.

Hutton Scientific Services recently announced plans to open Scotland's first lab capable of analysing anaerobic digestate within the next year.

A useful soil improver, anaerobic digestate is made up of the leftover material produced when organic waste is broken down by bacteria in a sealed anaerobic digester. These digestates can provide a useful alternative to synthetic fertilisers. However, before they're applied to a field, they must be tested against the quality requirements laid out in Publicly Available Specification 110 (PAS 110).

The Hutton plans to begin offering this testing from 2026, becoming one

of only three organisations in the UK capable of doing so. By becoming the first in Scotland, the laboratory will allow for a more localised analysis service, contributing to the green economy. The crop trial growth facilities at the Hutton will also make it possible to test and demonstrate the effectiveness of digestates on-site, providing another valuable service for clients.

Gareth Newman, Business Development Manager said, "We're excited to introduce a more locally accessible service for Scottish AD producers seeking material testing.

"We're also expanding our testing to include other organic waste materials beyond digestate—with the necessary approvals from SEPA, these too could be considered for land application."

As part of the lab's setup, Gareth and his team are inviting digestate producers for material and advice on the level of service expected. If you would like to provide either of these, or just want to learn more about what is offered by Hutton Scientific Services, please contact Gareth Newman (Gareth.Newman@hutton.ac.uk).





Two potatoes added to the approved list of varieties in Kenya

Two potato varieties, bred in a joint project between Hutton Scientific Services and Greenvale AP, have been included in Kenya's National Variety List.

Malaiika, named after the daughter of a farmer who was integral to the early field trials, and *Glen*, reflecting the Scottish heritage of the varieties, have passed the obligatory National Potato Trials and have also been approved by processors in Kenya.

Research carried out as part of the project showed that Kenyan smallholder farmers need potato varieties that have low dormancy (the length of time before they start to develop sprouts) that can be replanted quickly after harvest, and that are fast cooking to reduce fuel use. These new varieties combine these traits with resistance to potato cyst nematode (PCN), which is currently devastating the Kenyan crop. They mark a major breakthrough in controlling this pest and have the potential to be of value in the countries surrounding Kenya where PCN is also present.

The project was a collaboration with the University of St Andrews, the International Institute of Tropical Agriculture (IITA), the International Potato Center (CIP) and the International Centre of Insect Physiology and Ecology

(*icipe*), as well as the Kenya Plant Health Inspectorate Service (KEPHIS) and Seeds2B.

John Jones, Hutton lead on the project, said, "The release of these two varieties is the culmination of many years work and is a collaboration between social scientists, crop scientists, plant breeders, the Kenyan Government, seed suppliers and farmers. I'm delighted that we have passed this critical milestone."

Potato is the second most important food crop in Kenya after maize and

benefits some 2.5 million people across the potato value chain. With an approximate value of \$500 million per annum, potato is a key economic agricultural driver for Kenya.

Currently around 90% of growers source seed from their own farm or from neighbours with only 6% buying from certified seed suppliers. The information collected during this project will be used to shape plans for distributing the new potatoes and to give growers the confidence to grow these new varieties.



Scorching summer effects on potato



As the Met Office declared that summer 2025 was the warmest summer on record for the UK, Ian Toth, Director of the National Potato Innovation Centre (NPIC), warned that Britain is not at all prepared for the effects of climate change on our crops.

NPIC is already developing potato varieties that are more resilient to high levels of heat or rain, as well as to new pests and diseases, but Ian is adamant that faster action is needed to get these alternatives into production.

He said, "It's very difficult to produce good quality potatoes when the climate is leading to hot, dry weather. Whether it's next year or the year after, we are

certainly going to see the consequences on potato crops.

"The technology to mitigate against the impacts of extreme weather is out there but we need to act faster."

Potato is the second main food crop in the UK, but Ian maintains that unless action is taken, we will no longer be able to rely on what we can produce here and will have to import our potatoes.

Head of climate attribution at the Met Office, Dr Mark McCarthy, said, "Our analysis shows that the summer of 2025 has been made much more likely because of the greenhouse

gases humans have released since the industrial revolution.

"In a natural climate, we could expect to see a summer like 2025 with an approximate return period of around 340 years, while in the current climate we could expect to see these sorts of summers roughly one in every five years."

NPIC was one of a range of groups that hosted farmers from around the UK last year to discuss the immediate and long-term threats to their crops. Climate change was cited in the top five challenges by farmers, who all agreed on the need for new, more fit-for-purpose varieties.



The Interview

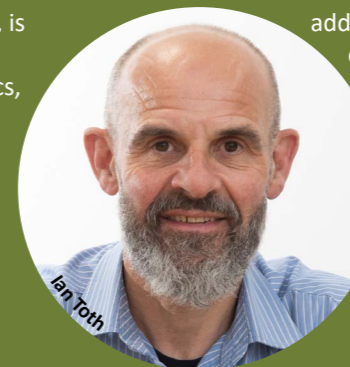
The Hutton continues to explore new ways to address the climate and biodiversity crises and ensure a reliable, sustainable supply of healthy food across the globe. The National Potato Innovation Centre (NPIC) is an exciting new venture that will allow our scientists to advance their cutting-edge research and make the most of the new technologies available.

We caught up with NPIC Director, Ian Toth, to find out more.

What is NPIC and how is the Hutton involved?

"NPIC, the National Potato Innovation Centre, is one of several crop centres developed by the Hutton. It works in partnership with academics, industry and government in the UK and beyond to carry out scientific research to future proof the potato industry and support economic resilience and growth.

It is currently a virtual centre though we are planning a state-of-the-art innovation centre, to be housed at our Invergowrie campus.



What are the main aims of NPIC?

NPIC will look to work together with industry and government to deliver solutions to industry. It will generate a creative cluster, where these different groups can come together to produce new findings, innovative products and highly skilled people in the sector.

The Hutton is already renowned for potato science and is the UK's biggest R&D centre for potatoes, so we will be building on all of that. We have extensive expertise in delivering commercially successful varieties for major breeding companies and have a track record in delivering applied science for the whole industry.

We are currently developing sustainable, climate resilient production systems using precision agri-tech tools such as robots, drones, below ground phenotyping, AI and modelling, that will help control disease, manage waste and contribute to net zero farming systems.

Looking ahead, we would like to do more research on novel uses of potato, such as plant-based vaccines and opioids, cosmetics and fibres made from harvest waste. The potato plant can be used for more than just food. Currently, the 40% of the plant that is above the ground is chopped down and ploughed back into the field, failing to exploit the richness of this commodity.

We'd also like to secure funding for up to 15 PhD students, working with industry partners, as we know that companies are finding it difficult to recruit technically experienced people with the necessary skills to drive the industry forward.

What advantages would a physical centre bring?

A physical space, with a glasshouse, would speed up our breeding programmes. We could exploit the genes from the Commonwealth Potato Collection, housed at the Hutton, and make use of IGS's vertical towers. New facilities to develop novel ways to exploit potato waste and new crop protection methods would greatly enhance our ability to help meet the industry's challenges.

It would also allow us to co-ordinate with different groups in the UK and beyond and bring people here to work together within NPIC. Of course, we already have people from the potato industry coming here for meetings so we are engaging with them now, but it would be great to have a place where industry and science meet regularly.

Why is potato so important?

Potato is a globally significant crop that provides sustenance for over a billion people worldwide and plays a vital role in addressing food security. It is one of the healthiest carbohydrates and the only staple food that provides all the essential amino acids we need.

It is the second most important staple food in the UK, after wheat, and the third most important worldwide.

I feel that we don't say enough about the strengths of potato, why it is so good, and why Scotland and the UK are so good at producing it.

It is economically important too.

- Potato production is worth £4.3b to the UK economy and £1.6b to the Scottish economy.
- The export market for UK seed potatoes is worth £55m.
- The seed potato sector in Scotland provides 80% of seed for the UK ware market (potatoes grown specially for human consumption, as distinct from seed potatoes or those used for industrial processing).

What is NPIC doing in the immediate future?

We will host a major potato summit next year at our Invergowrie campus for members of the government, industry and academia from across the UK to come together to identify how, together, we can support resilient domestic production and sustainable growth of this sector.

In my role as President of the European Association for Potato Research (EAPR), I will also lead its 23rd Triennial Conference in Edinburgh in June 2027. This prestigious event will see leading scientists, industry experts and policy makers gather from around the world to shape the future of potato science and production."



Scan here to stay connected with the National Potato Innovation Centre.



Could bees be the answer to PFAS monitoring?

It's no secret that bees do plenty to help our environment. These little black and yellow insects are vital pollinators, playing a key role in the reproduction of many plant species and helping support food crops across the world. However, according to new research from The James Hutton Institute, these fuzzy friends could have even more to offer their ecosystems.

New research from Dr Viktoria Mueller, conducted in collaboration with experts at the University of Graz, has shown that honey bees can be used to monitor levels of PFAS in the environment.

PFAS, short for per- and polyfluoroalkyl substances, are a group of more than 12,000 man-made chemicals used in everyday items such as frying pans and waterproof jackets. Sometimes referred to as "forever chemicals", these compounds are known for their resistance to degradation and can often take years or even decades to break down. In addition to their longevity, PFAS have been linked to serious health issues such as cancer, liver damage and infertility.

First popularised in the 1940s, these "forever chemicals" have since become

so prevalent that background levels can be found across the world in the atmosphere, plants, pollen and nectar. Despite this, scientists often struggle to find methods of monitoring PFAS concentrations within small areas and short time spans – pushing Viktoria and her colleagues to think outside the box.

In an experiment which is believed to be the first of its kind, a team of researchers from the Hutton and the University of Graz sampled western honey bee colonies in eastern Austria for signs of PFAS contamination.

Honey bees were chosen as they usually forage within 2–3km of their hive and only live for three to four weeks – meaning they provide an excellent indicator of PFAS contamination over a short time frame in a small area.

Working with both scientists and citizen-scientist beekeepers, the team collected samples of forager bees, hive bees and pollen from six locations between April and August 2024. A sample was selected every month, with sites covering a range of land uses including urban, semi-urban, rural and agricultural. Each sample consisted of 20 bees, allowing



researchers to get the information they needed without damaging the wider colony.

Detectable levels of PFAS were found in every sample type at every location, with nine different types of PFAS identified across the 90 samples. The highest concentrations of PFAS appeared, on average, in hive bees, followed by forager bees and then pollen.

Their full study, titled *PFAS in the buzz: Seasonal biomonitoring with honey bees (Apis mellifera) and bee-collected pollen*, was published in the journal Environmental Pollution and can be read in full on ScienceDirect.

Hutton work inspires Aberdeen teens to create reforestation robot

A trio of Aberdeen teens has teamed up to develop an award-winning reforestation robot after being inspired by The James Hutton Institute.

The prototype, named ThistleDroid, can assess if an environment has potential for reforestation and disperse seeds appropriate to the area.

The idea came about after S5 student Anjishnu Bhaduri spent the summer working on an afforestation project with Dr Alessandro Gimona. Together, the pair used the ECOFOREST (ECOsystem services and reFORESTation) tool – a web-based program developed by Dr Gimona which helps non-expert users identify the most promising areas for tree planting using a range of data including ecosystem service maps and the needs of individual tree species.

Inspired by this work, 16-year-old Anjishnu took it upon himself to create a machine which could reforest high-potential areas automatically. He teamed up with friends Adwait Sharma (16) and Jayawant Sivarajan (15) and, under the mentorship of Anjishnu's dad Aranya, the trio designed and built ThistleDroid.

Using multiple onboard sensors and a high-resolution, low-light camera, ThistleDroid gathers vital data, including soil measurements and quality imagery. The home-built robot then uses AI to assess an area and, if the right conditions are found, disperse the seeds needed for reforestation.

ThistleDroid is fully autonomous, using a built-in GPS to navigate without a human pilot. According to its creators, the machine could make ecological

restoration and environmental study much more cost-effective while reducing the manual labour required.

After developing the robot, the trio entered it into the World Robot Olympiad UK 2025. The entry won first place in the Senior Future Innovators category, and the teens have been invited to represent Great Britain alongside other UK winners at the International World Robot Olympiad in Singapore in November.



Introducing the Hutton's new Philanthropy Office

We are delighted to announce the launch of our Philanthropy Office at The James Hutton Institute – a new initiative designed to strengthen partnerships, encourage engagement with science and enhance the impact of our research for people and the planet.



The Philanthropy Office is the central hub for all philanthropic engagement at the Hutton. Its priority is to connect supporters with opportunities to contribute to our research, whether through major gifts, corporate partnerships, legacy giving, or mass fundraising initiatives. By aligning the interests of our supporters with the themes and priorities of our work, we aim to create meaningful, lasting impact for society and the environment.

One of our key objectives is to strengthen the Institute's charitable profile. To achieve this, we have been collaborating with The Lane Agency to develop our new fundraising campaign, *Unearthed*. A highlight of the campaign is a three-minute video narrated by actress Ashley Jensen, which showcases the vital work we carry out at the Hutton across four thematic areas: **land, food, water, and energy**.

We have also recently launched our **fundraising website**, designed to highlight how our research addresses global challenges, from sustainable food production to climate-resilient landscapes. In addition, our **Friends of Hutton membership programme** offers people a new way to get involved, contribute to our research, and stay connected with the latest news and discoveries from across the Institute.

We are extremely grateful to everyone who has contributed to our work so far, and we look forward to building new partnerships through the Philanthropy



Office. Through collaboration and commitment, we can unearth the discoveries that shape a more sustainable future.

To learn more about the Philanthropy Office, our fundraising campaign, or how to get involved, please reach out to a member of the team at: philanthropy@hutton.ac.uk or visit our brand new fundraising website: unearthed.hutton.ac.uk.



Jules Haston

Head of Philanthropy Office



Helena Geddes

Philanthropy Manager - Individual Giving



Liz Bassindale

Philanthropy Manager Trusts and Foundations



Groundwater decline in Malawi

An article published in *The Journal of Hydrology: Regional Studies* showed how Malawi's water storage has been changing over time and warned of groundwater decline in the country.

Malawi is heavily dependent on groundwater, that is water held underground in the soil or in pores and crevices in rock, with over 80% of the population relying on it to meet their daily needs, yet not enough is known about how much groundwater is in the country, due to a lack of groundwater monitoring infrastructure.

Although 71 groundwater monitoring boreholes have been installed nationally, at least 10 are currently non-functional due to issues such as vandalism and equipment failure. Additionally, the oldest groundwater monitoring records only date back to 2009, making it impossible to assess long-term trends using observed data alone.

Dr Rebekah Hinton, who conducted the study as part of her PhD research, said, "This is critically important. Between 1980 and 2009, Malawi experienced a consistent average annual groundwater loss of 0.59 km³, equating to nearly 0.1% of its total groundwater storage per year. The annual decline corresponds to a volume of water roughly equivalent to one-third of Malawi's second largest lake, Lake Chilwa, each year.

"Our results point to a problem that has been reported anecdotally but not yet studied, that Malawi's previous groundwater sources are being deleted."

Scientists from the Hutton and University of Strathclyde applied a water model, developed by the International Institute for Applied Systems Analysis (IIASA), to simulate groundwater storage over time, using stakeholder engagement to tailor it to represent accurately Malawi's water content and for the first time were able to estimate the country's groundwater storage over time. This stakeholder-informed and locally adapted modelling framework offers policy makers a powerful tool for future groundwater monitoring, planning and sustainable water management.

Malawi is often regarded as a water-rich country, primarily due to the presence of Africa's third-largest lake, and the fifth largest globally by volume, known variously as Lake Malawi, Lake Nyasa or Lake Niassa. However, despite the prevalence of surface water, groundwater is arguably the country's most essential source of water,

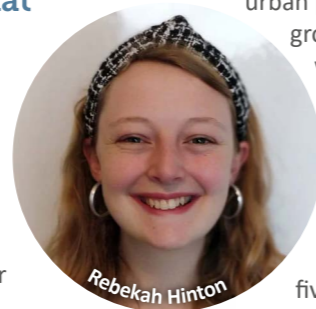
supplying over 80 % of domestic needs.

It is estimated that 82% of the rural population and 20% of the urban population depend on groundwater to meet their water needs. Climate change is increasing the reliance on groundwater, as is the high rate of population growth. Malawi's population is projected to increase fivefold this century, placing even more pressure on water resources.

Groundwater dynamics also have significant consequences for surface water security, as they play a critical role in river flow.

This is a challenge, not only in Malawi, but in many low and middle-income countries where groundwater monitoring data is simply not available. Anecdotal evidence has long pointed to groundwater decline but this model is able to quantify and point towards the challenge of sustained decline. This understanding of how groundwater storage has been changing over time is essential to ensure sustainable management in the future.

You can read the full report here:



Rebekah Hinton

Art in the Crop Innovation Centre

Painter and filmmaker, Ronnie Forbes, was delighted to visit the Crop Innovation Centre to view his painting, *Et in Arcadia Ego*.

Ronnie was Leverhulme Trust's artist in residence at the Hutton between 2007 and 2009, part of a scheme that saw artists working alongside scientists and academics across the UK. Before moving to its new home, his painting hung in the Hutton's library, along with small digital collage art prints created during that time.

He said, "This is a magnificent space. I am very pleased to see one of the larger pieces I produced here shown so well. It is appropriate and meaningful to have it here and means a lot to me."

The work is based on a painting by Poussin of the same name and reminds us that in life we are always surrounded by death. The figures are posed in the same way, but this time they are wearing white coats to symbolise the scientists who work at the Hutton and are encircled by images of the Carse of Gowrie and seeds of the ubiquitous plant, shepherd's purse. It allows viewers to see through one world into another.

Chief Executive, Colin Campbell, is thrilled to have the painting displayed so prominently. He said, "This is an open science campus, so we want the public to come in to have a coffee, see the art and be inspired by it and the science."

Ronnie's paintings are held in public collections in the UK, Ireland, USA, Poland and Australia as well as in private collection throughout the world. He has had around 50 solo exhibitions, and two and three person shows.



Science communication training

Thanks to funding from SEFARI Gateway, we held a day of science communication training, at our Invergowrie and Craigiebuckler campuses, delivered by Edinburgh Science.

We learned that good science communication is about connection. It helps researchers share complex ideas with non-experts, strengthens trust between science and society, and explains why research matters and how our work contributes to tackling some of the world's most pressing challenges.

First point - know your audience. Your message must be understandable, engaging and purposeful, using language your audience can follow.

Acronyms and jargon can be real barriers. Beware also of technical terms. If they are essential, you must explain them. Use examples and real-world case studies to make abstract ideas feel relevant. Show why your science matters and how it affects people's lives.

Use your voice

Whether spoken or written, delivery matters. An engaging rhythm keeps audiences with you. Finish with an impactful statement that acts as your take-home message. In writing, short sentences give readers breathing space and varied punctuation sharpens emphasis.

Outlining your plan helps everyone feel included and puts the whole audience on the same starting line. Invite questions. An audience that asks questions is an audience that is engaged. And if you don't know an answer, say so. Guiding someone to discover it themselves, an approach known as enquiry-based learning, makes that knowledge far more likely to stick.

The day also demystified short video communication. It may seem daunting, but this is a learnable skill.

- Treat it like a conversation.
- You look more natural if you are not

staring into the lens. Imagine you are talking to someone standing slightly to the side of the camera

- Use visual cues, like branded clothing, to reduce the need for words.
- When filming others, start with a strong opening question.

Everyone agreed that being thrown straight into pairs to create a 30-second video was the perfect way to cement this learning. That hands-on energy was evident throughout the day, with games, activities (including being tied together), and plenty of laughter.

Even familiar formats like academic posters came under the spotlight. The principles remain the same: fewer words, clearer messages, and visible contact details for those who want to know more.

The takeaway message? Impactful communication is not about dumbing down science. It's about opening it up. When that happens, everyone benefits.



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