The app that helps potatoes
Bringing world-leading expertise to small farmers in Africa
Report by James Hutton Institute 6

Taking action for oaks
The new partnership that aims to secure our most iconic trees
Report by Forest Research 7

How dog fouling harms cows
Research shows that a canine parasite leads to cattle abortion
Report by Moredun Research Insitute 8

year of young people
bliadhna na h-òigridh
2018

Sustainability in outdoor learning
West coast facility that is a model of best practice
Report by Field Studies Council Millport 11

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Scottish Consortium for Rural Research

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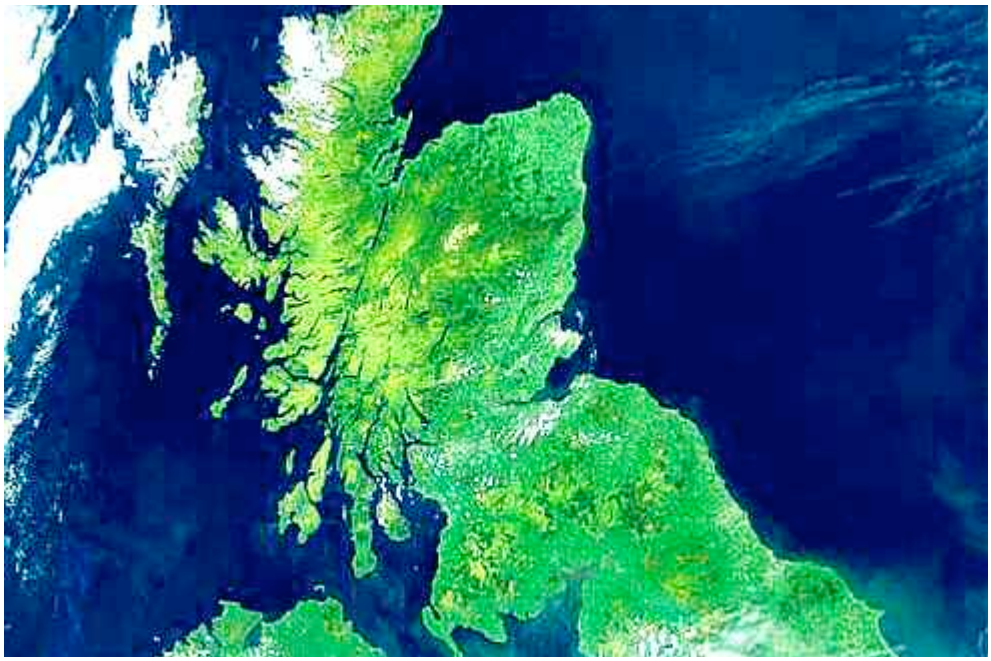


PICTURE: NASA

Diversity of the rural environment

Prof Stuart Monro, scientific director of SCRR, asks who will take the lead in managing land use in Scotland for the benefit of everyone?

THE RICHNESS of the rural environment in Scotland owes much to its diversity. The hill ground of the highlands, the unique landscapes of the Western Isles, the softer landscape of the Midland valley and the rolling hills of the Southern Uplands are what makes Scotland a land where people want to live and work, but also to visit.

Drilling (metaphorically speaking) a bit further into these landscapes, we must investigate the human activities that also contribute to this diversity. Embedded in the landscape is a range of commercial activities that sustain the population: farming and forestry, moorland estates and, increasingly, renewable energy from wind farms. The environmental diversity also fosters diversity of the flora and fauna which must be nurtured for the benefit of present and future generations.

At the same time, this country of ours is highly attractive to visitors from both home and abroad who contribute significantly to our economy. With all this competing activity, it is surely necessary to have proactive leadership in the management of our use of land for the benefit of all.

Issues will continually crop up that need to be resolved; most recently, infrastructure of parking and toilets on Skye and the impact on tourism. Some land use issues are the responsibility of local authorities; others lie with conservation bodies or SEPA; many relate to farming and forestry. Where should we look for leadership in resolving conflicting interests in the use of our diverse landscape?

One thing is for sure: with the glorious landscape in which we live come significant responsibilities.

This issue in numbers

Barley varieties grown in a trial on Raasay are harvested **2-3** weeks earlier than usual – **page 2**

Honeyberries could become Scotland's **5th** commercially grown berry – **page 2**

More than **550** scientists were involved in creating four new climate change reports – **page 3**

Identifying true manuka honey involves **4** chemical markers and one DNA marker – **page 4**

37 local businesses helped to create the new 'Slow Adventure' tourism experience– **page 5**

Just **2** different spores brought ash dieback to Europe– **page 6**

Sparsely populated rural Scotland could lose more than **a quarter** of its people by 2046 – **page 9**

About SCRR

THE SCOTTISH CONSORTIUM FOR RURAL RESEARCH exists to promote sharing of ideas and techniques among a group of organisations active in research into land, freshwater, coastal and marine resources, and their uses.

Our member organisations have bases throughout Scotland and are at work all over the world: details on the back page.

Members' reports

University of the Highlands and Islands, James Hutton Institute

Barley returns to Raasay

A cereal that has not been grown here in generations is now coming back to the Inner Hebridean island in order to enhance the local whisky, with the help of the University of the Highlands and Islands and the James Hutton Institute

BARLEY HAS NOT been grown for grain on the Inner Hebridean island of Raasay within living memory. Production there is challenged by a short growing season, high rainfall around harvest time, and a lack of knowledge about varieties suited to these conditions. With the ambition of using locally grown barley in whisky produced by its new distillery on the island, R&B Distillers approached the Agronomy Institute of the University of the Highlands and Islands in 2017 to help it investigate the feasibility of growing barley on Raasay.

Working with Andrew Gillies, a local farmer, several varieties of barley were tested, including very early maturing varieties from Iceland and Sweden. The latter were very promising and were harvested in late August, avoiding higher rainfall in September, and about 2-3 weeks earlier than varieties normally grown in the north of Scotland.

Harvesting and drying of grain was carried out with help from the James Hutton Institute, and the grain has now been malted and will be used on Raasay for distilling in 2018.

Building on the success of the 2017 collaboration, other north European varieties have been added to the trial in 2018. The trials are an important initial step in establishing a local barley supply chain for Raasay Distillery and in helping it produce unique high-provenance whiskies.

The successful introduction of very early maturing varieties of barley to the region could have wider advantages, since they could be grown by livestock farmers, reducing dependence on expensive imported feeds.

For details contact Dr Peter Martin, director of the Agronomy Institute, UHI
Peter.Martin@uhi.ac.uk

Top: the barley trial on Raasay in July 2017. Below: harvest of the barley in August that year

New partnership crop potential of in Scotland

A new partnership involving the develop a better understanding

A NEW Knowledge Transfer Partnership involving the James Hutton Institute, its commercial subsidiary James Hutton Limited and the newly launched Scottish Honeyberry Cooperative aims to create a new 'superfruit' industry in Scotland and turn the country into a world leader in the cultivation and processing of honeyberries.

Due to their agronomic qualities, such as winter hardiness, frost, and pest and disease resistance, honeyberries (*Lonicera caerulea*) have the potential to become the 'fifth berry' among the commercially grown fruits in Scotland after strawberry, raspberry, blueberry and blackberry.

However, since the crop has not previously been grown commercially in Scotland, the understanding of it, in terms of agronomic requirements, is limited. That is set to change with the appointment of Ruari MacLeod as Knowledge Transfer Partnership associate.

A graduate from the University of Dundee, Ruari has experience in biological and chemical laboratories

to develop honeyberries

James Hutton Institute aims to
of this distinctive fruit

and has been trained in a variety of techniques in molecular biology and chemical and mineral analyses.

Ruari sees this multifaceted project as an exciting opportunity. Work so far has been focused mainly in academic research, whereas this project will apply its findings directly in a commercial setting.

The aim is to identify the best varieties of honeyberry and develop products around which to build the Scottish Honeyberry brand.

While the project relies on Ruari's scientific knowledge to help establish greater understanding of the honeyberries as a crop, he will also be able to develop new skills in market research and product development.

Dr Dorota Jarret, a fruit breeder at James Hutton Limited and the lead academic supporting the project, hopes that the project will generate a step-change in the Scottish fruit industry by providing a new crop and derived products with diversifying growing opportunities, increasing the fruit growing area not just in Scotland, but throughout the UK.

Warning that biodiversity and nature's contributions continue dangerous decline

Scientists from the James Hutton Institute collaborated with colleagues from around the world to publish four new reports on the delicate state of our ecosystems

BIODIVERSITY CONTINUES to decline in every region of the world, significantly reducing nature's capacity to contribute to people's well-being. This alarming trend endangers economies, livelihoods, food security and the quality of life of people everywhere, according to four landmark science reports written by more than 550 leading experts from over 100 countries, including scientists from the James Hutton Institute.

Three years in preparation, the four regional assessments of biodiversity and ecosystem services cover the Americas, Asia and the Pacific, and Africa, as well as Europe and Central Asia – the entire planet except the poles and the open oceans. The assessment reports were approved by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) in MedellÌn, Colombia, at its sixth plenary session.

In every region, with the exception of a number of positive examples where lessons can be learned, biodiversity and nature's capacity to contribute to people are being degraded, reduced and lost due to a number of common pressures: habitat stress; overexploitation and unsustainable use of natural resources; pollution of air, land and water; increasing numbers and impact of invasive alien species; and climate change, among others.

'Pressures include habitat stress; overexploitation and unsustainable use of natural resources; pollution of air, land and water; increasing impact of invasive alien species; and climate change'

The James Hutton Institute contributed to the regional assessment for Europe and Central Asia (ECA) through social scientists Dr Kirsty Blackstock and Dr Anke Fischer, both based at the Institute's Social, Economic and Geographical Sciences group in Aberdeen.

Dr Blackstock and Dr Fischer co-authored chapter 6 of the ECA assessment, 'Options for governance, institutions and decision-making', which focuses on environmental governance for biodiversity and ecosystem services, as well as communication, capacity building and public participation. The chapter includes a reference to Scotland's Land Use Strategy 2016-2021.

Members' reports

BioSS

Defining manuka honey: Scottish expertise brings clarity to a sticky situation

When the New Zealand authorities needed a way to ensure the integrity of an iconic food product, their three-year science programme engaged the help of Biomathematics and Statistics Scotland

ENSURING THE AUTHENTICITY of food is a rapidly emerging issue, especially in regard to high-value products marketed through complex global distribution chains. With an ever-increasing potential for mislabelling, fraud and adulteration, governments are having to invest in assuring the authenticity of foods for international trade.

This is certainly the case for manuka honey, an iconic and high-value New Zealand food product which has recently received international media attention due to claims of fraud and mislabelling.

The Ministry for Primary Industries (MPI) in New Zealand led a three-year science programme to develop a robust definition for manuka honey that could be used in regulation on a global basis and so safeguard the authenticity and reputation of this product.

Mark Brewer of BioSS contributed statistical expertise to the programme that showed how the authenticity of a specific type of honey can be determined using a combination of chemicals from nectar and DNA from pollen. The programme took a novel interdisciplinary approach to evaluate a selection of authenticity markers, followed by statistical classification modelling (involving classification and regression trees) to produce criteria that are consistently able to identify manuka honey from New Zealand.

The programme resulted in a worldwide first, a scientific definition for New Zealand manuka honey based on levels of four chemical markers and one DNA marker. All manuka honey for export now has to be tested against and meet this regulatory definition.

Above: typical habitat. Below left: close-up of manuka flowers. Below right: a bee visiting a manuka plant

Steve Hathaway, Director of Science and Risk Assessment at MPI said: 'From the start, we needed the science behind the manuka honey definition to be robust and transparent. We wanted our key export markets and consumers to be confident in our assurance that they were receiving an authentic product; at the same time, we had to ensure the definition was fit for purpose for our honey producers.

The statistical expertise provided by BioSS played an essential role in the programme to ensure the manuka honey definition could be scientifically defended and withstand scrutiny from different angles.'

This work was recently published in npj Science of Food under the title 'Using chemical and DNA marker analysis to authenticate a high-value food, manuka honey'. Find it at www.nature.com/npjscifood

For further information contact Dr Mark Brewer, markb@bioss.ac.uk

Sustainable tourism initiative encourages visitors to take their time and get to know Scotland better

The Centre for Recreation and Tourism Research at UHI has worked with local businesses in the west of Scotland to produce a new kind of experience for tourists that has already proved to be popular

A RECENTLY COMPLETED EU-funded project has placed Scotland at the centre of a burgeoning movement to get tourists to slow down and spend more time immersing themselves in local landscapes and communities.

'Slow Adventure in Northern Territories' was led by the Centre for Recreation and Tourism Research (CRTR) at the University of the Highlands and Islands, and was co-financed by the Northern Periphery and Arctic programme.

Slow adventure serves as an antidote to people's urban lives, encouraging people to enjoy and experience the outdoors at a slower pace and to engage with remote and wild places. With partners across northern Europe, the aim of the project is to facilitate business collaboration on the development of new tourism products, promoted using this new marketing concept.

Building upon a peer-reviewed academic paper from two former colleagues (Varley and Semple, 2015*), the project partners worked directly with businesses to encourage them to collaborate on developing slow adventure products. UHI worked with 37 businesses along the Road to the Isles and on the Ardnamurchan peninsula, using a presence at Visit Scotland's EXPO as the driver.

The positive reaction from international buyers and tour operators led UHI to assist the businesses to establish the Slow Adventure Co-operative to enable them to continue developing, marketing and selling their collaborative products to tour operators and consumers beyond the project. CRTR trademarked the 'Slow Adventure' logo in Europe to ensure that businesses would be able to use the brand as a stamp of recognition for their tourism products.

Interest from organisations such as the European Travel Commission, as well as from businesses across the globe, has provided evidence that there is an appetite for slow adventure to become a 'movement' that will encourage businesses from other countries to develop experiences, use the brand and join other like-minded businesses that advocate sustainable tourism.

Slow Adventure Co-operative,
www.slowadventure.scot

** Peter Varley & Tristan Semple (2015), Nordic Slow Adventure: Explorations in Time and Nature, Scandinavian Journal of Hospitality and Tourism, 15:1-2, 73-90*

Members' reports

The University of Edinburgh; James Hutton Institute

PICTURE: EARLHAM INSTITUTE

Gene study highlights threat of ash dieback

The fungal disease originated with just two spores, but the arrival of a third might be disastrous, according to the latest research from The University of Edinburgh and its partners

A DISEASE that has devastated ash trees across Europe developed from just one or two sources of fungus on imported ash trees, a large-scale genetic study shows.

Analysis of the DNA of dieback fungus samples from the UK, Norway, France, Poland and Austria showed little diversity – demonstrating that the outbreaks probably all came from just two spores. This limited mix of genes in the fungus across Europe would be expected to curb its impact – but instead ash dieback threatens 95% of all European ash trees.

The findings suggest that the arrival of a third fungal spore from overseas would be enough to intensify the disease and potentially wipe out Europe's remaining ash population.

Ash dieback threatens 95% of all European ash trees. In its native Asia, the fungus *Hymenoscyphus fraxineus* is widespread and extremely diverse, but relatively harmless to the native Asian ash species.

Dieback disease begins with dark brown or orange lesions on leaves and either kills the tree directly, or makes it vulnerable to other pests or pathogens. The fungal bodies, each about the size of a match head, produce thousands of tiny spores that spread on the wind.

Ash dieback was first observed in European ash trees in Poland in 1992, where it probably arrived on trees imported commercially from East Asia. It has already killed or severely damaged a quarter of ash trees in southern Sweden and destroyed more than four-fifths of young ash in Norway. It was discovered in the UK in 2012 and is now found throughout the UK.

Tree populations take a long time to recover from disease, so it is vital to restrict the movement of potentially infected plants. The movement of ash trees into and around the UK is currently prohibited.

European ash trees are also under increasing threat from other pests and diseases, such as the Emerald ash borer beetle, which has been found in Russia and could push the remaining European ash trees to the brink. Emerald ash borer has already caused five ash tree species in the US to be threatened with extinction.

Researchers recommend creating seed orchards to breed ash trees that are less susceptible to dieback and other pests. Initial research in the UK and Denmark is enabling selection of trees for development.

The research was carried out by researchers at the Earlham Institute, the University of Edinburgh's genome facility, Edinburgh Genomics, and other partners. It was funded by the Biotechnology and Biological Sciences Research Council, Defra, the Economic and Social Research Council, the Forestry Commission, the Natural Environment Research Council, the Scottish Government and the French National Research Agency.

Above left: ash dieback disease

Updated Android potato growers and diseases in

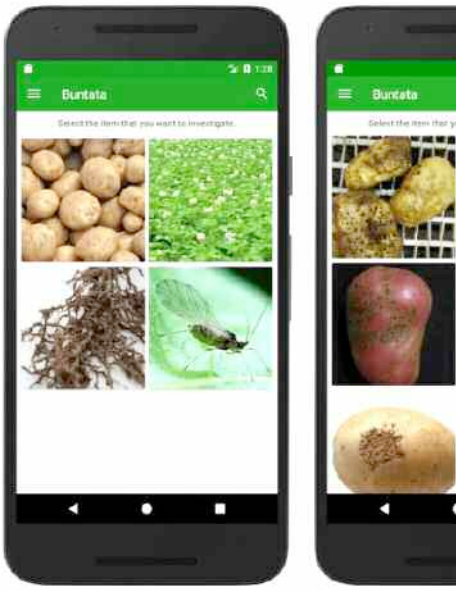
The free app is designed to spread knowledge and expertise to the farm particularly smallholders in Africa

THE INFORMATION and Computational Sciences group of the James Hutton Institute has announced a new version of Buntata, a free Android app to help potato growers identify plant pests and diseases in the field.

Produced with support from the University of St Andrews Impact Accelerator Award and named after the Scottish Gaelic word for potato, Buntata can be used even without mobile coverage. Through downloadable datasets, the app helps identify potato pests and diseases easily and suggests further resources for growers to consult if they want to confirm the diagnosis.

The new version offers a new catalogue overview of all pests and diseases in its database, and offers users a chance to keep track of any diseases found, plus the ability to add notes, take pictures and share any findings on social media.

According to Professor Lesley Torrance, Director of Science at the James Hutton Institute and member of the Buntata development team, the motivation for creating Buntata was to address the specific needs of smallholder potato farmers in Africa



app to help to identify pests the field

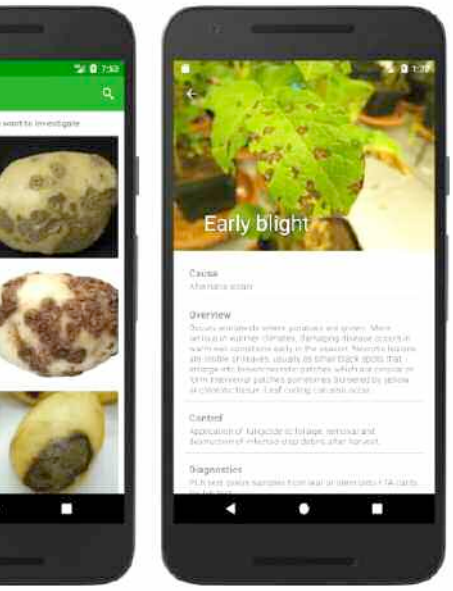
James Hutton Institute's
ers who need it most,

'There is no need to have prior knowledge of the pest, disease or other disorder as the app is designed to allow the farmer to match symptoms to the database'

who have limited resources. There is no need to have prior knowledge of the pest, disease or other disorder as the app is designed to allow the farmer to match the symptoms of their potato plant or pest to symptoms in the database and it is mobile enough to be deployed in the field.

Buntata is a collaboration between the University of St Andrews and the James Hutton Institute to enable open access to their information resources and put them at the fingertips of potato growers. Although developed for potato, the Buntata format has the potential to be applied to other crops.

Buntata can be downloaded from Google Play. Further information is available from the James Hutton Institute's Information and Computational Sciences group website



Above right: oakwood in Ariundle, Strontian

The Action Oak Partnership

Forest Research is playing it part to ensure that British oakwoods are safeguarded for the future

FOREST RESEARCH is playing a key role within the emerging Action Oak Partnership, a public-private initiative seeking to build support for activities to protect the UK's oak trees.

Our two native oak species, sessile and pedunculate oak, are an important visual element of many landscapes, have inspired woodland culture and provided timber for iconic buildings, and are a rich haven for biodiversity. Scotland's Atlantic oakwoods are unique in their assemblages of bryophytes and lower plants.

The partnership has formed in response to an increasing number of threats to the health of oak trees and a realisation of the surprising lack of understanding of the demography and dynamics of the oak population.

A number of pests and diseases are threatening oak health. The oak processionary moth and acute oak decline are affecting oak populations in southern Europe, but other threats are already more widespread, such as root-attacking species of honey fungus and powdery mildews; or have yet to arrive but are very much unwanted, such as Xylella, a focus of attention for SASA and Scotland's new Plant Health Centre (www.planthealthcentre.scot). Changing climate interacts with these biotic threats to create further uncertainties and raised concern. Losing oak trees from our landscape would impact our well-being, economy, environment and the species that depend on them.

Action Oak is developing a programme of activities including:

- Working with owners and managers of oak trees and woodlands to help to protect the trees from a range of threats.
- Funding research to improve our understanding of the threats and to inform best management practices.
- Using established professional and citizen science networks to record changes in the distribution, age and health of our oak trees to identify priority areas for action.
- Encouraging organisations to join the Action Oak Partnership and individuals to support Action Oak.

The initiative is supported by the governments of Scotland, Wales and Northern Ireland, and by Defra. Partners include the Woodland Trust, Woodland Heritage, National Trust, the Duchy of Cornwall, Royal Botanic Garden Edinburgh, the Forestry Commission and the Northern Ireland Forest Service. Action Oak was officially launched at the 2018 Chelsea Flower Show by Lord Gardiner, Defra's biosecurity minister, and events are now being organised around the UK to develop interest and support.

Scientists from Forest Research and the James Hutton Institute recently contributed to a baseline review of knowledge and hope to be involved, with others, in research to come.

For more on Forest Research's involvement please contact Chris Quine (chris.quine@forestry.gsi. gov.uk); further information on Action Oak is at www.actionoak.org

Members' reports

Moredun Research Institute; James Hutton Institute

Cattle abortion related to dog fouling

Scientists from Moredun Research Institute highlight the disease risk that dogs pose to pregnant cattle

MANY DOG OWNERS will be unaware of the threat posed to breeding cattle from dog-fouling in fields where cattle are grazing. This is because the dogs may be infected with the protozoan parasite *Neospora caninum* and the parasite eggs can be shed in the faeces of infected dogs where they will persist for long periods of time in the environment. If cattle eat the neospora eggs the parasite can invade and infect the animal, causing serious disease in pregnant cattle. This is now being recognised as one of the most frequently diagnosed causes of bovine abortion in the UK and worldwide.

Scientists at Moredun have been researching the parasite to understand more about the epidemiology and pathogenesis of the disease and to develop diagnostic tests to help farmers and vets prevent and control neosporosis. As neospora-infected cattle are significantly more likely to abort their calves compared with uninfected cattle, it is important to be able to identify those cattle most at risk. Moredun staff are also involved in outreach activities to educate farmers and members of the public about the parasite to help reduce transmission of Neospora caninum and protect cattle.

Dogs can become infected from eating raw meat containing viable *N. caninum* tissue cysts and the parasite will then develop in the gut of the dog with parasite eggs being shed for a short time into the environment. Therefore it is important to keep dogs away from cattle pasture, feed and water and for dog owners to pick up dog faeces when walking their dogs in the countryside to help reduce the spread of this important disease.

For further information see: www.moredun.org.uk/research/diseases/neosporosis

Professor Lorna Dawson and Mrs Anne Pack honoured in Queen's birthday list

Staff at James Hutton Institute receive recognition for their accomplishments

PROFESSOR LORNA DAWSON, lead soil forensic scientist at the James Hutton Institute, advisor to the Scottish Government on strategic research and SEFARI Gateway lead for environment, has been made a Commander of the Order of the British Empire (CBE) in the Queen's Birthday Honours List.

She is joined by longstanding Hutton member of staff Anne Pack, who has been awarded a British Empire Medal (BEM).

Professor Dawson's honour is for services to soil and forensic science, covering three decades of managing and conducting research in soil, and particularly within criminal justice.

Anne Pack has been honoured for services to agricultural research, Scottish culture and charity. She has been a member of staff at the James Hutton Institute and its predecessor organisations since 1992, serving as personal assistant to four chief executives all of whom held her devotion to duty in high regard. She is also an accomplished singer-songwriter and recording artist as well as a published author.

Population decline set to continue in rural Scotland

Research by James Hutton Institute scientists finds that sparsely populated areas of the country will face ongoing demographic challenges

NEW RESEARCH commissioned by the Scottish Government and conducted by the James Hutton Institute estimates that Scotland's sparsely populated areas are at risk of losing more than a quarter of their population by 2046 if current demographic trends are left unchanged.

These areas include vast tracts of the Highlands and Islands and some areas in the Southern Uplands, which together represent almost half of the country's land, but are home to less than 3% of its population.

The research team led by Dr Andrew Copus, of the Social, Economic and Geographical Sciences group at JHI, found that Scotland's sparsely populated areas have a demographic legacy which, in the absence of intervention, will result in decades of population decline and shrinkage of its working age population on a scale which implies serious challenges for economic development.

The research also underlined a divergence in the demographic development of these areas compared with the rest of the country. The key issue is a relatively small number of children and young people, which in the years to come will translate into a shrinking working-age population, projected to decrease by 33% by 2046. If no action is taken, this may have serious implications for the workforce, the economy, and the capacity for demographic regeneration.

Population projections for sparsely populated areas are tricky, due to the relatively small numbers of persons involved. Researchers applied a specially adapted forecasting model, developed in Nordic countries, to previously available data. This allowed an estimation of the likely future population trends for Scotland's sparsely populated areas and each of their constituent sub-areas.

The next stage of the research will examine issues such as potential changes in land use; evolving settlement patterns; likely changes in land-based activities because of new developments and the policy context, including Brexit; increased personal mobility; the potential of sparsely populated areas as an environmental resource to support the wellbeing of urban Scotland; and the social and cultural implications of inward migration on the scale which the projection model suggests.

For more, contact Dr Andrew Copus, andrew.copus@hutton.ac.uk

Members' reports

Society of Antiquaries of Scotland; Royal Botanic Garden Edinburgh

Exploring a rural landscape in detail offers lessons from the past

A new publication from the Society of Antiquaries of Scotland shows how rural life in prehistoric times can be brought to life and can

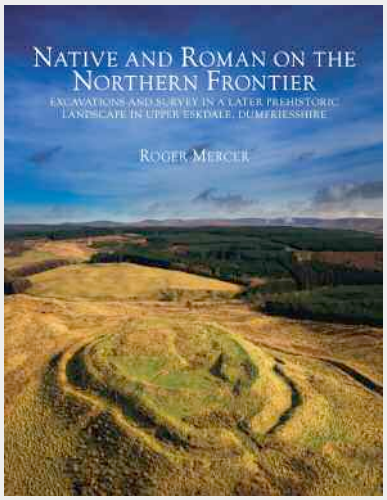
RURAL LIFEWAYS have dominated the majority of the 14,000 years or so during which people have lived on the geography that we now call Scotland. That story continues to be uncovered and has much to tell us about our present concerns with regard to sustainability and environmental change, as well as providing rich accounts of how people lived in the past.

Some bits of the story are already coming to life – in, for example, the Society of Antiquaries' latest publication, *Native and Roman on the Northern Frontier*, which reports on a programme of excavation and survey at the Castle Oíer hillfort and a unique enclosure at Over Rig in Upper Eskdale, Dumfriesshire. Exploring a rural landscape in detail highlights just how much we still have to learn from the past. Full details, including how to purchase the volume and thus support the Society in disseminating landscape research, are at http://bit.ly/2pMaPZy.

For stories still to be uncovered, the Society is helping set up research frameworks across the country through the Scottish Archaeological Research Framework (ScARF, www.scottishheritagehub.com). These regional frameworks will better define what we know and provide greater nuance to what research we want to prioritise and what opportunities exist to enhance research gain through efficient use of resources and increasing collaboration across disciplines and interests.

One regional framework has already been created for Argyll, and four are in different states of preparation in South East Scotland, Highland Region, Perth and Kinross, and the islands of Western Isles, Shetland and Orkney.

For more information and to get involved, contact project manager Helen Spencer, scarf@socantscot.org



Cartoon capers for the Scottish capital

A new animated short film created by Royal Botanic Garden Edinburgh is intended not just to entertain, but also to spread an important message about conservation in the city

GREEN THE GREY, a quirky two-minute animation featuring life in Scotland's capital and how it could be enhanced, is intended to inspire greater participation in Edinburgh's natural environment.

Instigated by Edinburgh Living Landscape (ELL), a partnership of organisations working to enhance nature in the city, the fun and colourful animation is the latest in a series of projects aimed at increasing public engagement in green issues.

Posted on YouTube in June 2018, it will also be viewed by nearly 3,000 people during the Luna Cinema festival at Royal Botanic Garden Edinburgh (RBGE) in September. As audiences settle down with their snacks and drinks to enjoy open-air showings of The Goonies, The Greatest Showman and The Shape of Water, Green the Grey will have its big-screen premiere as a film trailer under the stars from August 31 to September 2.

Above: a still from Green the Grey

Dr Chris Ellis, head of Scottish biodiversity research at RBGE, explained the idea behind the initiative: 'Edinburgh Living Landscape wants to encourage all of us to make some small changes for nature to improve the city in which we live, making it greener and healthier.

'The animation, by recently graduated film-maker Abby Edwards, is a fun way to raise awareness of the project, encouraging people to consider how simple choices we make affect our quality of life now and for future generations.'

Incorporating sustainability and conservation into outdoor learning

Field Studies Council, Millport describes its pursuit of best practice in an increasingly important area

OVER THE PAST few decades, there has been a paradigm shift in the education sector regarding where our learning should be taking place. The term 'outdoor education' no longer refers to a niche subgenre involving excursions (which you might refer to as 'outdoor pursuits') but instead represents the current idea of best practice in education across the globe, whereby students are encouraged to spend more time in the outdoors during all aspects of study.

The benefits of moving the learning environment outside are not just related to children's health and general wellbeing; studies have also demonstrated rises in academic attainment and transferable skills such as teamwork, communication and leadership as a result.

Several bodies, both independent and governmental, have been established during this period with the aim of promoting, guiding and evaluating this relatively new style of teaching, including the Institute for Outdoor Learning in 2001 and the Council for Learning Outside the Classroom in 2008. As a result of these developments, young people spend more educational time outdoors and field trips are on the up, with learners from primary school children to university graduates being led outside for as many activities as possible.

Nowhere is this more apparent than at FSC Millport, on the Isle of Cumbrae, an outdoor centre for all ages where the sheer diversity of learners and courses far exceeds most equivalent facilities in Scotland.

Run by the Field Studies Council, an environmental charity aimed at increasing people's understanding of the natural environment, FSC Millport is at the forefront of outdoor education in Scotland, hosting courses ranging from primary adventure programmes and high-school field trips to university marine research residentials and adult professional development courses.

With most sessions conducted outdoors where possible, it is extremely important to capitalise on these precious moments and use them to increase our understanding of the natural environment and make connections with our surroundings.

Above: students working outdoors at FSC Millport

All too often, chances to link the topic under study to real-world issues are missed; the intricacies of the subject matter, be it geography, English, maths or biology, are focussed on too closely, and the opportunity to introduce issues like sustainability, conservation and interdependence is squandered.

Staff at FSC Millport have utilised a range of techniques to incorporate these important issues into their teaching and the overall visitor experience. Staff at the centre employ these techniques on a daily basis to try to enhance people's connection with the environment, and therefore the responsibility they feel towards it. In this way, staff hope to encourage behavioural change with each visitor passing through the doors.

It starts as soon as the guests arrive: the centre's grounds host a variety of eco projects that are made conspicuous through informative signage. These projects include a biomass boiler for heating; a 'living roof', otherwise known as a green or planted roof; a bug hotel for invertebrates; a woodland nature trail; and a newly created wetland pond habitat. These developments are highlighted to students through the centre's 'Sustainable Welcome' talks, where all the key information for their stay is conveyed including what they, as visitors, can do to help reduce our carbon footprint and improve our surrounding environment.

Sustainability is also embedded in all aspects of the teaching. Whether it is incorporating a beach-clean into a visit to the beach with primary pupils, or discussing issues such as overfishing and nutrient run-off with older science students, the eco-friendly message is pushed home through case studies and short activities over their course.

FSC Millport also hosts research students (undergraduate, Masters and PhD) many of whom focus their research on global issues such as microplastics in the marine environment or the effect of climate change on marine organisms.

It is hoped that these developments can be of use to field research institutions and outdoor centres across the country and can be used as a model of best practice. Finding time to intrinsically link any scientific topic that crops up with wider issues of sustainability and environmental understanding is an effective way of instilling a sense of responsibility for our planet in generations of scientists to come.

For more details contact Jack Lucas, j.lucas@ field-studies-council.org

SCRR member organisations

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PEOPLE AT SCRR

Scientific Director:
Prof Stuart Monro
Stuart.Monro@blueyonder.co.uk

Secretary/Treasurer:
Prof Willie Donachie
willie.donachie@moredun.org.uk

CONTACT SCRR

SCRR, 18 Hoghill Court, East Calder, West Lothian EH53 0QA

01506 880929 or 07990 595217

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