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Scottish Consortium
for Rural Research

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PHOTOGRAPH: A.J WALLACE VIA UNISPLASH



This issue in places

Nairobi in Kenya was the venue for the first meeting to plan action against drought – **page 3**

The Museum of Scotland in **Edinburgh** hosted the city's new conservation film festival – **page 4**

Oban is home to the innovative Seaweed Academy – **page 4**

Benmore Botanic Garden in **Argyll** offers a new home to threatened species of lichen – **page 7**

The future is rural

Prof David Miller of the James Hutton Institute discusses the key role of rural areas in responding to challenges such as climate change

RURAL AREAS MAKE key contributions to tackling the challenges facing society. Introducing the European Union's Long Term Vision for Rural Areas (LTVRA), Ursula von der Leyen, the president of the European Commission, refers to rural areas as the 'fabric of our society and the heartbeat of our economy. They are a core part of our identity and our economic potential. We will cherish and preserve our rural areas and invest in their future.'

The LTVRA is for stronger, connected, resilient and prosperous rural areas by 2040. Its associated Rural Action Plan sets out flagship initiatives which include building carbon sinks by investing in rewetting wetlands and peatlands; stimulating

entrepreneurship and the social economy of rural areas; overcoming barriers to social inclusion of vulnerable groups and roles of women; soil health and food; and a rural observatory for data and analysis. The Rural Pact Conference, being held in June, is intended to put a spotlight on the specific needs of rural areas, stimulate debate on their future and their current and future roles in European society, and to strengthen and tailor their governance at multiple levels.

The LTVRA has strong similarities with Scotland's Land Use Strategy, now in its third iteration, which sets out a vision for land use and an original set of principles for sustainable land use. Public investments in peatland restoration, woodland expansion, and

Pictured above:
Highland cow on a croft in Skye

the new National Test Programme 'Preparing for Sustainable Farming' reflect some of the expectations placed on Scotland's rural areas to contribute to challenges such as tackling climate change and reversing the loss of biodiversity.

The current work of the pilot Regional Land Use Partnerships and the subsequent Regional Land Use Frameworks offer new opportunities to identify how and where the places and

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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.

News from SCRR

From page 1

people of rural Scotland can be supported in realising the roles sought of them. The process of identifying a new National Park creates further opportunities for public debate on visions for the landscapes, land use, natural and cultural heritage and communities of those areas.

In informing aspects of those debates, Scotland has the benefit of the Scottish Government Environment, Natural Resources and Agriculture Research Programme (2022–27), which commenced in April. At its core the

research in the programme is within and about rural areas of Scotland, working with the communities of place and interest who visit, live or work there. A characteristic of Scottish research is the transdisciplinary working between representatives from policy, practice and research.

This has resulted in a creative and effective means of designing and delivering research that is relevant and responsive to the needs of Scotland’s environment, communities, people and rural economy, as envisaged in the Strategic Research Programme. It has also contributed to Scottish research

organisations being competitive in winning funding from sources such as the EU.

The reliance being placed on the people and resources of rural areas is accompanied by opportunities and pressures. Collective challenges are on how to capitalise on the approaches, research and policies that position Scotland at the forefront of scientific understanding of rural areas of Scotland, Europe and further afield, respecting the identity and heritage of those areas, and strengthening the contributions they make to the benefit of us all.

Peter Wilson Lecture 2022: the time for rural is now

Prof Sarah Skerratt, our scientific director, reports on an event that addressed key goals of sustainability and resilience

MAY 2022 SAW the 17th annual Peter Wilson Lecture, a joint event organised by SCRR and the Royal Society of Edinburgh (RSE). In 2020 and 2021, the lecture was held online due to the pandemic. In May 2022, we were delighted to hold the event in person at the RSE (with live-streaming available). We built in additional networking time before the beginning of the formal proceedings, and the tea and coffee room was buzzing with people reconnecting in 3D!

The event was created in memory of the distinguished agriculturalist and former RSE general secretary, Professor Peter Wilson CBE, who was a professor of agriculture and rural economy at the University of Edinburgh. He was elected RSE Fellow in 1987, served as RSE general secretary from 1996 until 2001 and in 2002 was awarded the Society’s Bicentenary Medal, an award reserved for those who have given outstanding service to the Society. Following a short illness, Peter died on January 29, 2004 and the lecture was established the following year.

Our speakers this year were:

- Professor Julie Fitzpatrick OBE, chief scientific adviser (CSA) for Scotland, scientific director of Moredun Research Institute and CEO of the Moredun Foundation. She also holds a chair in Food Security at the University of Glasgow’s College of Medicine, Veterinary Medicine and Life Sciences.



- Claire Taylor, agricultural communicator with Jane Craigie Marketing and *Herald* columnist.

- Dr Leslie Mabon, lecturer in environmental systems in the School of Engineering and Innovation at the Open University.

The speakers addressed themes of ‘resilience’ and ‘sustainability’, described as essential goals that we must reach.

Our speakers highlighted how we must address connected crises of climate, biodiversity and livelihoods. They explained how research and practice in rural Scotland are already supporting and will continue to support the opportunities and address the challenges that we’re facing, in Scotland, the UK and internationally.

Our speakers (L to R) – Dr Leslie Mabon, Prof Julie Fitzpatrick and Claire Taylor

Each speaker communicated with passion about their topic. They emphasised the extensive research base that already exists across Scotland, through the institutes, university and college networks, with a strong message coming through about the physical spread of researchers already embedded in rural Scotland – particularly Early Career Researchers (ECRs).

The role of young people was a common thread, central to the future of rural Scotland – not just talking about young people but bringing them into the heart of dialogue now as solutions are talked through.

A third theme was the obvious diversity of rural Scotland – not just geographically, but also in terms of what rural Scotland offers, including high-tech industry, space tech, quantum computing, carbon capture/storage, decommissioning of oil rig technology, as just a few examples.

All three speakers were unanimous that the time for rural is now, in research, practice and policy, with the audience Q&A reinforcing this perspective.

It seems that the Peter Wilson Lecture continues to provoke and encourage every year!

SCRR EVENT NEWS

Early Career Research conference in November

Our popular ECR conference, which unfortunately had to be postponed last year due to the pandemic, is planned to be held on November 17, 2022 – watch out on our website for further details. See scrr.ac.uk/events/

Members’ reports

The University of Edinburgh

PHOTOGRAPH: SAVE THE CHILDREN



A new partnership to tackle recurring food shocks in East Africa

Drought is bringing increasing difficulties, but a combination of global and local responses can help, explains Prof Alan Duncan of the Global Academy of Agriculture and Food Security at the University of Edinburgh

Above: a young man selling water to villagers in drought-hit southern Sudan

THE HORN OF AFRICA is experiencing another drought that is disastrous to millions of people living in pastoral areas. The early signs were clear way back in 2020 but the humanitarian response will, as so often, only kick in once the crisis is at its peak and lives and livelihoods have been lost. It could be very different if predictions were more reliable and could lead to early action that better prepares and protects people and their livelihoods in advance of a crisis.

The problem of recurring food shocks in East Africa is a longstanding one but climate change is leading to increased frequency and severity of drought. This is compounded by recurring conflict, diminishing pasture lands and policies that do not favour the mobility of pastoralists, which is fundamental to their survival.

It was against this background that the Jameel Observatory for Food Security Early Action was formed in 2021. The Observatory brings together the complementary skills of the University of Edinburgh, Save the Children, International Livestock

‘The problem of recurring food shocks in East Africa is a longstanding one but climate change is leading to increased frequency and severity of drought. This is compounded by conflict and diminishing pasture lands’

Research Institute, Jameel Poverty Action Lab and Community Jameel to work together on the issue of recurring food crises.

How do we work? We connect, collaborate, capacitate and communicate. There are many actors and stakeholders already active in this area, each with its own expertise, knowledge and data. The Jameel Observatory brokers combinations that harness and apply ‘glocal’ (global and local) expertise to tackle the local realities identified in and by communities that are facing food security threats.

Key elements of this approach are as follows.

- Rather than setting an agenda, the Jameel Observatory creates and facilitates open innovation ‘labs’, where observatory partners, collaborators and a wider community of practice connect to identify the critical challenges and bottlenecks and, together, devise and test solutions.

- The Jameel Observatory fosters and facilitates data and evidence-driven collaborations bringing together best brains, best data and deep local insights with proven impact pathways.

- The local challenges are diverse and difficult, but can be addressed by catalysing and capacitating local to global innovation labs that together apply big data and expertise to find solutions for real challenges.

- The Jameel Observatory communicates lessons and insights and solutions in order to inspire and inform others.

In April 2021, the Observatory convened a first ‘Community of Practice’ meeting in Nairobi which brought together around 50 regional experts. In brainstorming mode, participants identified some key challenges holding back progress on early action for food and nutrition security in the face of climate/food system shocks.

Working in groups, small teams of participants drafted five challenge questions that will later be refined through the Observatory and will form the early manifesto of research/action. These questions concerned issues of coordination among many actors, getting finance in place and available in advance of crises, better use of data to predict crises, building mutual trust among actors in data provision and use, and more effective use of local community action to deal with food shocks.

The Observatory is at an early stage but has already built momentum and interest among key players in the region. One early high profile report called *Dangerous Delay: the Cost of Inaction* has already been produced by Save the Children and Oxfam with support from Jameel Observatory.

Very soon early projects of the Jameel Observatory will begin to hit the ground and contribute to effective early action as food shocks unfold, so that that humanitarian crises such as the current one in the Horn of Africa will become a thing of the past.

For further information, see <https://jameelobservatory.org/>

Members' reports

National Museums Scotland, Scottish Association for Marine Science

Conservation on film

The first Edinburgh Conservation Film Festival proved to be inspirational, says Nick Fraser of National Museums Scotland

THE FIRST EVER Edinburgh Conservation Film Festival, organised by Edinburgh Conservation Science (ECoS), was held as part of the Edinburgh Science Festival on April 23, 2022 at National Museums Scotland.

ECoS is a consortium of research institutions organisations providing an interface between the scientific and conservation communities. Its main partners are the Royal Botanic Gardens Edinburgh, NatureScot, National Museums Scotland and the University of Edinburgh.

The festival, which attracted a total of 77 entries from around the world, began with a film by Simon Dures, 'What is CoP 15?', which focuses on why CoP 15 is so important to the whole of society.

The theme for the festival was 'A World Living in Harmony' and each film was judged on its conservation relevance, its storytelling and its ability to inspire or engage the audience in a positive way.

Some films were created right here in Scotland and others came from much further away including India, Kenya and Lebanon.

All of the films had been entered into the festival with the prospect of winning a category prize or even the accolade of the overall winner. The judges were faced with very difficult decisions but eventually chose 'Choices' as the overall winner along with the following category winners:

- 1) Why nature matters – 'Choices'
- 2) Fixing nature and climate – 'Rush'

- 3) Connecting people and nature – 'Team Lioness'
- 4) Innovation and tools for biodiversity – 'Standing up for the Little Guys'

The organisers decided that one film, although not among those shortlisted for this festival, brought a powerful message that they wanted to share. 'Diversity in Birding', produced by Stephen Magee and featuring Sorrel Lyall, illustrates the barriers to participation encountered by many people in our communities. To maintain and protect biodiversity, we need inclusive societies where everyone is needed and valued.

Since the event, the festival has received much positive feedback with numerous comments. We look forward to the second Edinburgh Conservation Film Festival in 2023.

Edinburgh Conservation Film Festival – www.ecff.co.uk/

'What is CoP 15' – youtu.be/js_WQ1dn5I

'Choices' – www.youtube.com/watch?v=p-5E1rqhiMA&t=4s

'Team Lioness' – www.lx.com/politics/world-news/meet-team-lioness-the-first-all-women-wildlife-ranger-unit-in-kenya/52052/

'Standing up for the Little Guys' – www.youtube.com/watch?v=zcdysPwxzsg

'Diversity in Birding' – www.youtube.com/watch?v=VC8a_RWV0tI



Jess Wise, Helen Taylor and Helen Senn, recognised for 'Standing up for the Little Guys'



Seaweed success for Rhianna at Aquaculture Awards

Just days after its launch, there was a further boost for the Seaweed Academy at the Scottish Association for Marine Science

Rhianna Rees (above) was joint winner of the Rising Star category at the awards in May

SAMS CELEBRATED further seaweed success at this year's Aquaculture Awards after the coordinator of the newly launched Seaweed Academy picked up one of the top awards.

Rhianna Rees was jointly awarded the Rising Star award at the ceremony in Aviemore on May 4, 2022 alongside Andre Van of Kames Fish Farm.

The award came a week after the launch of the Seaweed Academy, the UK's first dedicated seaweed industry facility, which uses research knowledge generated at SAMS to offer advice to start-ups, train workers and share the latest research to help businesses develop. The £400,000 funding for the project came from the UK Government's Community Renewal Fund.

The success of the Seaweed Academy launch at SAMS, which attracted nearly 200 people and hundreds more virtual attendees,

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The University of Edinburgh

'We are moving ever closer to a thriving new industry for the UK and Europe'

demonstrated the huge scope of interest in seaweed cultivation in the UK and across Europe. As a precursor to the launch event, 200 primary school children visited SAMS to learn more about seaweed, its uses and its potential. Other invited guests had the chance to visit the SAMS seaweed farm and the seaweed nursery, where seed stock is grown and ready to be deployed on seaweed farms.

Following her award, Rhianna said: 'Words cannot describe how grateful, surprised, proud, and honoured I am to have been awarded Aquaculture UK Rising Star award.'

'This was a win for seaweed, for SAMS, and everyone in the team who has worked so hard to achieve all the things we have so far as part of the Seaweed Academy.'

Andrew Richardson of biotechnology company Innovafeed, an alumnus of SAMS UHI's Aquaculture, Environment and Society (ACES+) joint masters degree, was also shortlisted in the Rising Star category.

Head of SAMS Enterprise Mike Spain said: 'This is a tremendous achievement for Rhianna, who has established an incredibly comprehensive and high-quality Seaweed Academy project in a short period of time. She brings energy, enthusiasm and expertise to the role of coordinator and thoroughly deserves this accolade. It has been an incredibly busy and rewarding few weeks for the SAMS Enterprise team but also for the developing seaweed farming industry as a whole.'

'As the profile of seaweed cultivation grows, we move ever closer to a thriving new industry for the UK and Europe. SAMS Enterprise is helping to lead that movement.'

Globally, the seaweed farming industry is estimated to be worth around \$15bn per annum. However, the vast majority of this activity is in Asia and there is huge growth potential in Europe, with a growing demand for seaweed from gourmet restaurants to livestock feeds.

Seaweed is used extensively in food ingredients, agriculture, cosmetics and pharmaceuticals, and seaweed farming has a low carbon footprint, using no fresh water and with minimal land-based infrastructure.

If you would like to find out more about the Seaweed Academy, see – www.seweedacademy.co.uk/

Right: how we farm livestock should account for issues of health and sustainability



Stakeholder study seeks to map future of UK livestock

Researchers are engaging with the livestock sector to discuss the potential for transformation of animal agriculture, explains Prof Dominic Moran of the University of Edinburgh

RESEARCHERS ARE TO work with stakeholders in UK livestock to seek consensus on the sector's increasingly contested role in the economy, against a backdrop of climate change targets.

A team of scientists will engage with farmers, retailers, policymakers and others, aiming to balance the sector's market value and opportunities for innovation with its less tangible contributions to food systems, health, rural economies and social wellbeing.

The three-year initiative will aim to define an agreed pathway to transform UK livestock in readiness for a changing future. It gets under way as sustainability in UK livestock is called into question over the environmental and health impacts of meat and dairy production and consumption.

The project, led by the Global Academy of Agriculture and Food Systems and involving the Roslin Institute, is named TRAnsforming the DEbate about livestock systems transformation (TRADE) and is funded by UK Research and Innovation's Transforming UK Food Systems Strategic Priorities Fund.

Its team of scientists will explore better integration of social and scientific understanding to mitigate societal, political and economic barriers to potential solutions.

Their objectives include mapping UK stakeholders, understanding production and consumption patterns and associated impacts, and understanding competing views on regulation, as well as determining evolving health and social impacts and public preferences for livestock goods and related ecosystem services.

The team will also seek to understand regulatory objectives and establish consensus on roles and responsibilities of market participants and government.

In addition, they will model the livestock system and develop a pathway to specific, measurable outcomes related to market, environment health and social impacts of production and consumption of livestock products.

There is general consensus that livestock farming must change but there is no clear agreement of how this might happen.

To make progress, consensus among stakeholders in the livestock sector should be underpinned by evidence of the impact potential production systems may have, and with reference to public preferences, to better understand the possible trade-offs in environmental, health, economic and societal impacts of change.

Members' reports

Royal Botanic Garden Edinburgh



Salix lapponum growing at Allt an Aghaidh Mhilis, Dubh Ghleann, Cairngorms National Park

Genetic approaches to the conservation of montane willows

An in-depth genetic study in the Cairngorms National Park by researchers from Royal Botanic Garden Edinburgh provides evidence to support effective conservation action for two threatened willow species

MONTANE WILLOW scrub is one of Scotland's rarest and most threatened natural plant communities. Supporting important populations of rare plants and animals, the habitat is restricted, fragmented and isolated due to grazing pressure as well as historic burning.

The Royal Botanic Garden Edinburgh has carried out extensive collaborative conservation genetic research with montane willow species in the Cairngorms National Park. Recent work with nationally Vulnerable *Salix lapponum* and Endangered *S. myrsinites* was designed to support best-practice management decisions by partner organisations.

We sampled all known wild populations of *S. lapponum* and *S. myrsinites* across three estates (Glen Feshie and Abernethy of the Cairngorms Connect Partnership and Mar Lodge, managed by the National Trust for Scotland) around the main central massif at the heart of the National Park. Here the willows are found mainly clinging to crags and overhanging burns outwith the reach of grazing animals, often on north-facing crags beneath late snow beds where they likely rely on the irrigation from meltwater – highlighting their vulnerability to a warming climate.

Such small willow populations (often comprising fewer than 10 individuals) are at high risk of

catastrophic events such as landslides, as well as genetic problems such as inbreeding depression – potentially decreasing seed production, germination or survival rates – and reduced genetic diversity, limiting the species' ability to adapt to environmental changes including climate change or new pests and diseases. We know that reproduction in these willow populations is very limited, but it is not yet clear whether this is due to grazing pressure alone, or stems also from such genetic issues.

Therefore, our studies aimed to determine the number of unique individuals (clonal reproduction may lead to population sizes being overestimated), level of genetic isolation between populations, and extent of inbreeding depression.

Clonal reproduction was found to be very low, with populations comprising many genetically separate individuals. From a conservation perspective this is important since it means that population estimates are likely accurate, and that almost all individuals are potentially useful sources for nursery stock and future reinforcements – although care needs to be taken to avoid using hybrid individuals, which can occur between multiple montane willow species.

We found evidence of historic gene flow across the Cairngorms within both

species, tens or at most hundreds of years ago. This likely occurred by insects transporting pollen between populations and seed being dispersed widely by wind. However it is possible that connectivity depended on now-extinct populations lying between today's populations, connecting them in the wider landscape. Whether gene flow continues today cannot be determined from such data.

Genetic diversity was high within all populations, with the exception of two populations of *S. lapponum*, which were also the most genetically isolated. Possible evidence of inbreeding depression was found in some populations of *S. lapponum*, which showed higher relatedness between individuals in the population and low levels of reproductive success. This could not be tested in *S. myrsinites* due to the complexity of its decaploid genome.

Although these results are mostly encouraging, the extremely small size of the Cairngorms willow populations suggests they are likely to suffer increasing negative genetic effects in the long term.

The three estates on which this work was carried out are working collaboratively at a landscape scale to improve the conservation status of both willow species. This includes action to prevent the loss of any existing populations – particularly the smallest ones – by reinforcement with new unrelated individuals to maximise genetic diversity and minimise inbreeding depression (in this case, the risk of creating outbreeding depression is minimal).

Our work suggests this is a powerful approach, although ideally population sizes need to be increased significantly (to thousands of plants) to secure their long-term future.

It would also be beneficial to create new populations to act as genetic 'stepping stones' facilitating gene flow across this fragmented landscape. Additionally, it is imperative that pollinating insect communities are protected to maintain gene flow between the willows.

Further work will include analysis of seeds and seedlings to determine present-day rates of gene flow, and analysis of populations outwith the current study area to provide a broader conservation context.

This work was carried out in collaboration with Cairngorms Connect, the National Trust for Scotland, RSPB and Wildland.

Members' reports

Royal Botanic Garden Edinburgh



Pseudocyphellaria intricata on hazel at the source site in Argyll

LIKE MANY Scottish cryptogams, *Pseudocyphellaria intricata* is taxonomically obscure and difficult to distinguish from its close relatives. Although the name has been ascribed to many, likely unrelated, lichens around the world, in Scotland the species is rare enough to be listed as Near-Threatened.

Confined to the fragmented temperate rainforests of western Scotland and Ireland, it is threatened by a number of factors including invasive non-native species and climate change.

Lichenologists at the Royal Botanic Garden Edinburgh (RBGE) are working to establish new populations of *P. intricata* at safe, ecologically suitable sites such as Benmore Botanic Garden in Argyll, to secure the future of the species.

Early attempts have not always been successful. In 2018, Rebecca Yahr and Kristine Bogomazova transferred (with permission) several thalli from a farm in Argyll to carefully chosen sites at Benmore: two sides of a mossy rock face and the boughs of spruce trees in a moist grove on damp ground near the River Massan. The site looked promising as it was already home to several other members of the rainforest lichen community. Spreading their bets, the team tried multiple methods of attaching the lichens to their substrate: string, nets, epoxy resin and even snail slime.

Sadly, by the end of 2020 only three of these translocations survived. The snail slime quickly washed away, the nets didn't press the thalli close enough to the surfaces, and – the main issue – the rock face proved inhospitable, with the few patches of bare rock quickly covered by mosses,

The ups and downs of lichen translocation

Scientists at the Royal Botanic Garden Edinburgh are getting promising results as they try to establish new populations of rare lichens

leaving the lichens to rot. On the spruce boughs, several lichens were lost when the low branches they were attached to were shed naturally by the trees. The three thalli that survived were those tied by twine onto the remaining spruce boughs. A stable pattern of new growth and production of propagules

on their margins indicated that this was a suitable microsite.

While disappointing, this experimental translocation provided invaluable information supporting future establishment of a stable, self-sustaining population at Benmore. A route forward was clear: more twine on higher branches of the trees, making use of gravity and tree biology.

In autumn 2021, another collection was made at the Argyll farm. Here, a small number of hazel trees support large, dense mats of *P. intricata*, which genetic work has shown to comprise very few individuals spreading extensively by vegetative propagation. This makes it an ideal donor site, where multiple samples may be removed without noticeable impact on the population.

The thirty lobes collected were installed at Benmore the following day. All were attached using jute twine to mossy spruce twigs in the original glen or to hazel boughs a few metres downstream. In March 2022, only a few months later, all the translocated thalli were found alive and most looked healthy, the exceptions being a few in the most exposed locations.

Astonishingly, three thalli had already attached to the hazel twigs: small fungal attachment pads were visible emerging from the lower side of the lobes, and spreading across the bare bark. This is remarkably rapid compared to other translocations of similar lichens in Scotland.

The RBGE team will continue to monitor these conservation translocations as they grow.

For more information contact Rebecca Yahr, Lichen Biodiversity Scientist: ryahr@rbge.org.uk



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