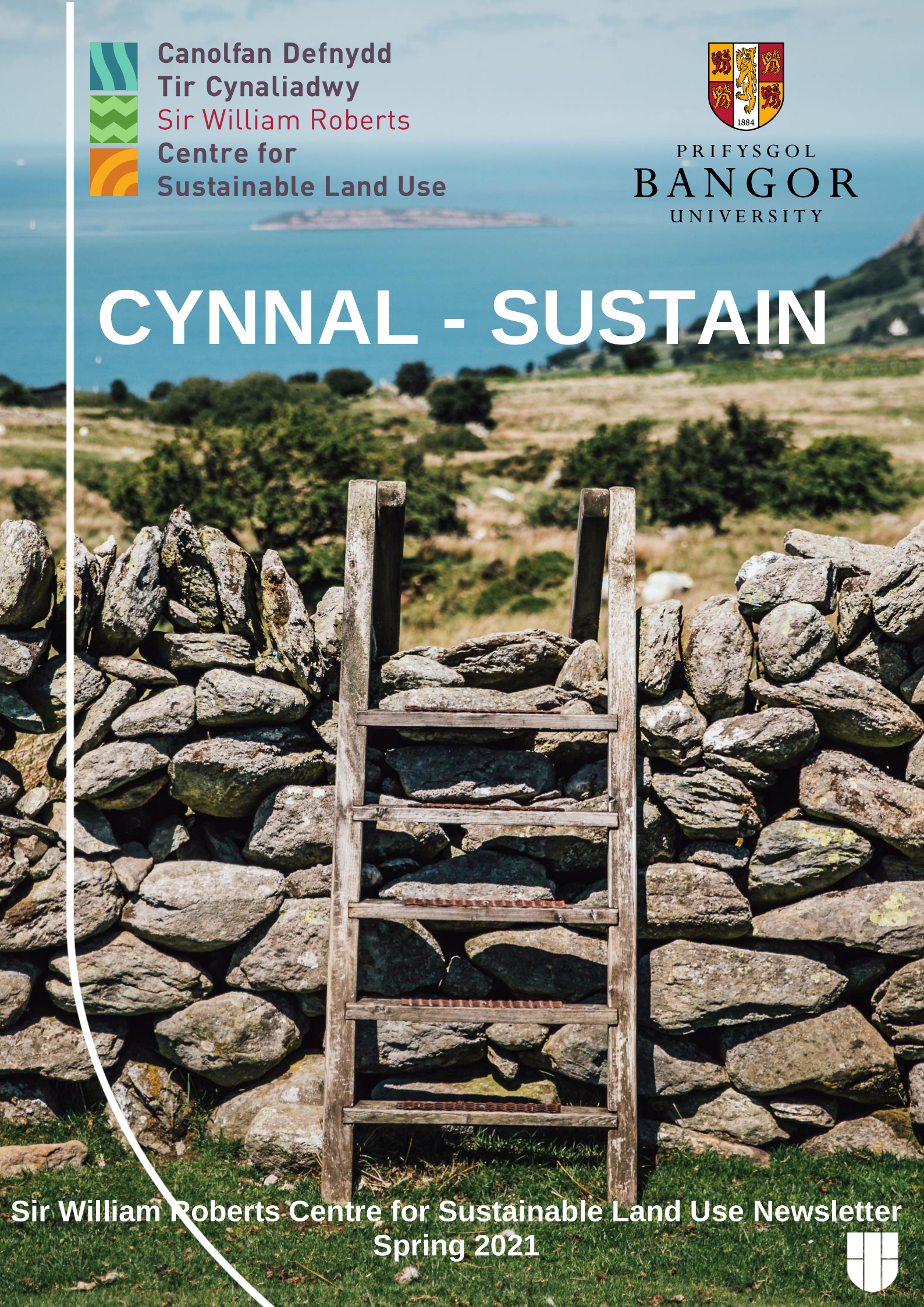
Canolfan Defnydd Tir Cynaliadwy
Sir William Roberts Centre for Sustainable Land Use

Prifysgol Bangor University

CYNNAL - SUSTAIN



Sir William Roberts Centre for Sustainable Land Use Newsletter
Spring 2021

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WELCOME

From Norman Dandy, Director of the Sir William Roberts Centre for Sustainable Land Use (SWRC)

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Dr Norman Dandy, Director of the Sir William Roberts Centre for Sustainable Land Use

"Welcome to *Cynnal-Sustain*, the first Sir William Roberts Centre e-news bulletin.

In establishing *Cynnal*, our aim is to reach out and connect to everyone interested in land use and sustainability. We hope that you will find insights into our latest forestry, agriculture, conservation and other research interesting and informative. We'd like you to keep in touch, and we'll be seeking ways in which you can work with us to help design, support and deliver our future research.

Equitable land use is vital to future sustainability in Wales, the UK and beyond. Recent events have generated searching questions about how to live healthy, sustainable lives. As part of this, an apparently strong desire has emerged for people to (re)connect with the natural world and their local landscapes. Being outside in 'fresh air' has re-asserted itself strongly as an element of health and wellbeing. However, not everyone has equal access to the natural environment. Therefore, which benefits are produced by our land, how, and who is able to access them, remain essential questions that need answering.

Enabled by a generous endowment from Bangor alumnus Sir William Roberts, our Centre aims to provide a forum within which to promote interdisciplinary study of land-centred sustainability challenges. In this first issue, we would like to draw attention to our current work training the next generation of soil scientists, exploring cutting-edge innovations in tree health, supporting the sensitive evolution of rewilding, and addressing the major challenge of woodland expansion in Britain."

REWILDING IN WALES

Rewilding is a hot topic across the UK and Europe. Accelerating environmental decline is creating demand for new ways of doing conservation and changes in rural economies are potentially opening-up opportunities for innovative approaches. In Wales, we have seen interest in rewilding from established conservationists and land managers, from the National Trust to National Parks. New organisations are also emerging including Rewilding Britain and Wales Wild Land Foundation. This excitement and experimentation has, however, had to be balanced against the concerns of the farming community regarding the sustainability of their businesses and cultural heritage. Working with two major projects, Bangor research has been at the forefront of exploring these trade-offs, notably demonstrating the importance of interdisciplinary insights that consider the social, cultural and economic dimensions of rewilding.

Dr Sophie Wynne-Jones has worked closely with Wales Wild Land Foundation to evaluate the social impacts of the Cambrian Wildwood project in Mid Wales and consider how any tensions can be mitigated. This has included making stronger connections to Welsh heritage in their educational programme: linking discussions of nature conservation to folklore associated with different animals, as documented in the Mabinogion. Linguistic sensitivity has also been important. Welsh interpretations of the word 'wild' don't necessarily encompass a romantic appreciation of wilderness. For some Welsh communities landscapes are not empty and unpeopled, they are full of stories of generations living and working on the land over time. Culture in Welsh is about un-wilding *diwylliant* and the term to describe sense of place *cynefin* is rooted in traditions of shepherding.

In autumn 2018, Rewilding Britain gained funding for a large rewilding area in Mid Wales: the Summit to Sea project. In response to widespread community concerns, Rewilding Britain stepped back from project leadership. It handed over to the RSPB and remaining project partners to reformulate the aspirations and scope of work proposed. Ecological restoration – of both land and sea 'scapes – is still at the heart of what partners hope to deliver, but the re-design process is being done with a much higher level of input from community members to ensure that shared values are driving the project.

Dr Wynne-Jones has worked with Summit to Sea partners through this period of upheaval, including input to evaluations and generating baseline data to enable monitoring of future change arising from the project. Doctoral researcher Rachel Dolan is monitoring how the natural environment is being used and engaged with by residents and visitors. This information enables us to understand what people do in different locations, why they want to spend time in nature, and how it impacts on their wellbeing. Findings show the value of the project landscape for visitors and residents alike. Natural spaces close to peoples' homes, which they access daily to 'restore themselves' and reconnect with the natural world, are particularly important. This reminds us that when we are thinking about rewilding, we are not necessarily looking for wild spaces far from people, but ensuring that people and nature have greater opportunity to flourish together.

SOILS TRAINING AND RESEARCH STUDENTSHIPS

Bangor University is playing a key role in training the next generation of soil scientists via the Soils Training and Research Studentships (STARS). STARS is a Centre of Doctoral Training funded by NERC and BBSRC, and is an exciting consortium of four universities and four research institutes from across England, Scotland, and Wales. They are collaborating to offer training to 40 doctoral researchers.

Bangor University hosts seven STARS doctoral students, with projects ranging from *Understanding if soil microbial biodiversity matters* to *Evaluating the long-term impact of neonicotinoids on the trophic cascade*, and *Understanding the carbon and nutrient dynamics in urine patches*. Researchers at Bangor University are also co-supervisors of students hosted by other partner organisations.

Professors Davey Jones and Dave Chadwick have contributed to training workshops on soil quality monitoring and assessment both in Tenerife - exploring some of the key soil orders of the world in an easily accessible environment - and in Bangor - delivered at the university's farm, Henfaes. These workshops used the altitudinal sequence of soils on the university's land, from the deep peats on the mountain top through to the lowland brown earths and saline soil close to the Menai Strait. Researchers explored methods for assessing soil quality and ways in which to relate soil properties and knowledge of soil formation to potential land use and delivery of ecosystem services.

The STARS programme is not only training the current cohort of soil science doctoral researchers, but also aims to build a lasting legacy of useful resources for use by future students and researchers. One strategy for achieving this is the production of videos summarising soil quality and wider land use for each of the main soil orders of the world. These short films have already been produced for the soil orders of Tenerife, and filming of the catena sequence (a series of distinct but related soils) at Henfaes has just been completed.

The unprecedented level of training offered by the STARS programme compliments the individual PhD projects, and will result in better trained and informed future policy makers, researchers, advisors, and industry leaders.

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Photography by Dan Struthers
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FUTURE OAK

The sustainability of land and landscapes can depend on conditions at the very smallest scales. The FUTURE OAK project, led by Professor James McDonald, is investigating the relationship between communities of microorganisms and the health native oak trees that form such an important part of our wooded landscapes.

Trees live closely with bacteria, fungi, and other microorganisms. Different communities of these are found in their stems, roots, and foliage and play important roles in acquiring nutrients for the plant and supporting its health. The microorganisms, their interactions, and the parts of the plant where they live is called the 'microbiome'.

Oak trees in the UK face a number of threats to their health, perhaps most prominent of which is acute oak decline – a complex, multi-faceted decline disease. FUTURE OAK researchers will analyse the composition of the microbiome of trees across the UK, comparing results with the health condition of the trees. The team will also test particular microorganisms for their ability to suppress pathogens and identify beneficial members of the oak microbiome community. After identifying these beneficial microbes the FUTURE OAK project aims to use this information to explore the potential for use of 'engineered' microbiomes to suppress disease in oak trees.

Bringing the microbiome in to our thinking about sustainability, and specifically to forest health presents a significant challenge: one that demands interdisciplinary efforts. Considering our responsibilities to sustain land and wildlife may be quite familiar to us, but should we be aiming to leave particular microbial communities for future generations? SWRC Director Norman Dandy will be leading part of FUTURE OAK working with land managers to explore their knowledge and understandings of microbiomes and their role in oak health. The future condition of tree microbiomes will be heavily influenced by their management practices and, potentially, their use of 'engineered' microbiomic products. The FUTURE OAK project therefore aims to stimulate conversation and reflection amongst stakeholders and the research community to grow knowledge in this area.

FUTURE OAK is led by Bangor University in collaboration with Forest Research, Aberystwyth University, Woodland Heritage, and the Sylva Foundation. The team includes specialists in plant pathology, microbial ecology, anthropology, metabolomics, environmental governance, and silviculture. The project is part of the UK Research and Innovation's (UKRI) programme on Bacterial Plant Diseases.

THE SPACE FOR FUTURE WOODLANDS IN BRITAIN

Britain wants more woodland - 25,000 and more hectares of new woodland every year! Reasons range from climate change mitigation and timber production to community cohesion and biodiversity conservation. *How* these new forests will come in to being, and *where* they will be, is however very much up for debate. In a highly populated cultural landscape such as Britain, most every piece of land already hosts one or more land uses. This makes new woodlands a conversation not only about forestry, but about the wider relationship between land covers, land uses, and amongst the diverse network of stakeholders that govern and manage Britain's land.

Bangor University researcher Theresa Bodner aims to contribute to finding the necessary space for Britain's future woodlands through her doctoral project '*Emerging spaces for native woodland growth in Britain's crowded future landscapes'*. The project is funded by the Sir William Roberts Centre for Sustainable Land Use, and is within a field of research that's currently considered a hot topic both inside and outside of academia. Because of the complexity of the environmental and socio-economic challenges around woodland creation, *space*, in this case, is not only geographical – as in where can we put woodlands on a map or in the ground – but also cultural, political, and financial. Where could trees fit within our vision of the British landscape and those of the land management community, and what regulations or policies may support or challenge their emergence?

The project is in two parts. The first looked at the last 100 years of woodland creation in Britain. This analysis considered all the changing objectives and planting targets the country had throughout time, and investigated how that could inform Britain's outlook and plans for the future. The second part of the project builds on these intermediate results and considers the *how* and *where* of future woodland creation. Specifically it focuses on the use of natural colonisation of trees on previously non-wooded land. After decades of intentional larger scale afforestation, ideas of 'rewilding' and the use of scattered patches of emerging natural regeneration to grow new forests is becoming more popular. The doctoral project aims to contribute to this discourse by investigating how natural regeneration is mapped and understood spatially, and whether trees outside woodlands and natural regeneration could indeed be capitalised on as another pathway towards creating Britain's future treescapes.

@HENFAES

At the SWRC, our centre of gravity is the landscape of North Wales, and particularly the Henfaes Research Centre.

Spring will see lambing of the Welsh Mountain ewes @Henfaes in full swing and we all hope for good weather during this period. The livestock are managed by the Centre for Hill and Upland Management (CHUM) which works very closely with the University, researchers, and neighbouring land managers including through membership of the Aber and Llanfairfechan Common Graziers Association.

The Covid pandemic has proven an enormous challenge for higher education. As restrictions begin to ease however, the facilities @Henfaes enable our students to continue their learning safely outdoors. Environmental Science students recently participated in a covid-safe field trip to Henfaes exploring coastal habitat creation and erosion management, along with the impacts of microplastic pollution on soil functions and processes.

We are approaching the third year of a DEFRA-funded project aimed at assessing the impact of slurry acidification on soil and crop quality. This year the fifth and sixth slurry applications will be made in spring and summer, and we'll measure greenhouse gases, soil mineral N, soil pH, and electrical conductivity, as well as crop yields.

Henfaes will soon be central to delivery of a new Zoology with Animal Management degree, led by Rhea Burton-Roberts. This programme will enable students to grow their livestock management knowledge, develop practical skills, and enhance their employability. Placement students have already been getting stuck in to training our three alpacas!

The agroforestry (silvopastoral) trials plots @Henfaes are an important research and teaching resource. Work is currently underway to remove the stumps of trees previously felled as part of experimental thinning, and supply them to a biomass contractor (Wood Energy Wales) in Llanrwst.