

# Annual Review

2019 - 2020







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## Director's Overview

The University of Exeter's Environment and Sustainability Institute (ESI) is a unique facility bringing together a diverse, interdisciplinary group of researchers dedicated to finding solutions to problems of environmental change. Based at the University's Penryn Campus in Cornwall, our world class work is enhancing people's lives by improving their relationships with the environment.

The ESI has been funded by the European Regional Development Fund Convergence Programme (£22.9m) and the South West Regional Development Agency (£6.6m), with significant support from the Higher Education Funding Council for England.



I took over the Directorship of the ESI at a truly remarkable time. On May Day 2020 we were amidst a global pandemic, our building was shut, and everyone was working from home. It was both the worst and best of times to be taking on the new job. Confronting the deadly reality of the virus was oddly counterpoised to the realisation that our environment was having a rest. The skies were free of vapour trails and the roads were eerily silent. People discovered previously unknown footpaths around their communities and came to appreciate the joy of witnessing spring. The virus prompted a renewed appreciation of the beauty of wild flowers and bird song, even in cities. The calm was good for nature and good for our souls and in a visceral way, it exposed the impact of our economy on the environment. In what were normal times, we were driving, shopping and

travelling without much thought, largely oblivious to the impact we were having on nature. While activists and academics told us we were destroying the world on which we depend, we could decide not to listen. Now, however, we have experienced a world in which natural systems have had the space to expand. The virus spread due to the corrosive impact of our relationships with nature but it has also exposed that damage, and we now have the chance to rethink what we do in the future. There is an urgent need to make a new covenant with the environment. We need to create an economy and associated society that works in harmony with the environment. This has been the mission of the ESI since its inception almost a decade ago. It is also reflected

in the goal to support 'environmental growth' as part of wider efforts towards sustainable development and carbon neutrality in Cornwall. The ESI now has the opportunity to work with renewed vigour to achieve this vision, through collaboration with our regional, national and global partners. We need to develop the tools to ensure that the environment is central to decision making in the rush to economic recovery. Our hope is that Cornwall can become more of a beacon for sustainable socio-economic renewal and that the ESI can play a part in making this happen.

Professor Jane Wills



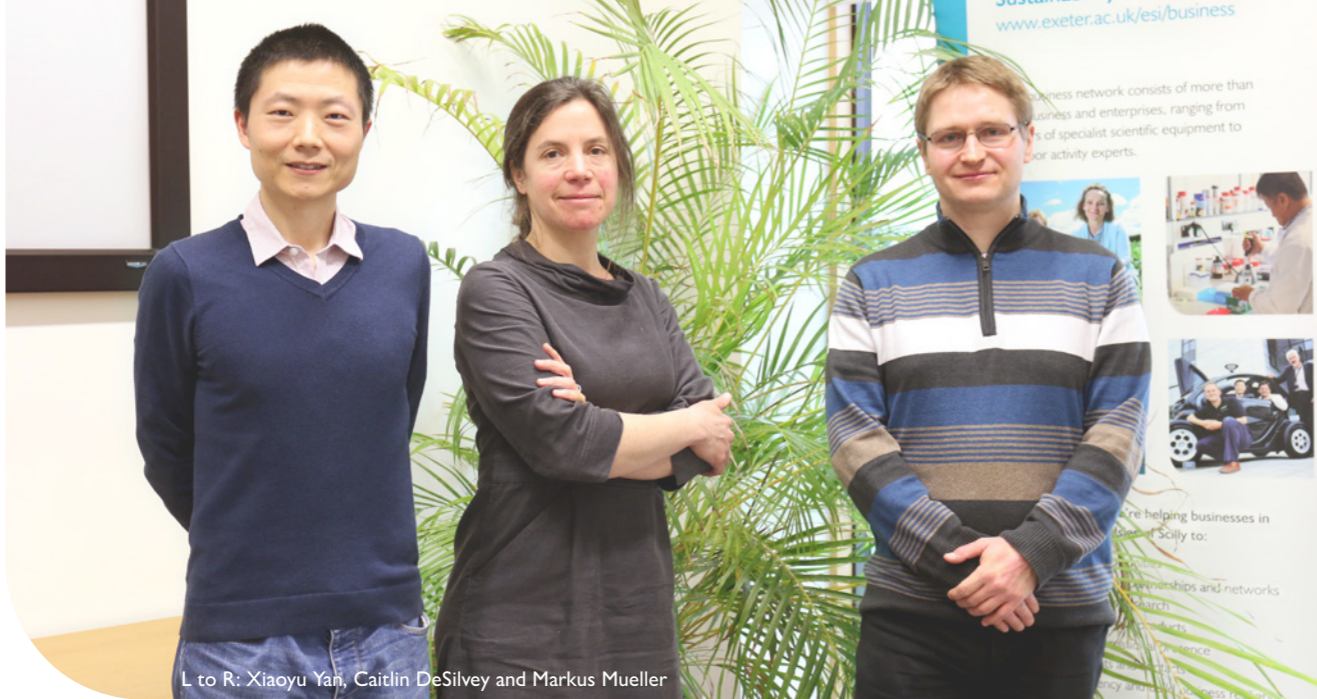
I have just completed my three year term as Director of the ESI and I am really delighted to hand over to Professor Jane Wills who brings a whole new perspective and great enthusiasm to weave the social and scientific work of ESI even more closely together to tackle environmental change. Some of the highlights for my final year in the role were seeing the Creative Exchange growing and expanding to form

a foundation stone in the University's art and culture strategy; watching our young and talented staff and students explore new areas of research and teaching in the context of the climate and environment crisis gaining higher public profile. I am proud that the ESI is at the centre of the University's response to the climate crisis, and the region's Environmental Growth strategy. The coronavirus pandemic has made us all see life and work

from a completely different perspective, and it is great to see Jane begin her Directorship by ensuring that ESI is still an important 'convening hub' for the region to think about sustainability and motivate activity during difficult times – even if this is currently virtual rather than within the building itself.

Professor Juliet Osborne





L to R: Xiaoyu Yan, Caitlin DeSilvey and Markus Mueller

## Associate Directors

The ESI has recently appointed three associate directors to help provide thought leadership in key areas: transdisciplinary research; education and engagement; and internationalisation and partnerships.

### **Caitlin DeSilvey, Associate Director for Transdisciplinary Research**

In the ESI, we usually describe the research we do as interdisciplinary. In the early days of the Institute we had some valuable discussions about what this actually meant, and over the last eight years we've tried to put these ideas into practice, often with great success. In my new role as Associate Director, I'm hoping to work with colleagues to

extend beyond interdisciplinarity and develop new ways of working together and with our external partners.

The concept of 'transdisciplinary' research brings a slightly different flavour to shared enquiry, and it actually has two active meanings--both relevant to our work in the ESI. In one sense, it can refer to researchers from a diversity of disciplines who come together with the specific intention of developing integrated approaches to address a shared problem or question. It requires a willingness to open up our methods to scrutiny, and to allow these methods to evolve to support new, holistic ways of making knowledge. In another sense, the term transdisciplinary can refer to research that reaches outside the academy, to engage in the co-creation of knowledge and practice through direct

collaboration with non-academic partners. In the ESI, we already experiment with both kinds of transdisciplinary research; in my new role as Associate Director for Transdisciplinary Research I will celebrate this activity and work with others to continue to push the boundaries of knowledge production.

### **Markus Mueller, Associate Director for Education and Engagement**

As an interdisciplinary research institute, the ESI also plays an important role in providing access to its research through undergraduate and postgraduate taught programmes, outreach and widening participation. ESI academics, research staff, and research students lead or contribute to a large number of modules on many programmes offered on the university's Penryn and Truro campuses. We also provide workshops to pupils at schools in the region and on campus, through events like the annual Environment and Sustainability Day, to which we invite around 60 to 80 secondary school children to peek in our labs and work with us on the grand challenges that Cornwall and the world are facing, with this year's workshops focusing on ways to reduce waste.

In my role as Associate Director for Education and Engagement I will aim to further strengthen the idea of interdisciplinarity in the ESI's teaching and engagement activities. I am planning to develop novel ways of integrating disciplinary modularity into inter- and transdisciplinary taught and research programmes. Building on problem-based enquiry already enables the ESI to engage with a wide range of researchers and stakeholders,

and will open further avenues for impactful work with students as part of our education portfolio.

### **Xiaoyu Yan, Associate Director for Internationalisation and Partnerships**

The ESI has achieved impressive positive impact regionally, nationally and globally since its founding, thanks to extensive and mutually-beneficial partnerships with a wide range of organisations. We must continue to work closely and creatively with our partners and stakeholders around the world to tackle the most pressing environmental and sustainability challenges across spatial and temporal scales. This will be more important than ever in the time after COVID-19 and Brexit.

In my new role as Associate Director, I'm hoping to work with colleagues to enhance existing partnerships as well as fostering new ones in order to realise the ESI's regional and global ambitions. This will involve reflecting collectively on our experiences in existing and previous partnerships, e.g., who we work with, why and how we work with them and the outcomes of this, as well as sharing good practices. It will also involve working closely with colleagues in Innovation, Impact and Business (IIB) and Global Partnerships to identify new partners and innovative ways of collaborative working, making sure our visions and values as well as strength and passion in transdisciplinary research and education are embedded in all our partnerships.

# Thought leadership in Interdisciplinary Research

The ESI aims to provide insights and solutions, at local to global scales, to meet the challenges of securing a sustainable future in an era of unprecedented environmental and societal change. Some of these solutions may be based in the environment, some in technology and some in society; but the most successful solutions will involve a mixture of all these areas. The ESI Building is home to nearly 200 research staff and students with expertise across Biosciences, Business, Geography, Mathematics, Medicine, Mining, Politics and Renewable Energy who, together, look at problems holistically to find cutting-edge, lasting solutions.

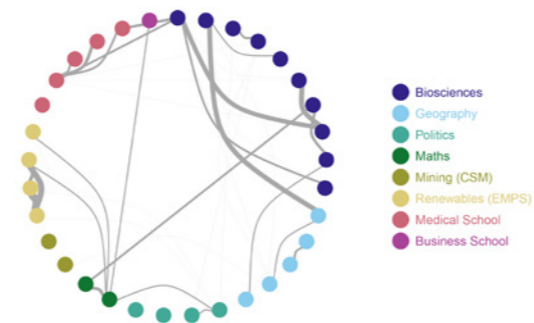
The ESI also acts as a hub for interdisciplinary environmental research for the University of Exeter and the region, through initiatives such as our Think Tank and Creative Exchange programmes. We bring together expertise, stakeholders and the community to

help find solutions and to encourage people to consider environmental and sustainable practises in new ways.

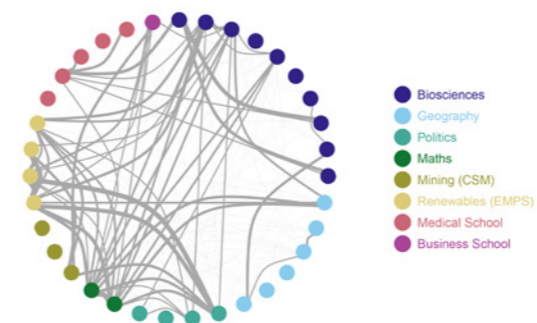
The research networking diagrams on this page highlight the ESI's interdisciplinary strengths. The coloured dots represent our academics and their traditional disciplines. The thickness of lines connecting them show the number of interactions they've had; the thicker the line, the more interactions.

As well as this collaboration within the Institute, all of our staff work closely within and across the departmental structures in which they are fully embedded and our community extends well beyond the confines of those in the building. We value a culture of collaboration and partnership working with colleagues across the Cornwall and Exeter campuses around areas of shared vision.

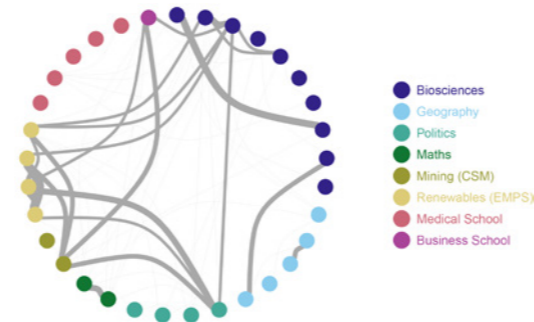
**Publications**



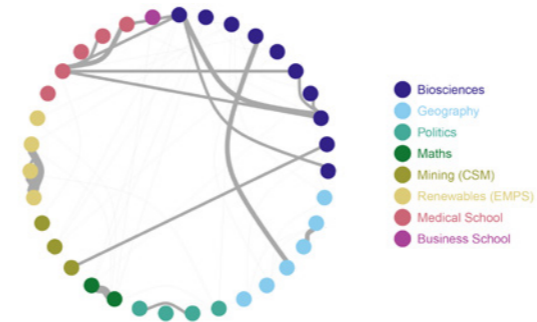
**Applications**



**Awards**



**PGR students**



Collabograms credit: Dr Matthew Silk

## ESI Creative Exchange

The ESI's Creative Exchange Programme aims to facilitate collaboration between creative practitioners and researchers on our Cornwall Campuses who share an interest in issues of environment and sustainability. For seven years, we have been fostering distinctive new transdisciplinary cultures by bringing together artists and researchers to explore shared questions and generate the cross-fertilisation of scientific and arts methodologies.

Through this programme the ESI is seeking to develop the region's creative industries, inspire research and stimulate opportunities for public engagement and collaborative learning.

In the past year, we have supported projects covering topics as varied as wave energy, material relationships, sea shells and climate change, solar panels as art and microbial underworlds.

The Creative Exchange is co-funded and supported by the University's Arts and Culture programme.





### Pretty Useful Solar Panel Artwork

Art and Energy artists Chloe Uden and Naomi Wright collaborated with post-doctoral researcher Dr Katie Shanks to challenge the aesthetics of silicon solar PV in order to re-imagine solar panels as places for artworks of the future.

According to Dr Katie Shanks, “Chloe was incredibly enthusiastic to learn about solar energy and how she could re-design the technology. As scientists, it is easy to lose some of our positivity and creativity in all the challenges we face in the deep dark world of fundamentals and critical reviews. Chloe’s attitude was stimulating for the work. The ideas for the developed PV artworks stemmed from Chloe’s surprise at the different varieties of PV (coloured, transparent, 3D) and from the lack of such devices in the market when they use all the same manufacturing as standard panels. Their efficiency is marginally lower, which of course we checked as we wanted these devices to be truly useful, green energy artistic statements.

One of the aims of the work is to change how people view solar panel technology, from its rather boring commodity function and almost guilt trip motivation to be more eco-friendly, to something people want and are

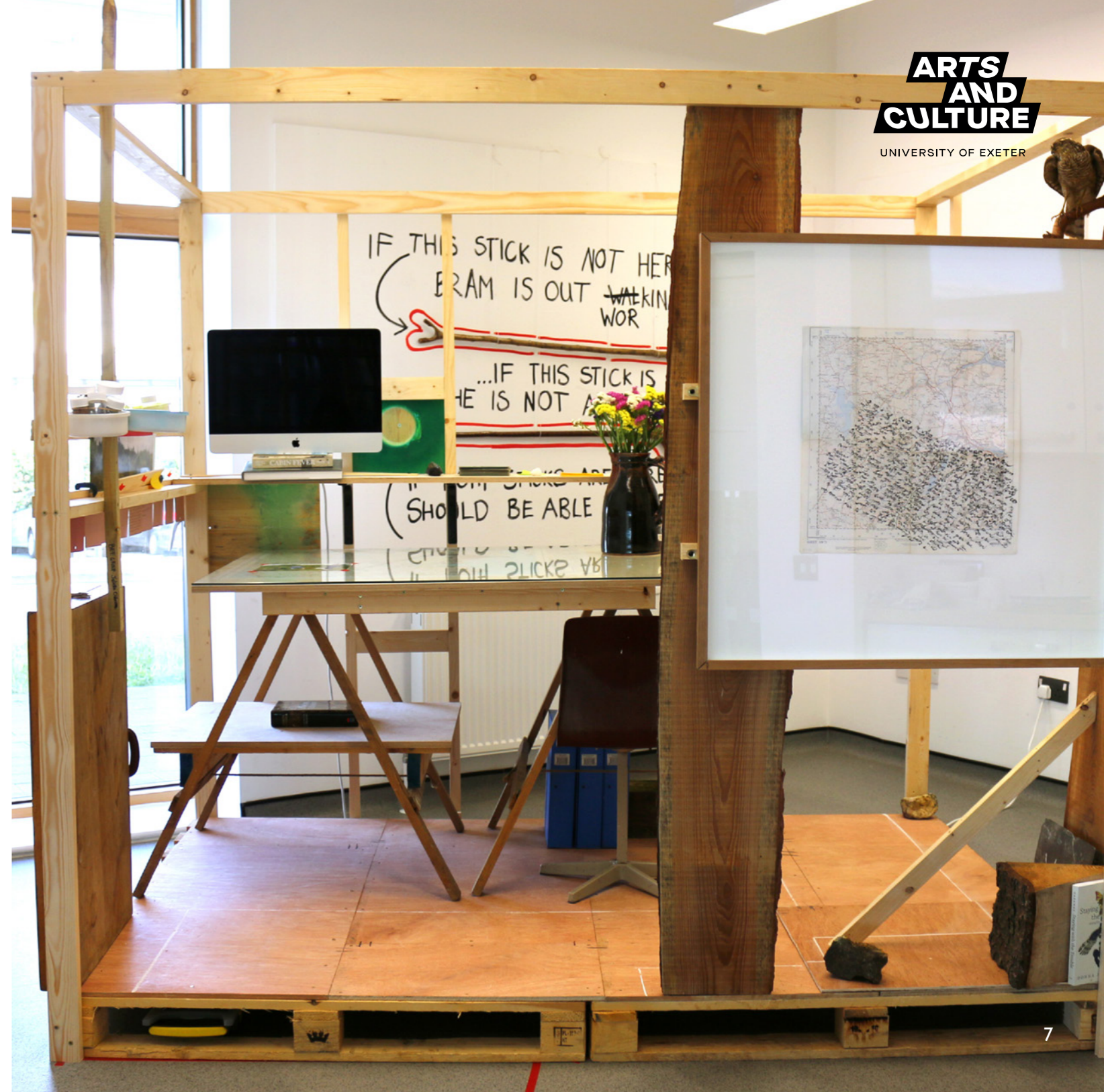
proud to display. If we plan to integrate renewable energy and sustainable technology into our everyday lives, then it needs to be visually impactful. In our discussions, we realised this was a major flaw in the world of sustainable technology. It is common that our technological product choices are strongly influenced by aesthetics and what people can ‘see’ it do. There are further plans to develop these types of PV artworks and carry out more workshops engaging with the public, to help them build their own PV artwork devices and understand solar energy technology better.”

### A Transect for Trelowarren

In the summer of 2019, the Creative Exchange programme hosted Bram Thomas Arnold, one of the University’s inaugural Arts and Culture Creative Fellows, on the transdisciplinary project, A Transect for Trelowarren.

Bram, an artist whose practice spans performance, installation, drawing, academia, broadcasting and writing, stepped out onto a line drawn from the ESI to the Trelowarren estate. He walked and talked this transect into being in collaboration with a transdisciplinary team of researchers from the ESI, comprised of ecologists, geologists, cultural geographers and environmental scientists.

The team is working with the Trelowarren estate to gather data that will inform a process of ‘wilding’ on parts of the estate. Bram’s transect intersected with, and interrogated, transects drawn by the researchers as they measure, count, survey and remotely sense the landscape and its inhabitants.



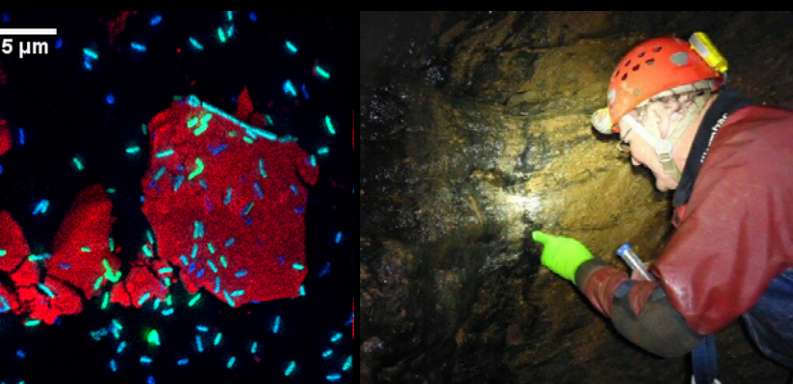


# Think Tanks

To stimulate innovative thinking and project ideas, our regular Think Tank events – supported by the Halpin Trust - bring together researchers from across the University of Exeter and stakeholders from the community to explore concepts that cut across all our themes. This approach allows us to achieve a dynamic synthesis across fields; changing over time to tackle the big questions in environmental and sustainability science.

So far, our Think Tanks have inspired an Environmental Growth evidence group (with Cornwall Council); a new interdisciplinary degree programme; two PhD studentships; at least nine research project proposals; three new events; the creation of the South West Climate Action Network, the Exeter Energy Hub and three other new networks.

The main outcome of the Think Tanks is to produce a space and time where intellectual connections can be built across departments with an aim of creating new approaches and new methods to solve problems.



## Extreme Environments

A Think Tank on 'Extreme Environments', organised by Karen Hudson-Edwards and Dave Hosken, was held in the ESI on October 18th, 2019. Extreme Environments had been flagged as a possible research theme in the Cornwall 2030 Strategy, as it was thought to have coherence across the campus and the wider university. The aim of the Think Tank was to give researchers from different disciplines an opportunity to come together to discuss and debate this proposal.

The morning session consisted of presentations from Exeter academics. These covered (i) an overview of research in Extreme Environments in their particular disciplines / departments, (ii) case study examples of their research group's work in Extreme Environments and (iii) ideas for future interdisciplinary opportunities for Extreme Environments in theirs and other disciplines. Excellent presentations were given on Extreme Environments in the geologic past, remote sensing, law, the humanities, the political sciences, the microbial world, aquatic and terrestrial ecosystems, astrophysics, space physiology and mining. In the afternoon structured discussions on the future of Extreme Environments at Exeter were held. Everyone agreed that this was an initiative that should be taken forward for networking, research, teaching and outreach activities.

A subsequent Think Tank on the theme of 'Surviving and Thriving in Extreme Environments' is being organised for the autumn of 2020. Other activities for the new 'Exeter

Extreme Environments' hub are also being planned, including a webinar with SA Catapult on space technology in extreme environments, and development of a website and of a newsletter.

## Regional economic development, the Cornish way

Our 'Regional economic development, the Cornish way' Think Tank in March 2019 brought University of Exeter experts together with stakeholders including Members of Parliament, Cornwall Council, businesses and climate activists from across the county and beyond to examine how the collective identity of Cornwall and the Isles of Scilly can be used to create a narrative that re-envision the economy reflecting an embedded sense of place.

The event, led by Professor Jane Wills, looked at how location, including the county's natural capital, is one of the most important economic opportunities for Cornwall. The explicit importance of nature, and its value, is reflected in the county's unique Environmental Growth Strategy, published by Cornwall Council and co-authored by the ESI's Professor Kevin Gaston, which sets out a roadmap putting natural capital at the heart of the county's regional development and evidences that Cornwall can lead when it comes to embedding natural capital within a thriving business environment.

The geographic argument for Cornwall's brand drives thinking about the county's regional economic development in novel ways, as an autonomous hub

rather than a remote, peripheral appendage of a broader nation. To that end, interdisciplinary problem-solving sits at the heart of new approaches to regional economic development whether it is incorporating models from evolutionary theory or leading within a broader transition towards a circular economy.

Going forward, the workshop offered compelling arguments that Cornwall's identity as an economic region, which is framed around valuing natural capital and supported by a flexible workforce enticed by opportunities of greater work-life balance, remains a work in progress. Questions remain around access to opportunities for all the county's residents, wage levels, support for new businesses, sustainability and transportation.

It was widely agreed that the priorities for Cornwall's economic development should lie in identifying cutting-edge opportunities that give the county a leadership role wherever possible.

## Think Tanks to date:

The Anatomy of Adaptation	Inspired by Nature	Researching Emergent Energy Communities and Associated Regulation	Environmental Growth
ECEHH & ESI: Rethinking Health and the Environment	Treloarren: An Interdisciplinary Expedition	Regional Economic Development: The Cornish Way	Cornwall Council: Climate Emergency Response
Extreme Environments	Towards Fashion Justice: A UK-India Exchange	Further details of all of our Think Tank events can be found on our website.	



# Thought leadership in Building Interdisciplinary Careers

## Supporting Early Career Researchers

As a hub for interdisciplinary research and teaching in environment and sustainability, a key part of the ESI's ethos is to help develop the careers of early career researchers by supporting them to undertake a holistic approach to their research and to pursue interdisciplinary careers.

As well as working with 32 world-class academics within the Institute and over 200 other academics across the University of Exeter studying the environment and sustainable futures; access to a network of over 450 businesses, NGOs, policymakers and schools; and a team of dedicated support staff, the ESI also offers student and staff-led events aiming to facilitate knowledge sharing between academics, post-graduate students and post-doctoral researchers about the challenges and advantages of interdisciplinary working, how ECRs can initiate their own research and to learn more about the interdisciplinary research being carried out across the University.

This year the ESI hosted an interdisciplinary workshop open to staff and students across the Penryn Campus. The event included talks on what interdisciplinary research is and what it means in practise, the difference between inter- and trans- disciplinary working, the

funding available for interdisciplinary projects, what makes a good application and what support the University can offer.

The event featured talks from our own interdisciplinary academics and staff on their experiences and guest speaker Dr Milena Buchs (University of Leeds) spoke of her work leading several major interdisciplinary UK Research and Innovation grants.

### Dr Sarah Crowley



Sarah joined the ESI to carry out her PhD research in 2013 as a member of Prof Robbie McDonald's Wildlife Science research group. On the completion of her PhD, Sarah moved into a research fellow post leading the social scientific components of an interdisciplinary project aiming to find effective, sustainable techniques to reduce hunting behaviour in domestic cats, without compromising cat welfare. She has now been awarded a lectureship at the University's Centre for Geography and Environmental Science (CGES).

On developing her career in the ESI, Sarah says: "Being based in the ESI has allowed me to work closely with natural scientists while continuing to connect with and learn from my social science colleagues. It's also enabled me to learn about research areas very different from my own and to establish collaborations and friendships with academics outside of my field(s), something I have really come to value. The ESI welcomes the often challenging interdisciplinary projects I have been working on and has provided great support in hosting and promoting our domestic cat project, which has involved extensive public participation."

### Dr Edvard Glücksman



Edvard joined the ESI in 2014 as a postdoctoral researcher working on the environmental and social impacts of mining in a highly interdisciplinary collaboration with colleagues at the Camborne School of Mines. His research landed him a job with Wardell Armstrong, where he spent three years consulting as an environmental and social specialist on large-scale extractive projects in emerging economies. Throughout his time in the private sector, Edvard maintained an external stakeholder affiliation with the ESI, giving lectures in geography, environmental science and human health, mining engineering and business. In 2018, he returned to the University of Exeter as an enterprise-facing manager on Tevi, an ESIF-funded programme that supports small

and medium-sized enterprises (SMEs) in Cornwall to grow whilst contributing to environmental sustainability.

Currently based in the university's cutting-edge Innovation, Impact and Business (IIB) department, Edvard strengthens the relationship between researchers and external stakeholders such as businesses, community groups, NGOs and policymakers. Edvard works with ESI engineers, biologists, social scientists, management and sustainability experts to amplify the impact of their research, making it relevant and accessible to enterprises in Cornwall. At the same time, he collaborates with external stakeholders to facilitate their access to collaborative research projects and to help them access governance and policymaking mechanisms, whilst supporting SMEs to design waste out of their product life-cycles and to actively contribute to growing the environment around them. He also continues to deliver university lectures on the relationship between business and the environment.

"The ESI is unique in its ability to assemble expertise in a way that promotes collaborative research on projects that have meaningful positive impact on the Cornish economy. Through the Tevi programme, I've been fortunate enough to work with most of the areas covered by ESI researchers and to apply their collective knowledge to the challenges faced by SMEs across Cornwall. The outputs from programmes like Tevi will undoubtedly have long-lasting impacts on how Cornish enterprises do business. At the same time, this interdisciplinary, cross-sector work offers the University's students a continuously evolving case study in applied sustainability."



### Dr Stephen Lowe



As an Industrial Impact Fellow working on the Tevi project, the ESI enabled me to develop a career focused on the application of key principals in Geography, Environmental Science and

Sustainability to environmental, social and economic issues across Cornwall. I work closely with Cornish SMEs to develop approaches focused on environmental growth and circular economics, fields advanced by ESI research. My work at the ESI has been led by Kevin Gaston, who is a leader in the development of strategies to promote the environment in business and society, including the landmark Environmental Growth Strategy, published by Cornwall Council.

Through Tevi and the ESI, I have been able to lead the development of Lagas, an environmental intelligence hub, developed to communicate data relevant to Cornwall's environment and sustainable development.

### Dr Kyle Roskilly



Kyle joined the ESI in 2018 working on Tevi as the Industrial Impact Fellow for CEMPS. With Xiaoyu Yan and Markus Mueller, Kyle is leading the development of Tevi's sensor network (TeviSENSE).

This gives businesses in Cornwall feedback on their resource use and the means to engage with local wildlife using cameras. It will also provide a legacy for longer term monitoring of wider environmental parameters using sensors and long range communication technology.

Kyle says: "My main interest is the engineering of novel measurement technologies and I have always enjoyed interdisciplinary working. The chance to join ESI on Tevi was amazing, allowing me to apply the work I enjoy to new fields and learning from world-leading academics across engineering, business and environmental science. The project has also allowed me to work with Cornwall Council, Cornwall Wildlife Trust and industry. My fantastic Tevi colleagues and I are helping hundreds of local businesses to grow, while embracing sustainable practices and growing nature. In turn, I hope this will help people value what Cornwall has and bring more opportunities for people like me in future."

### Dr Katie Shanks



I first came to the ESI to start my PhD on identifying novel optics to enhance solar energy technology. The way I'm able to receive guidance, discuss and collaborate with such ease is, in my opinion, invaluable

to the progression of not only my development, but of research in general. My PhD supervisor Prof Tapas Mallick was excellent for pushing me to do more, and through the many research sharing social events held on campus, I was

further encouraged by other ECR's and Dr Adam Feldman towards collaborating with Prof Richard French-Constant on butterflies research. Prof French-Constant was, and still is, incredibly helpful and enthusiastic when it comes to interdisciplinary research, specifically starting with the cabbage white butterfly for its unique optical wing structures for solar energy.

This has spurred my research and led me to further delve into this field and overlap with other disciplines as much as possible. The opportunities within the ESI, such as the Creative Exchange, has allowed me to explore artistic PV prototypes with artist Chloe Udon as part of the 'Pretty Useful exhibition' and the fundamentals of interdisciplinary research itself through hosting workshops to encourage others into the unexplored paths between disciplines. Thanks to the eclectic mix of backgrounds and expertise within the ESI, there is plenty of opportunity for my research and career to grow, with exciting research innovations waiting to be developed.

## Fellowships

Our highly successful and collaborative environment has proven to be the perfect location for independent research fellows. The Penryn Campus has a reputation for effectively hosting fellowships funded through UK, European and international schemes with support offered at all stages of the process. Working with our diverse range of academic staff in the Institute as well as colleagues from their respective Colleges, has helped grow individual's careers and expertise with many going on to become permanent members of academic staff.

### Dr Anne Leonard



Anne is a NERC Industrial Innovation Fellow investigating catchment-scale processes that contribute to the transmission of antibiotic resistant bacteria in coastal bathing waters.

"Being based in the ESI and the European Centre for Environment and Human Health, I have easy access to a vibrant and supportive research environment, which brings together professional services, world-class facilities, and leading academics in a variety of disciplines conducting cutting-edge investigations into issues concerning environmental change and human health."



**Dr Aimee Murray**



Aimee is a Natural Environment Research Council (NERC) research fellow, interested in how human activities may influence the evolution of antimicrobial resistance in natural environments. Aimee is part of the European Centre for Environment and Human Health.

“I enjoy being part of the ESI community as we have a broad range of expertise in so many diverse research areas. Given the environmental focus of my research, the breadth of sustainability research being conducted here is brilliant for broadening my horizons. I feel like there is a genuine, concerted effort within the ESI to use research to affect positive changes in the real world, which I find highly rewarding and I am proud to be part of.”

**Dr Stineke van Houte**



Stien is a BBSRC Future Leader Fellow who aims to develop new methods to eradicate genes encoding antibiotic resistance from microbial communities. She is also part of the College of Life and Environmental Sciences.

“Being based in the ESI has given me the tremendous advantage of being part of a vibrant and highly interdisciplinary group of researchers who share the vision of working towards a more sustainable future, and being able to share a state-of-the-art lab with a team of world-class and highly collaborative microbiologists.”

**Prof Edze Westra**



Edze is a NERC independent research fellow focussed on how ecological variables shape bacteria-phage interactions. Edze was awarded a personal chair earlier this year. He is also part of the College of Life and Environmental Sciences.

The state-of-the-art facilities for microbiology research at the ESI, and the thriving and collaborative research environment at the Penryn campus where the ESI is based, meant that Edze has been able to rapidly develop a team of around 14 scientists, who perform cutting-edge research aimed at understanding the evolutionary ecology of bacterial resistance mechanisms that protect against phage infections.

# Thought leadership in Education

While the ESI is an institute built around research, education plays an important role in what we do. Our staff’s roles in TEF Gold level teaching and world-class research have a symbiotic relationship, each feeding and benefitting the other.

Academics from the ESI teach onto over 70 modules across the Penryn Campus. These include undergraduate and post-graduate degree programmes in Biosciences, Business, Engineering, Environmental Science, Geography, Heritage, Mathematics, Mining and Mineral, Politics, Renewable Energy.

## Masters Seminar Series

To generate collaboration and encourage the sharing of working practices across the Masters programmes, we organise a series of seminars where each cohort invites an expert speaker from their field to come to the ESI and speak to their fellow students. This year speakers included Prof Heather Jamieson (Queen’s University, Ontario), Prof J Karthikeyan, (PSG College of Technology, India), Paul Buckling (Freelance Conservation Consultant) and Prof David Grey (World Bank / University of Exeter).

As well as interacting with each other and hearing expert speakers, the seminars give the students an opportunity to engage with the wider ESI community and find out about the environment and sustainability research taking place across the University.

## Masters Programmes

The ESI leads five of the University’s interdisciplinary Masters Programmes:

- MSc in Conservation Science and Policy**
- MSc in Mining Environmental Management**
- MSc in Renewable Energy Engineering**
- MSc in Sustainable Development**
- MRes in Sustainable Futures**



## Environment and Sustainability Day

The ESI prides itself in its work with schools and colleges across Cornwall. The children of Cornwall were VIPs at the opening of the Institute and the ESI is host to an annual Environment and Sustainability Day for students from across the county. During these events, researchers in the ESI work with groups of students using a variety of interdisciplinary approaches to tackle global challenges.

At a time of Environment and Climate Emergency, building more sustainable futures is at the forefront of legislative

and public consciousness so this year our Environment and Sustainable Day focused on 'Sustainable Futures for Cornwall'. Bringing together experts from across Mining, English, Biology, Geography, History, Maths, Social Sciences and Renewable Energy, pupils explored problems and possible solutions to creating a more sustainable future for the county in terms of pollution, landscape, industry, creativity and communities and had the chance to design their ideal future Cornwall.



## Thought leadership in The Region

### Partnerships

While much of our research and activities are national or international in scope, we ensure that Cornwall and the Isles are at the heart of our endeavours. We are proud to contribute to the environmental, educational and economic futures of Cornish communities.

Alongside outreach events and locally-based research, one of the ways we deliver our contribution to the region is through key strategic partnerships with local stakeholders. Sustainability and the environment have long been important issues in Cornwall and by sharing experience, skills and information across this network, we can learn what can be done and how to do it, ensuring the region continues to lead the way in these fields.

The ESI takes a leading role, for the University of Exeter as whole, and in several important collaborative partnerships, regionally and nationally. Such partnerships are important in helping inform the direction of our research and teaching whilst also ensuring our research activity delivers real-world impact. Our partnership activities support a transition to an increasingly sustainable economy, society and natural environment, and are key to ensuring Cornwall and the wider South West region deliver on strategic aspirations to pioneer



regional responses to climate and environmental emergency. Such partnership working and collaboration will also be key to supporting the region's sustainable recovery and renewal as we emerge from the COVID-19 pandemic.

### Cornwall Council

Cornwall Council has been a key regional partner of the ESI since the inception of the Institute and has remained so throughout the Institute's existence. Indeed, the two have worked closely together on a wide array of issues, in some cases developing collaborative projects over many years. This includes work on agriculture, carbon emissions, circular economics, green infrastructure, local politics, and planning. The ESI was heavily involved in the development of the Environmental Growth Strategy for Cornwall, which was launched in 2016, is a core strategy of Cornwall Council, and whose principles have had broad impact on environmental strategy in the region. The ESI has also been closely involved with the Cornwall & Isles of Scilly Local Nature Partnership (CloSLNP), since this body was established. By bringing together representatives from key organisations the CloSLNP plays an important role in regional leadership in the environmental sector.



## The Eden Project

The ESI works closely with the Eden Project and since 2014 has jointly run a collaborative programme of applied research, public engagement and citizen science projects. The programme brings cutting edge and exciting science to Eden Project visitors, and takes our science to new audiences. A diversity of projects have been catalyzed, ranging from exploring the human microbiome, to climate science in the tropical biome's rainforest walkway to better understanding the microbial ecology of the world's largest flower. In June 2020 Eden and Exeter joined with Culture Declares Emergency to host an online public symposium exploring the importance of art and ecology in times of crisis. The University and the ESI also collaborate with the Eden Project around larger-scale projects such as Eden's 5 year Wellcome Trust supported Invisible Worlds showcase and the geothermal project led by EGS Eden Energy.

## National Trust

The ESI is also at the forefront of new partnership development on behalf of the wider University. The University has a long-track record of working closely with the National Trust and discussions are ongoing in consolidating this relationship. The National Trust and ESI share many objectives around sustainable land use, increasing biodiversity, improving and diversifying access to the natural world, enhancing wellbeing and reimagining our cultural and natural heritage and landscapes. The ESI is excited by where this hopeful new partnership with the National Trust will take us in 2021 and beyond.

## Tevi

The Tevi ([www.tevi.co.uk](http://www.tevi.co.uk)) programme, delivered in partnership with Cornwall Wildlife Trust, Cornwall Council and Cornwall Development Company, supports over 350 SMEs and includes a grant scheme, enterprise networks and key international collaborations. By encouraging enterprises to grow Cornwall's unique natural capital and to contribute to a circular economy transition, Tevi lays the foundations for delivering Cornwall's long-term Environmental Growth Strategy (2015-2065). Working with ESI researchers, one of Tevi's key outputs is Lagas ([www.lagas.co.uk](http://www.lagas.co.uk)), an environmental intelligence hub bringing together data relating to Cornwall's SME community with environmental data obtained through historical research and a network of cameras and sensors installed by Tevi's engineering team.

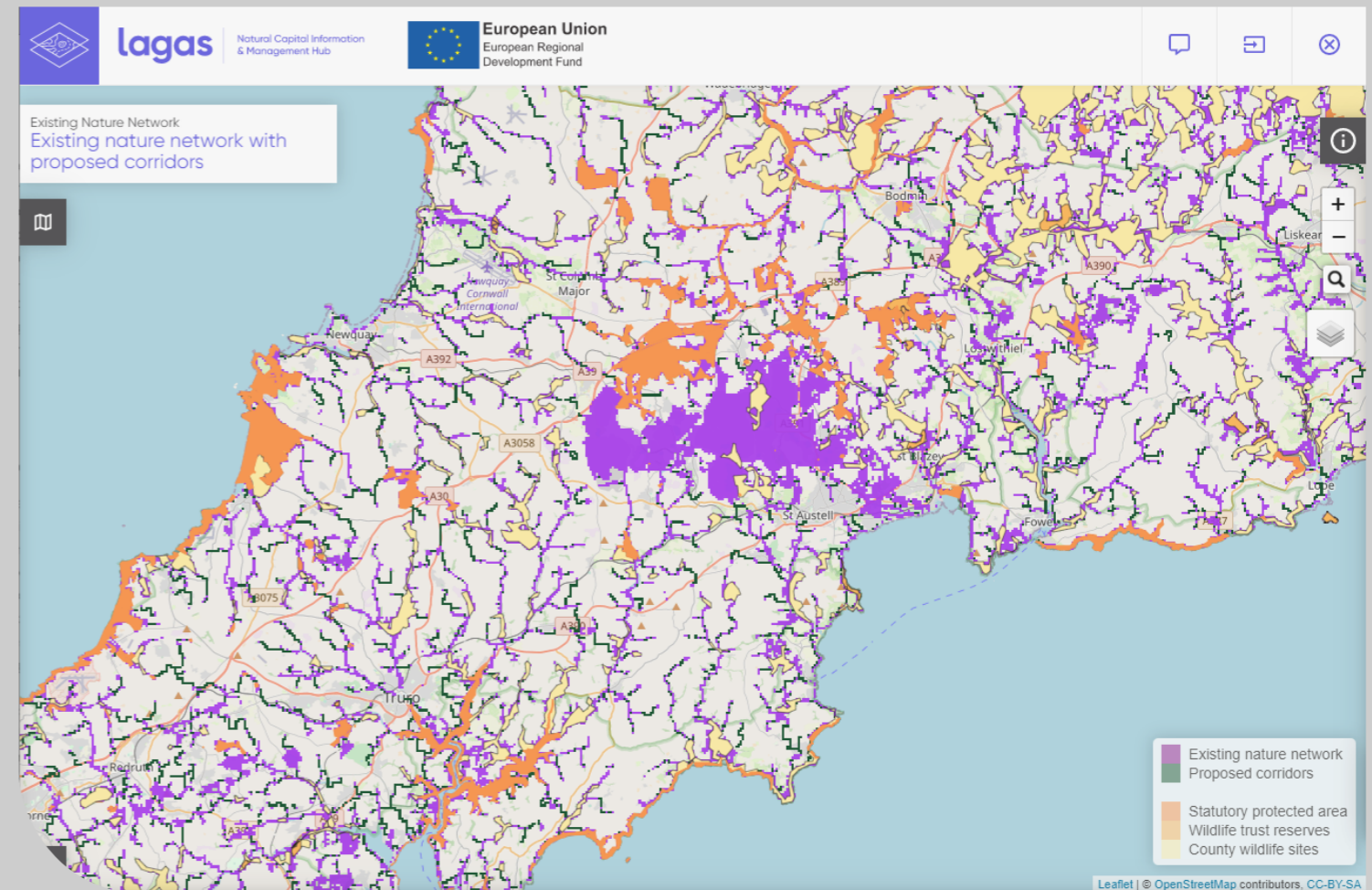
Launched in May 2020, the initial role of Lagas is to help deliver the environmental growth message through mapping and environmental monitoring. Applications include the presentation of environmental growth opportunity maps covering a wide range of environments, including woodland, lowland and wetland habitats. Nature network maps are also covered, helping to highlight the value of connections in nature, and potential areas to improve connectivity between strategic habitats, which in turn help to boost biodiversity and species richness across the county. The platform is also used to plot the impact of Tevi across the county in terms of engaged enterprises, and interactive case study maps, currently under development.

We are also working closely with Cornish SMEs to share environmental data from the sensor and wildlife camera

networks being developed as a part of Tevi, including the presentation of live video streams from strategic locations across the county.

Lagas has been designed to be versatile and expandable; allowing uploads of spatial and environmental data from a range of popular GIS applications. It is hoped that Lagas

will evolve, helping the ESI to communicate its work across the county, and to showcase Cornwall as a county at the forefront of environmental intelligence, environmental growth and exploring the essential relationships between business and the environment.





## Environment and Climate Emergency

The ESI's Director, Prof Juliet Osborne, chaired the University's Environment and Climate Emergency Working Group which wrote a white paper outlining suggestions for the University's response to the emergency. The group included academics, students and support staff.

### White paper key points

The Environment & Climate Emergency (E&CE) Working Group was tasked with producing a set of recommendations detailing what declaring a climate emergency should mean to the University of Exeter. The group, led by Professor Juliet Osborne, comprised of over 30 staff and students, including leading environment and climate experts, and was supplemented by over 200 ideas from the University community. The White Paper was published in November 2019 and brings to light the transformative action required to tackle the declared Environment & Climate Emergency, amassing over 100

recommendations for the institution. The University has since committed to a number of these goals including achieving net zero for direct carbon emissions by 2040. The report also called for divestment from fossil fuel companies, which was enacted in December 2019. The E&CE White Paper is currently being used to inform the creation and implementation of a comprehensive delivery plan led by the E&CE Team.

### South West Environment and Climate Action Network (SWeCAN)

The South West Environment and Climate Action Network (SWeCAN), is an emerging initiative that the University of Exeter is catalyzing to support the region and communities in responding to declared environment and climate emergencies. SWeCAN was a key recommendation of the University Environment and Climate Emergency White Paper published in November 2019.

The University has been consulting regional partners as to how SWeCAN can best support their needs and requirements. Initially SWeCAN will make it easier to access a range of existing environmental and climate change relevant research taking place within the region. Through new tools such as a 'community focused carbon benchmarking tool,' SWeCAN will provide access to environmental data and intelligence supporting communities in making more informed decisions to support their environment and climate change action. In the medium term SWeCAN also aims facilitate closer links with our students supporting activity around environmental volunteering and student placement and projects. In the long term, and in partnership with others, it hopes to attract regional funding to ensure the South West is a leading UK region in responding to the environment and climate emergencies faced.

## Publications and Awards

### Selected Publications

Crowley SL, Cecchetti M, McDonald RA (2020). Our Wild Companions: Domestic cats in the Anthropocene. *Trends in Ecology & Evolution*, 35(6), 477-483.

Hackney F, Saunders C, Willett J, Hill K, Griffin I (In Press). Stitching a sensibility for sustainable clothing: Quiet activism, affect and community agency. *Journal of Arts and Communities*.

Phillips BB, Wallace C, Roberts BR, Whitehouse AT, Gaston KJ, Bullock JM, Dicks LV, Osborne JL (2020). Enhancing road verges to aid pollinator conservation: a review. *Biological Conservation*, 108687-108687

Leonard AFC, Garside R, Ukoumunne OC, Gaze WH (2020). A cross-sectional study on the prevalence of illness in coastal bathers compared to non-bathers in England and Wales: Findings from the Beach User Health Survey. *Water Research*, 176, 115700-115700.

Rollie, C., Chevallereau, A., Watson, B.N.J. *et al.* Targeting of temperate phages drives loss of type I CRISPR-Cas systems. *Nature* 578, 149-153 (2020).

Anderson K, Fawcett D, Cugulliere A, Benford S, Jones D, Leng R (2020). Vegetation expansion in the subnival Hindu Kush Himalaya. *Global Change Biology*, 26(3), 1608-1625.

Yan X, Corbin KR, Burton RA, Tan DKY (2020). Agave: a promising feedstock for biofuels in the water-energy-food-environment (WEFE) nexus. *Journal of Cleaner Production*, 261

Oscar Fitch-Roy, Jenny Fairbrass & David Benson (2020) Ideas, coalitions and compromise: reinterpreting EU-ETS lobbying through discursive institutionalism, *Journal of European Public Policy*, 27:1, 82-101.

For the full list, visit the ESI staff profile pages.



Edze Westra at the Blavatnik Awards

### Awards

Prof Edze Westra has been awarded the prestigious 2020 Fleming Prize by the Microbiology Society. He was also a 2020 honouree for the Blavatnik Awards for Young Scientists in the UK in the Life Sciences category.

Prof Kevin Gaston was once again named in the Top 1% of highly cited researchers world-wide by Clarivate Analytics.

Prof Tapas Mallick has been awarded Fellow of World Society of Sustainable Energy Technologies (FWSSET).

Prof Karen Hudson-Edwards was invited to the European Association of Geochemistry (EAG) as their Distinguished Lecturer for 2019.

The Green Infrastructure for Growth project was celebrated at the CIRIA BIG Biodiversity awards as overall winner as well as being highly commended in the Biodiversity Legacy Award and winner of the Medium/Large Scale Project of the Year.



**£4.4million** in research awards in the 2019/20 academic year

Over **170** ESI papers were published last year in leading journals and nearly **800** papers since the ESI's inception

**15** PhDs completed and awarded in the last year

**5** academic staff promotions

Staff and students from **25** countries across **5** continents

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Accuracy of information

Every effort has been made to ensure that the information contained in this booklet is correct at the time of publication.

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