LOW CARBON ENERGY & ENVIRONMENT
RESEARCH NETWORK WALES RHWYDWAITH YMCHWIL
CYMRU AR YNNI CARBON ISEL A'R AMGYLCHEDD

AFRICA WALES RESEARCH COLLABORATIONS TACKLING CLIMATE CHANGE

#SmallNationBigIdeas

Introduction

This year's annual United Nations Climate Conference is taking place in Africa, in Egypt. This historic event is an important opportunity to recognise the great work taking place across the continent to tackle man-made climate change and look towards the future as world leaders meet to decide how to move forward.

There is now a very strong scientific consensus that the rapid rate of climate change is man-made, and that the global consequences should we not act fast will be severe. Rising sea levels, erratic weather patterns characterised by longer, more intense droughts and intensive rainfall events, shifting weather patterns that destabilise food production and escalating temperatures, particularly in cities, are all forecast to become increasingly severe problems over the coming decades.

Man-made climate change has major consequences for the ecosystems we depend on and the wildlife we share our planet with, all resulting in a very real human cost. The World Bank Group estimate that, on our current trajectory, climate change will force an additional 100 million people into poverty by 2030[1]. The current drought in many parts of the Horn of Africa, the worst in forty years, highlights the terrible costs of climate related disasters with the United Nations World Food Program estimating that 22 million people now at risk of starvation after the failure of seasonal rains.

Despite playing a negligible role in the causes of the man-made climate change, Africa is already playing an important role in combating climate change with many African nations making serious efforts to transition into low-carbon economies. Morocco has set an ambitious target of using 52% renewable energy by 2030 and has built the world's largest concentrated solar facility to meet that aim, South Africa introduced a historic Carbon Tax Act in 2019 that could reduce the countries emissions by 33% over the next 15 years[2] and Nigeria is supporting the delivery of innovative mini-grid systems to meet their target of 30% renewable energy usage by 2030.

Africa is also well placed to play a leading role in the fight against climate change. The continent is home to 18% of the world's tropical forests and 18% of the world's mangrove forests, both of which are vital stores of carbon and an essential part of natural climate solutions. African countries also hold a comparative advantage in renewable energy with an abundance of wind, solar and geothermal energy.

In sub-Saharan Africa, agriculture accounts for 70% of employment but there is significant scope to increase agricultural productivity. The Food and Land use Coalition estimate sustainable agricultural improvements could deliver $320 billion dollars in revenue across sub-Saharan Africa and improve food security whilst also fighting climate change[3].

Underpinning all the efforts in the fight against climate change is research. One of the four pillars set out in the vision and mission of COP27 is collaboration, and in that spirit, we would like to take this opportunity to highlight some of the fantastic collaborative projects between Welsh and African research partners tackling climate related issues. We hope that the case studies presented below may provide inspiration for further collaboration. If any of the projects are in areas of particular interest please feel free to reach out to the project collaborators listed and for more general information on collaborating with Welsh universities please get in touch with us through our website.

[1] Hallegatte, S. (2016). Shock waves: managing the impacts of climate change on poverty. World Bank Publications.
[2] Sifiso M. Ntombela, Heinrich R. Bohlmann, and Mmatlou W. Kalaba, "Greening the South Africa's Economy Could Benefit the Food Sector: Evidence from a Carbon Tax Policy Assessment," Environmental and Resource Economics 74, no. 2 (2019): 891-910.
[3] Food and Land Use Coalition, People, Health and Nature: A Sub-Saharan African Transformation Agenda (London: Food and Land Use Coalition, 2019).

Why Wales?

Whilst Wales may be a geographically small nation, it punches far above its weight when it comes to academic research.

- ☑ Welsh research has a high impact with a citation impact score of 1.8, which is 80% above the global average and 13% above the UK average
- ☑ Wales's share of the top 5% most highly cited publications is twice the global average
- ☑ Natural science research, which includes climate change research, accounts for 54% of Welsh research
- ☑ Welsh researchers are very successful collaborators with 50% of Wales's research output coming from international collaborations
- ☑ Welsh researchers collaborate well with industry producing real world results

* Eleseview (2021). A performance-based assessment of the Welsh Research Base (2010-2018), Elesevier.

About the Case Studies

The following case studies have been produced by the Low Carbon Energy and Environment Research Network Wales (LCEERNW) based at Bangor University. The networks core aim is to support and promote Wales's world leading low carbon energy, nature based solutions to environmental challenges, the bioeconomy, and sustainable food production research.

The list of case studies presented below is by no means exhaustive, but is a good representation of the scope, scale and quality of collaborative climate research conduced between African and Welsh researchers. This document contains a brief synopsis of each case study. To see the case studies in full please visit www.lceernw.ac.uk/wales-in-africa

Mitigation - Natural Climate Solutions

Forests4Climate&People

Tropical forests store approximately one quarter of all terrestrial carbon on the planet making them vital carbon sinks and they create a further biophysical cooling effect through their ability to create clouds. Tropical forest conservation is therefore plays a prominent role in natural climate solutions, but it is important that forest conservation does not disadvantage communities living around the forest edge. Forests4Climate&People is a joint project between the University of Bangor, Wales, and the University of Antananarivo, Madagascar, which advocates for forest communities interests in the global fight against climate change to ensure adequate development support is in place and to mitigate against undue harm.

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Dr Sarobidy Rakotonarivo, University of Antananarivo, Madagascar
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Global Mangrove Watch

Mangroves are one of the most carbon-rich ecosystems on earth making them crucial for mitigating man-made climate change and 18% of all the world's mangrove forests can be found in Africa. The Global Mangrove Watch in part developed by Aberystwyth University, Wales, utilises the latest satellite technology to monitor the status of mangrove forests across Africa. The project collaborates with Wetlands International using an open source alert system to identify threatened areas of mangrove forest allowing for a quick response on the ground.

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Water

Groundwater in Africa

Access to clean drinking water for households is an important issue in many countries across the continent. Groundwater is an increasingly important source of water, especially with the increased prevalence and severity of droughts predicted due to climate change, however, not enough is known about the status of groundwater supplies in many places. A joint collaboration between Cardiff University, Wales, and the African Ministers' Council on Water has begun an important discussion on groundwater with African leaders and city planners looking at important questions such as how much groundwater is currently being extracted? Is it safe to drink? Is it sustainable? And, how is climate change likely to effect the groundwater supply

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Food Security

Disease Resistant High Yield Potatoes

One of the Africa's greatest challenges in the next 50 years is sustainably feeding a growing population. In many areas of Africa where potatoes are an important crop the climate is predicted to become wetter meaning potato blight will increasingly become an issue, especially as current potato stocks on the continent are often susceptible to disease. A collaborative project between Bangor University, Wales, and the National Potato Research Organisation, Togo, is trialling different varieties of high yield blight resistant potatoes in Togo. One variety being trialled could increase yield by 400%, limiting the amount of land needed for agriculture whilst improving food security and reducing the need for potentially harmful biocides.

Dr David Shaw, Bangor University, Wales
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Drought Resistant Pearl Millet

With droughts forecast to increase in frequency and intensity, finding drought resistant crops is key for food security. A collaboration between Aberystwyth University, Wales, and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Niger, has developed a new drought resistant strain of pearl millet to improve food security in the face of climate change. The strain has also been bred to maximise pearl millets low glycemic index qualities meaning that it is a particularly appropriate staple food for those living with diabetes, a growing problem on the continent.

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Renewable Energy

Sustainable Solar

Solar power is an important part of the renewable energy mix needed to transition to a low carbon economy. It is particularly appropriate in many parts of Africa and ideal for low cost mini-grid and off grid solutions. Current solar technology requires extraction of minerals, use of hazardous materials in manufacturing and has little recycling value, so limiting their sustainability. A collaboration between Swansea University, Wales, and the University of KwaZulu Natal, South Africa, have developed a new perovskite based solar cell that can be printed onto a flexible surface, doesn't rely on sought after minerals and, best of all, can be fully recycled into new solar panels at the end of its life. The teams innovative solution minimises many of the drawbacks of solar power offering a truly sustainable circular economy solution.

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Circular Economy

Wonders from Waste

Plastic, particularly single use plastic, causes numerous environmental problems from the carbon emitted in production to plastic pollution at the end of its life. A research collaboration between Bangor University, Wales, and the National Agricultural Research Organisation, Uganda, has developed an innovative plastic replacement from the waste material from maize production by turning it into food packaging. The same team are now investigating using other plant-based materials to create new replacements for fossil-fuel derived plastics.. As well as the significant environmental benefits offered by replacing single use plastics, the team's solution also creates additional value for maize farmers and creates employment in rural communities.

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Adaption

Down2Earth

One of the key issues created by climate change is the increased unpredictability of once stable weather patterns making decisions such as when or what to plant far more challenging. A research collaboration between Cardiff University, Wales, and the IGAD Climate Prediction and Application Centre, Kenya, have been working with communities in the Horn of Africa to develop bespoke climate information systems to help answer questions such as, will the season be dry? Will there be enough pasture for my livestock? And, will there be enough water to drink? This information will be crucial for communities adapting to the effects of man-made climate change.

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Dr Abebe Tadege, IGAD Climate Prediction and Application Centre, Kenya
Website: www.down2earthproject.org

Managing for Climate Change

Changing weather, such as the increased temperatures and reduced or more extreme rainfall patterns, poses significant challenges for land managers as it impacts ecosystems. A research collaboration between the University of Bangor, Wales, and the University of Jos, Nigeria, has been working with conservation organisations and communities in north-eastern Nigeria to help plan for the extended and more severe dry seasons predicted under climate change. The project has developed a new management plan for a private reserve, delivered workshops for community members and has led to the formation of a new local charity called Tallafi.

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Connecting Communities

Many rural communities in Liberia are not connected to the road network and risk becoming cut off during periods of heavy rain as watercourses become uncrossable, something predicted to become more frequent as a result of climate change. A collaboration between Swansea University, Wales, and the Lofa Integrated Development Association, Liberia, have developed a low-cost bridge design suitable for motorcycles, the predominant form of local transport, to keep communities connected. The project also works with company providing solar power and e-bikes to off grid communities advancing quality of life more rapidly than traditional grid infrastructure can and using clean renewable energy.

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Learning from Trees

When it comes to predicting the impacts of climate change, understanding the climate of the past is crucial. Unfortunately, Ethiopia has very limited historical climate records making it harder for researchers to predict when droughts may occur and so for authorities to plan accordingly. A research collaboration between Swansea University, Wales, and Addis Ababa University, Ethiopia, have been using core samples from living juniper trees to understand the historic climate by measuring the tree rings. The team have confirmed that drought is increasing in the country due to less water coming to the country from the Congo Basin – invaluable information for scientists and government officials as they plan for the future.

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Healthcare

Climate Change and Healthcare

The changing climate has an impact on people's health, especially surrounding extreme weather events, such as outbreaks of cholera following a flooding event. A research collaboration between Cardiff Metropolitan University and Imo State University, Nigeria, is exploring this causal link in more detail using data science to combine meteorological and healthcare data to understand the impact of climate change on human health. The information from the project will be invaluable for policy makers, government agencies and non-governmental organisations planning for the impacts of climate change and responding to extreme weather events.

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Biodiversity

Hot Dogs

Understanding how increased temperatures will impact different species is crucial information for conservationists looking to manage for biodiversity. A collaborative project between Swansea University, Wales and the University of Witwatersrand, South Africa, is studying wild dogs in Kenya, Namibia, and South Africa using using state of the art collars featuring GPS tracking and 3D accelerometers and micro temperature sensors implanted under the dogs' skin to tell body temperature. The combined data will help researchers understand how the dogs cope and adapt in different temperature conditions which will be invaluable for future conservation planning not just of wild dogs but other large, bodied carnivores as well.

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www.wildlifeconservationphysiology.com

Collaboration

Research in Action

One of the challenges of academic research is ensuring that it is disseminated to the audiences where it will have the most value. Jalia Packwood, a Ugandan working at Bangor University, Wales, has spearheaded a project to disseminate research produced by Bangor University in Uganda and establish linkages between Bangor University and Makerere University, Uganda, and also the private sector in Uganda. The project has been very successful in developing new links and drawn the attention of the Ugandan High Commissioner.

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To see all the case studies in full scan here

Or visit: www.lceernw.ac.uk/wales-in-africa


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Caerdydd


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University
Prifysgol
Abertawe


MAKERERE UNIVERSITY


ADDIS ABABA UNIVERSITY


IMO STATE UNIVERSITY
EXCELLENCE IN SERVICE


UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA


LIDA


IGAD
ICPAC


NARO


UNIVERSITY OF
KWAZULU-NATAL
INYUVESI
YAKWAZULU-NATALI


ICRISAT
INTERNATIONAL CROPS RESEARCH
INSTITUTE FOR THE SEMI-ARID TROPICS


Every drop counts
Count every drop
AMCOW
African Ministers' Council on Water


Wetlands
INTERNATIONAL


Forest4Climate & People
Mponina eny ifotony: iron'ny fikajiana ny ala sy ny fambolen-kazo
Putting local people at the centre of decisions about forest
conservation and restoration


DOWN 2
EARTH


GLOBAL
MANGROVE
WATCH


UNIVERSITY OF JOS
DISCIPLINE AND DEDICATION


NORTH WALES AFRICA SOCIETY
CYMDEITHAS AFFRICA GOGLEDD CYMRU


Empowering Northern Nigerian Communities
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