



UK ODA AND WELLCOME- FUNDED RESEARCH ON CLIMATE CHANGE AND INTERNATIONAL DEVELOPMENT

Case studies

These case studies were developed as part of a UKCDR project to analyse UK-Funded Research on Climate Change and International Development: The scope and reach of UK ODA and Wellcome-funded research (2015 – 2020). See www.ukcdr.org.uk/resource/uk-funded-research-on-climate-change-international-development-2015-2020/

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Between a rock and a wet place: exploring historical trajectories of exposure, governance and tenure to build resilience to multiple hazards in Small Island Developing States (SIDS)



Findings from this historical analysis of the drivers of disaster risk in Dominica have contributed to national and regional planning in the areas of disaster recovery and climate resilience.

KEY INFORMATION

UK funders: Department for Business, Energy and Industrial Strategy (BEIS) via Arts and Humanities Research Council (AHRC), Economic and Social Research Council (ESRC), Natural Environment Research Council (NERC)

Fund: Global Challenges Research Fund (GCRF)

UK investment: £160,778

Total investment: £160,778

Project dates: Nov 2016 – Feb 2018

Principal investigators: Overseas Development Institute (ODI) and University of East Anglia (UEA).

Co-investigators: Caribbean Disaster Emergency Management Agency, Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Island Heritage Initiative, Global Water Partnership – Caribbean, Risk Management Solutions Ltd, Secretariat of the Pacific Community, University College London, University of the South Pacific, The University of the West Indies.

Countries of focus: Dominica, Vanuatu, and Small Islands Developing States (SIDS) more broadly.

Background

In 2017, Hurricane Maria hit the island of Dominica affecting 65,000 people, with 31 dead and 27 missing, and damaging or destroying more than 90% of buildings.

Dominica is a Small Island Developing State (SID) in the Caribbean and is highly exposed to marine and

land-based hazards, including hurricanes, floods, landslides, volcanic eruptions, and cyclones. In SIDS, isolation, limited land availability, limited resource base, and environmental hazards intensify exposure to risk. With our changing climate, it is likely that we will see more severe hazards, including category four and five hurricanes, in the future.

“On average, hurricanes cause \$835 million worth of damage annually in the Caribbean.”

(ODI Policy Brief 2018)

However, as with all disasters, the drivers of risk are social, political, and cultural, as well as physical. Exposure to disaster risk is generated in part by decisions, actions, behaviours and policies adopted by individuals and institutions, many of which have deep-seated structural roots.

This GCRF-funded research project tested the hypothesis that disaster risk management is more effective when placed within the particular historical and cultural contexts. The project looked at the historical drivers of disaster risk in Dominica to examine how SIDS can strengthen their resilience to future disastrous events.

Underpinning Research

This project took an “all hazards” approach exploring how hazard exposure in Dominica and Vanuatu is shaped by political and economic decisions, cultural and social processes dating back to the colonial era.

“Building back better in the Caribbean requires building resilience to multiple hazards. It means integrating across infrastructure, housing, economic and social development, and environment sectors, to strengthen resilience.”

(ODI Policy Brief 2018)

The research team undertook a historical analysis, focused on three time periods in the 17th, 19th, and 20th centuries. Data were collected and analysed by a multidisciplinary team of social and physical scientists from a range of primary and secondary sources, including material from historical archives, contemporary literatures databases, and Parliamentary papers and records.

The research team identified decisions taken around land use, agriculture, land tenure, capital investments, post-disaster aid, and the development priorities of successive colonial governments in the Caribbean. This research found that colonial policy decisions and practices - and the

Research findings:

- Understanding the historical dimensions of disaster risk in the Caribbean, as well as future threats to the region, can help in identifying what needs to change.
- Uncovering historical drivers and persistent issues, elucidates lessons for pursuing a more resilient development trajectory, including through the promotion of economic restructuring and diversification, and land reform.
- By focussing on past processes and decisions, research can help broker sensitive conversations on why current risks exist, and how to reduce them.

post-colonial legacy of aid dependency - have led to an accumulation of risks in Dominica; and that this, combined with multiple hazardous events, has prevented the necessary re-structuring that could ensure long-term resilience.

Identifying these processes and barriers creates an opportunity to tackle them directly during the extensive recovery that is needed in the wake of Hurricane Maria.

The findings from this research have been shared with high-level stakeholders from Caribbean countries, UK government departments, donors, the insurance industry, and others engaging in climate resilience discussions concerning small island developing states. The lead institution, ODI published a [policy brief](#) and convened an high-profile [event](#) on ‘Building back better: a resilient Caribbean’.

Towards Impact

POLICY AND PLANNING

- The project's Principal Investigator presented research findings (“[Historical Trajectories of Risk in Dominica](#)”) to senior government officials in Dominica. This opened up a dialogue with the Permanent Secretary of Planning on longer term structural issues that should be addressed in a [Climate Resilience and Recovery Plan 2020-2-2030 \(CRRP\)](#) to guide long-term recovery after Hurricane Maria. The Principal Investigator was appointed Chief Scientific Advisor to the [Climate Resilience Execution Agency of Dominica \(CREAD\)](#) and

worked closely with CREAD to write the CRRP. Data and graphs on crop production and exports from the GCRF research product were included in the CRRP. All 5-year strategic plans developed by ministries in Dominica refer to the CRRP targets, and all projects and budgets are now being aligned to achieve these targets.

- The historical, structural issues behind disaster losses across the Caribbean in 2017, including in British Overseas Territories were discussed in a [blog](#), which was referred to during COBRA meetings to discuss the UK response.
- ODI's [policy brief](#) was used by the Foreign & Commonwealth Office (FCO, now FCDO) to develop a disaster management strategy for the UK Overseas Territories.

REGIONAL UPTAKE

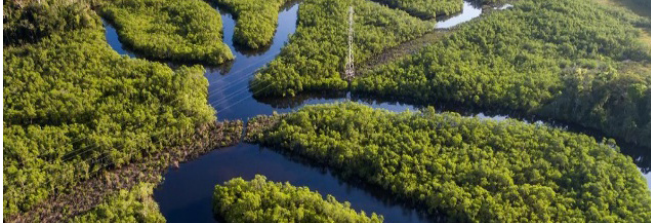
- Research findings were picked up by the [Caribbean Disaster Emergency Management Agency \(CDEMA\)](#), which is now promoting analysis of risk drivers across its 18 participating states. The research team is collaborating with CDEMA in a longer-term endeavour to bring historical perspectives and knowledge of risk drivers to disaster risk discourse and policy.

- The Regional Platform for Disaster Risk Reduction in the Americas and Caribbean will now be running workshops on the forensic analysis of disaster recovery.

NETWORKS AND PARTNERSHIPS

- Discussions between NERC and the Commonwealth Secretariat, informed by this research, led to the development of the [GCRF Caribbean Resilience and Recovery Knowledge Network](#). The CRRKN ran a Forensic Analysis of Disaster Recovery workshop at the [11th Comprehensive Disaster Management \(CDM\) Conference](#) in Sint Maarten, which was livestreamed and viewed by over 1,000 people. The network will support implementation of the [Regional CDM Strategy \(2014-24\)](#), improve dialogue around post-disaster recovery and contribute towards initiating a new recovery planning process in Caribbean states.

Climate Science for Service Partnerships (CSSP) Brazil



Collaborative climate science conducted through the CSSP Brazil programme is leading to the development of climate services that can inform decision making both in Brazil and internationally.

KEY INFORMATION

UK funders: Department for Business, Energy and Industrial Strategy (BEIS) via Met Office

Fund: Newton Fund)

UK investment: ~£14 million

Total investment: ~£14 million + match funding

Project dates: 2016 – 2021

Lead institutions: Met Office, Brazil's National Institute for Space Research (INPE), National Institute for Amazon Research (INPA) and the National Centre for Monitoring and Early Warning of Natural Disasters (CEMADEN)

Partner institutions: UK Centre for Ecology & Hydrology, University of Bristol, University of Edinburgh, University of Exeter, University of Leeds, University of Oxford, University of Reading

Country of focus: Brazil

Background

In recent years, Brazil has experienced a number of extreme weather and climate events, including floods and drought and landslides. As well as the impacts on lives and livelihoods, climate change also has an impact on important sectors of the Brazilian economy, such as hydro-electric power, agriculture and energy, and on the health of the Amazon rainforest, affecting ecosystems and livelihoods.

The [Climate Science for Services Partnership \(CSSP\)](#) Brazil is one of five projects in the [Weather and Climate Science for Service Partnership \(WCSSP\)](#) Programme - a network of partnerships that harness scientific expertise for strengthened

resilience to weather and climate variability in [Brazil, India, South Africa, Southeast Asia, and China](#). It aims to develop capability to inform decision makers in climate mitigation and adaptation strategy. CSSP Brazil is supported by the UK government's Newton Fund, matched with in-kind funding from Brazil. It is delivered through the Met Office in the UK in partnership with INPE, INPA and CEMADEN in Brazil. The scope of the project was jointly determined by the Met Office and the three Brazilian partner institutions, with strategic steer from the Brazilian Ministry of Science, Technology and Innovation, as part of their long-standing collaboration that predates the Newton Fund.

The **Met Office** works in partnership with the UK government, the global meteorological community, national governments, and development agencies to provide capacity development, climate information for longer term planning, and operational support. The Met Office are part of the World Meteorological Organisation (WMO) and exchange information with sister organisations and other meteorological and hydrological services globally.

In CSSP Brazil, the Met Office played a dual role as both delivery partner and implementer.

Underpinning Research

CSSP Brazil is a five-year scientific research programme that aims to use UK expertise to support the developing of Brazilian climate science and services. CSSP Brazil's portfolio focuses on three main research areas, each with a range of sub-projects and foci:

1. Improved carbon cycle modelling to inform mitigation policy
2. Climate modelling
3. Climate impacts and disaster risk reduction

As a large, multi million-pound programme consisting of a varied research portfolio, this CSSP Brazil case study adds value in allowing us to look at collective research impact at the programmatic level.

Towards Impact

ENHANCING KNOWLEDGE & UNDERSTANDING

- A partnership between the UK, Brazil and Australia has used satellite observations of Brazilian rainfall over the last 30 years, combined with future projections from supercomputer climate simulations to show that rainfall variability is likely to increase across all regions of Brazil as climate warms, leading to heavier rainfall and more dry spells.

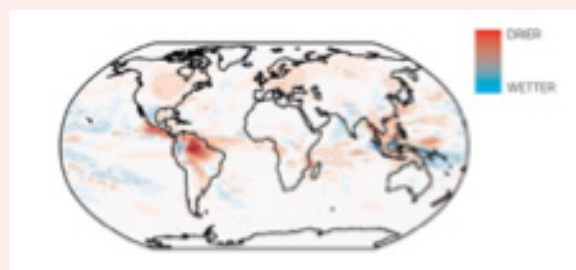
- Nurturing a UK-Brazil community of researchers in weather and climate science and has facilitated over 20 exchange visits between partner organisations. These have been invaluable in forging strong, mutually beneficial relationships which exchange and accelerate scientific knowledge and expertise. This knowledge exchange has contributed to the more than 50 CSSP Brazil peer-reviewed research articles which have been published in international respected journals.

IMPLEMENTATION AND PREPAREDNESS

- A CSSP project has led to improvement of fire monitoring public databases in the Amazon, enabling real time access to fire incidence and helping civil defence agents respond quickly to minimise damage caused by natural and human-driven fires.
- Citizens of areas with a high risk of flooding, such as Guarulhos, Maua and Aruja in the metropolitan areas of Sao Paulo, can now receive SMS alerts of flooding risks on their mobile phones, alerting them of heightened risk of landslide and minimizing the risk of casualties in rainy season.

Understanding drivers of future changes in rainfall in Brazil

New work in CSSP Brazil suggests CO₂ affecting plant stomata could be the most important mechanism which drives future changes in rainfall over Brazil and in particular for the Amazon basin. The large red area over Brazil in the map below suggests this process could cause the region to become much drier by the end of the century.



Rainfall changes due to CO₂ affecting plant stomata.

POLICY AND PLANNING

- The Seasonal Fire risk forecast for South America report, launched in Oct 2020, is helping local authorities prioritise their actions and resources to respond more effectively to fire risk
- CSSP Brazil is working with INPE to produce a national and regional inventory of recent greenhouse gas emissions such as carbon dioxide and methane for South America. This activity will support Brazil's submission to the first United Nations Framework Convention on Climate Change (UNFCCC) Global Stocktake and allow progress towards their Nationally Determined Contributions climate pledge to be tracked.

“We’ve known for many years that the land surface can affect our weather, but these results [rainfall changes in Brazil being due to CO2 affecting plant] show it is an increasingly important part of the puzzle to understand. These advances come when scientists from across the spectrum of research, from atmospheric sciences to plant physiology, come together to advance our ability to predict how climate change will affect our planet. CSSP Brazil continues to enable new collaborations between UK and Brazil scientists in order to tackle problems of importance for our future well-being.”

CSSP Brazil science lead at the Met Office

Future Climate for Africa: Future Resilience for African Cities and Lands (FRACTAL)



Participants co-explore burning issues in their city during learning labs in Lusaka. Credit: Bettina Koelle

FRACTAL has supported the integration of climate change issues into the development and planning of cities in southern Africa and strengthened the capacity of researchers and city officials to access and co-produce climate information.

KEY INFORMATION

UK funders: Foreign and Commonwealth Development Office (FCDO - formerly DFID), Department for Business, Energy and Industrial Strategy (BEIS) via Natural Environment Research Council (NERC)

UK investment: £3,960,144

Total investment: £3,960,144

Project dates: 2015-2019 (phase 1)

Lead institution: University of Cape Town

Partner institutions: Met Office, Stockholm Environment Institute, START, ICLEI-Local Governments for Sustainability, Swedish Meteorological and Hydrological Institute, Red Cross Red Crescent Climate Centre, University of Oxford, Aurecon, CSIR: Council for Scientific and Industrial Research, US National Atmospheric and Space Administration, Lawrence Berkeley National Laboratory, European Commission Joint Research Centre, City of Cape Town, City of eThekweni, City of Johannesburg, The Polytechnic University of Malawi, University of Eduardo Mondlane, University of Namibia, University of Zambia, University of KwaZulu-Natal, University of Witwatersrand, Lusaka City Council, Maputo Municipality, City of Windhoek, Blantyre City Council, City of Harare, Gaborone City Council

Countries of focus: Botswana, Malawi, Mozambique, Namibia, South Africa, Zambia, Zimbabwe

Background

Cities are complex environments made up of multiple interconnected social, economic, and environmental ecosystems. Dealing with the cross-cutting issue of climate change across

these ecosystems can be a challenge for cities, particularly in terms of decision making. FRACTAL – Future Resilience for African Cities and Lands – looked at the complexity of decision-making spaces in nine southern African cities.

FRACTAL identified that while significant amounts of useful climate change research was being produced, very little was informing decisions in these cities. They found that firstly, not all the information was relevant to the city-regional scale at which decisions are made and secondly, decision makers had not had opportunities to engage with concepts of uncertainty associated with climate change information. FRACTAL set out to design new approaches to integrating climate science into decision making.

Future Climate for Africa

FRACTAL was one of five research consortia in the Future Climate for Africa (FCFA) programme.

The aim of the FCFA programme (2015-19) was to generate new climate science focused on Africa and ensure that this science had an impact on human development across the continent.

Underpinning Research

FRACTAL aimed to increase the climate resilience of southern African cities by supporting decision-making processes to include climate knowledge. FRACTAL took a three-pronged approach:

1. Unpacking city-specific contexts, including urban climate change risks and impacts
2. Understanding the decision-making space in cities and looking for opportunities to better incorporate climate information
3. Advancing scientific knowledge and developing robust and scale-relevant climate information

To achieve this, FRACTAL implemented several approaches:

- **Transdisciplinary research:** FRACTAL connected city actors to existing science through in-depth transdisciplinary research. Integrating perspectives of multiple stakeholders in knowledge production ensured its relevance and applicability.
- **Embedded researchers (ERs):** FRACTAL funded researchers to occupy positions in local city council offices as well as at partner universities. The ERs drove in-city research and led learning processes.

- **Learning labs:** Central to the ER's responsibilities was facilitating learning labs. The learning labs provided the space and 'level playing field' for academia, civil society, and city officials to co-identify projects and co-produce potential solutions.
- **Climate risk narratives:** FRACTAL used climate risk narratives not only to help interpret complex climate information, but also as a co-production device to support discussions related to climate risks.
- **Climate information distillation frameworks:** These frameworks were used by FRACTAL teams to re-think how information is constructed to inform decisions, in a transparent and collaborative manner.
- **Inter-city exchanges:** FRACTAL supported city-to-city learning through exchanges. These enabled teams to share experiences and knowledge, explore different approaches to dealing with risk, and co-develop solutions.

Towards Impact

POLICY AND PLANNING

- In Namibia, through convening diverse stakeholders, providing training, and facilitating an interactive and evidence-based approach to policy development, FRACTAL supported the collaborative development of Windhoek's [Integrated Climate Change Strategy and Action Plan](#). Climate risk was integrated into the strategic plans using narratives and infographics developed through FRACTAL.
- In Zambia, FRACTAL had ongoing engagement with Lusaka City Councillors in the development of Lusaka's [Water Security Action and Investment Plan \(WSAIP\)](#). Lusaka's Learning Lab process also culminated in four policy briefs, which were integrated into community training to support the implementation of the WSAIP.
- In Maputo, Mozambique, FRACTAL led the co-production of an [online tool to map vector and waterborne disease risks](#) and help the municipality better anticipate disease hotspots. The tool was informed by engagement between researchers and city and national stakeholders, supported by the ER.

- In Zimbabwe, as a result of city learning labs, workshops, and inter-city exchanges, the need for an environment management unit, with officers representing each city department, and a Climate Change Desk in the [City of Harare](#) was identified.
- Dialogues analysing progress towards the Paris agreement goals and implementation of Nationally Determined Contributions ([Talanoa Dialogues](#)) were integrated into city learning processes in [Lusaka](#), Zambia and [Windhoek](#), Namibia.

CAPACITY STRENGTHENING

- ERs, including early career researchers, developed increased knowledge of climate modelling and how climate science is used in decision making, built skills in transdisciplinary research and communicating with decision makers, and improved regional and international networks.
- FRACTAL led the training of councillors in climate science in Maputo, [Lusaka](#), and [Windhoek](#), and of executives and senior managers in [Transformational climate change leadership](#) in Windhoek.

PARTNERSHIPS AND NETWORKING

- FRACTAL built [a strong network of city and academic partners](#). These networks have mobilised resources for collaborative projects in the climate change field.

“This was the first time that these critical stakeholders in different spheres of Zimbabwe’s water management had come together to think and plan.”

(Dr Mzime Ndebele-Murisa - START’s Programme Specialist for FRACTAL. Ndebele-Murisa’s team identified the need for an environment management unit in Harare)



A field trip to an informal settlement supports the experiential learning of participants during the second learning lab in Lusaka. Credit Bettina Koelle

Health and climate change research impacts on policy and implementation



Health and climate change research through two multidisciplinary research initiatives has supported decision-makers to create policies for healthy and sustainable diets, and household air pollution, and informed implementation in Africa and India.

Climate change impacts pose a significant risk to health and food security. Climate change's greatest impacts on health will be in the way it increases or worsens existing health problems, particularly on already vulnerable communities, exacerbating impacts of: poverty and inequality; inadequate housing, water and sanitation services; poor nutrition; natural disasters; weak governance; and emotional/mental stress. It is therefore vital to understand how the two elements of climate change and health intersect and their trade-offs.

PART 1: SUSTAINABLE AND HEALTHY FOOD SYSTEMS (SHEFS)

KEY INFORMATION

UK funders: Wellcome

Funding programme: Our Planet, Our Health

UK investment: £5.7 million

Total investment: £5.7 million

Project dates: 2017 - 2022

Lead institution: London School of Hygiene and Tropical Medicine (LSHTM)

Partner institutions: University of KwaZulu Natal, Centre for Chronic Disease Control (CCDC), New Delhi, and Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore.

Countries of focus: South Africa, India, UK

Background

Food systems are changing rapidly and influencing what we eat, our health and the environment. Climate change and variability challenges countries ability to deliver a sustainable and healthy food system under environmental change. SHEFS (Sustainable and Healthy Food Systems) is a global research programme funded through Wellcome's Our Planet Our Health programme (OPOH) to help decision-makers create policies that deliver nutritious, healthy, affordable and sustainable diets.

Underpinning Research

SHEFS is working on the transformation of existing agricultural systems so they are resilient to changing climates and can provide food and nutrition security. Part of this includes use of neglected and underutilised species (NUS) – a transformative adaptation to climate change and food and nutrition security. SHEFS is contributing to knowledge on how understanding socio-political, food, and environmental systems, and the urban,

urban-rural and rural environments they produce supports an understanding of how climate change, which undermines or enhances these systems, impacts on health. Research in SHEFS spans across agriculture, livestock, environment, human development (poverty and community), economics, policy, nutrition and health.

Towards Impact

POLICY & PLANNING

- In South Africa, SHEFS research on indigenous crops contributed to a new national research strategy, a commitment to add indigenous crops to the **Climate Smart Agricultural Strategy**.
- An interdisciplinary project on the water-energy-food (WEF) nexus contributed to the adoption of the nexus as a framework to achieve national goals aligned with the **National Development Plan**. This work has led to the development of an integrated analytics tool for assessing the WEF nexus, which has now been adopted by the **Water Research Commission of South Africa** as a planning tool.
- In India, SHEFS research has supported the **National Institute of Nutrition** and engaged the government on inclusion of food in smart cities initiatives.

IMPLEMENTATION

- SHEFS research contributed to knowledge and social learning that supported the establishment of the [Transformative Riverine Management Programme \(TRMP\)](#) in Durban, South Africa, which aims to adapt 7,400km of streams and rivers in the city to flooding, drought and higher temperatures. The TRMP now forms part of the **Durban Climate Change Strategy** and its **Climate Action Plan** as a C40 city.
- SHEFS research on river rehabilitation in Durban led to a partnership between environmental and engineering departments in the eThekweni Municipality and research institutions and civil society groups. The partnership is implementing **participatory river rehabilitation projects** in Durban, which are supporting climate adaptation responses including built infrastructure, social learning and improved ecosystem services to urban residents.

PART 2: CLEAN-AIR (AFRICA)

KEY INFORMATION

UK funders: Department of Health and Social Care (DHSC) via National Institute for Health Research (NIHR)

Funding programme: Global Health Research

UK investment (ODA): £1,992,748.00

Total investment: £1,992,748.00

Project dates: April 2018 - April 2021

Lead institution: University of Liverpool

Partner institutions: Centre for International Climate and Environmental Research in Oslo (CICERO), Universities of Moi (Kenya) and Ghana, Douala General Hospital (Cameroon) and Kintampo Health Research Centre (Ghana), World Health Organisation (WHO)

Countries of focus: Cameroon, Ghana, Kenya

Background

Globally 3 billion people rely on polluting solid fuels for cooking and heating their homes. Exposure to smoke from burning these fuels has significant health implications, causing more premature deaths and illness in Africa than malaria. Indoor air pollution can result from carbon-based fuels which also contribute to greenhouse gas (GHG) emissions. Clean Household Energy for the Prevention of Non-communicable Disease in Africa [CLEAN-Air (Africa)] aims to help communities in Africa transition to clean modern energy, informing national policies and programs.

Household air pollution: The silent killer in the kitchen

“With every breath we take we feel the air grow blacker in taste and colour.”

(Author unknown)

Underpinning Research

Led by research experts, physicians and academics, CLEAN-Air(Africa) aims to address the burden of disease from household air pollution through a program of policy relevant implementation research and health systems capacity building. Its mixed-methods participatory research in Cameroon, Ghana and Kenya supports communities to adopt clean household energy alongside national government policies to scale household use of liquified petroleum gas (LPG) to reduce the negative impacts on health, deforestation and climate of reliance on solid fuels for cooking and heating. CLEAN-Air(Africa) has demonstrated that the major health gains achieved from scaling LPG for household energy include climate co-benefits from reduced deforestation and reduced emissions of climate-forcing pollutants from solid fuels. In collaboration with the World Health Organization, CLEAN-Air(Africa) has implemented programs of national health professional training in household air pollution, health and prevention working with the ministries of health in its focus countries.



Household adoption of liquified petroleum gas (LPG) as a cleaning cooking fuel in Cameroon. Credit: CLEAN-AIR(Africa)

Towards Impact

POLICY & PLANNING

- 5,000 households switched to clean cooking in Cameroon as result of pioneering microfinance programme.
- 130,000 community health workers in Kenya, reaching households across all 47 Kenyan counties, will be trained in household air pollution, health and prevention through new training adopted by the Ministry of Health as part of 2021 Universal Health Coverage.
- Informed international recognition of the need to scale adoption of LPG for clean cooking across sub-Saharan Africa, as opposed to technologies for burning solid fuels more cleanly (“improved cookstoves”). This aligns with WHO Air Quality Guidelines and many sub-Saharan African governments’ targets to expand LPG to meet SDG7.

International Climate Finance (ICF): Tools for informing decision-making



Tools developed through ICF-funded research have informed climate change decision-making both in mitigation, through the 2050 calculators, and adaptation and resilience, through the Ecosystem Services Valuation Database.

PART 1: THE 2050 CALCULATOR

KEY INFORMATION

UK funders: Department for Business, Energy and Industrial Strategy

Fund: International Climate Finance (ICF)

UK investment: £4.6 million

Total investment: £4.6 million

Project dates: 2012 - 2023

Lead institution: Mott MacDonald

Partner institutions: Imperial College London, Climact, Ricardo

Countries of focus: Bangladesh, Brazil, Colombia, India, Indonesia, Malaysia, Mexico, Nigeria, Philippines, South Africa, Taiwan, Thailand, Vietnam

Background

By 2050, the global population is expected to grow by a further 3 billion and the economy to triple in size. Yet, by 2050, the world also needs to reach carbon neutrality ("net zero" emissions) to achieve the goals of the [Paris Agreement](#). In order to have the best chance of meeting this goal, it is important for countries to set targets and develop effective plans to meet them under the Paris Agreement.

The 2050 Calculators programme, funded by BEIS through International Climate Finance (ICF), supports countries to create effective long-term strategies and explore multiple possible pathways for low-carbon development.

Underpinning Research

In response to the UK's [Climate Change Act 2008](#) which set the first legally binding mitigation target in the world (80% reduction of CO₂e emissions by 2050, [updated in 2019](#) to 100% reduction), BIES (then DECC – Department of Energy & Climate Change) built a model to explore different pathways to meeting this emissions target and their impacts – the 2050 Calculator. The calculator is an open source energy and emissions model. Unlike other models, the 2050

Calculator is based on engineering and physics, rather than economics – it is intended to model what is possible, rather than probable. It covers all energy forms and emissions, and can include implications for industry, land use, air quality etc. The calculator has three levels of complexity for different audiences:

- Excel spreadsheet – for government technical experts and stakeholder experts
- [Web tool](#) – for policy makers, stakeholders and the well-informed public
- [My2050](#) – for the general public and school children

Following the launch of the UK calculator, DECC quickly received interest from other countries looking to develop their own 2050 calculator models to support their low-carbon planning. The first ICF calculator programme was set up to support 10 LMICs in this endeavour. The ICF 2050 Calculator Extension Programme was set up to support LMICs to update or create new calculators.

The role played by ICF funding includes providing technical, policy, and research capacity strengthening support to enable LMICs to carry out research and build their own, country-relevant calculator models. All 10 countries included in the original ICF programme have now launched finished 2050 Calculator tools. The new programme is currently working on 3 calculator updates and 2 calculators for countries that have not had one previously.

Towards Impact

- Four countries (India, Vietnam, Colombia and Nigeria) have used their 2050 calculator models in the formulation of their mitigation targets (Nationally Determined Contributions – NDCs) for the Paris Agreement.
- India used their 2050 calculator to develop their [National Energy Policy](#) (2016). In addition, a second tool was built by the Planning Commission of the Government of India, which developed long-term strategies and policy direction for the country. Assam's state-level calculator is also being used to develop a state energy plan.
- In Colombia, their [2050 calculator](#) has been used by ministries to define how they reduce each sector's emissions by 20%. Regional versions of the calculators are also being used

by regional governments in decarbonisation planning.

- Vietnam used their [2050 calculator](#) to develop their Power Development Plan. The model's results influenced the decision to ban licenses for new coal power plants. The government is now developing sectoral and regional action plans to help meet their INDC and [Green Growth Strategy](#) target.
- South African created a [My2050 calculator game](#) aimed at school children. It was designed for schools with low-bandwidth internet and has been used to train teachers on energy and climate. There are plans to add it to the national curriculum. Taiwan and Colombia have also developed My2050 games for school students.

International Climate Finance (ICF)

[International Climate Finance](#) (ICF) is a UK government commitment to support LMICs to respond to the challenges and opportunities of climate change. The £5.8bn (ODA) fund is invested by three government departments: FCDO (formerly DFID), BEIS and Defra. This is part of UK's commitment, alongside other HICs, to jointly mobilise \$100bn per year in climate finance to LMICs, as set out in the Paris Agreement.

ICF delivers all four aims of the UK aid strategy with a focus on climate change, equally split between mitigation and adaptation.

ICF has already provided 33 million people with access to clean energy, supported 66 million people to cope with climate change, and avoided or reduced 31 million tonnes of greenhouse gas emissions.

PART 2: ECOSYSTEM SERVICES VALUATION DATABASE (ESVD)

KEY INFORMATION

UK funders: Department of Environment, Food & Rural Affairs (Defra)

Fund: International Climate Finance (ICF)

UK investment (ODA): £120,680

Total investment: £191,555

Project dates: April 2018 – June 2020

Lead institution: Foundation for Sustainable Development (FSD)

Partner institutions: Foundation for Sustainable Development Brander
Environmental Economics

Countries of focus: Global

The Ecosystem Services Valuation Database (ESVD) is another ICF-funded tool used by policymakers and stakeholders to inform decision-making. While the 2050 calculators' focus is mitigation, ESVD concentrates on adaptation and resilience, and wider ecosystem services.

Underpinning Research

The Ecosystem Services Valuation Database (ESVD) is a follow-up to the "The Economics of Ecosystems and Biodiversity" (TEEB) database. The ESVD was developed with Defra support to provide insight into the monetary value of specific ecosystem types, to help analyse the effects of different land use options. The database holds values of 23 ecosystem services across 16 habitat types. The updated version of the ESVD contains 4,042 value records obtained from 693 studies. The database provides key evidence in support of driving improvements in environmental, climate and sustainable development-focused programming. It allows programmes to have a greater focus on the natural environment. It enables the UK government and actors globally to accurately estimate the impact of policies and interventions on specific locations and habitats across LMICs.

Towards Impact

The database has provided invaluable evidence to support improved decision-making for ICF. It has enabled the inclusion of ecosystem services into cost-benefit analyses. It has been used for appraising Defra's ICF programmes in new business cases and will be used in annual reviews. This has allowed for a better understanding of the impacts of Defra's ODA spend.

At a local level, the database has provided detail on ecosystem services to local communities, which allows ICF to consider better the equity of programming and who beneficiaries are.

Patterns of resilience among young people in a community affected by drought in rural South Africa



This co-produced and co-designed project developed an interdisciplinary understanding of the effect of drought on young people in rural South Africa and generated a set of recommendations for decisions makers, which have had impact on policy and planning.

KEY INFORMATION

UK funders: Department for Business, Energy and Industrial Strategy via Arts and Humanities Research Council (AHRC), Economic and Social Research Council (ESRC), Natural Environment Research Council (NERC)

Fund: Global Challenges Research Fund (GCRF)

UK investment: £179,930

Total investment: £179,930

Project dates: Nov 2016 – May 2018

Lead institution: University of Brighton

Partner institutions: BoingBoing Brighton, Dalhousie University, Khulisa Social Solutions, University of Cape Town, University of Johannesburg, University of Manchester, University of Pretoria

Country of focus: South Africa

Background

Drought is a slow-onset natural hazard that negatively impacts the social, economic, and environmental systems that affect young people's health and wellbeing. The impacts of drought can be direct, such as a shortage of drinking water and crops dying, or indirect such as food being more expensive and people losing their jobs. These impacts of drought on young people are particularly severe in sub-Saharan Africa, where recurrent drought intersects with development challenges such as inequality, exclusion, poor education, and a lack of employability skills. The Mpumalanga region of South Africa, home to approximately 4.42 million people, has faced terrible and worsening droughts

for over a century, with the 2016-17 drought resulting in severe consequences.

With GCRF funding, this project co-produced significant impacts arising from addressing the project's main question: How can young people in the Mpumalanga region best be supported to reflect on and communicate their resilient responses to drought, and how can adults (including local and national governments) 'change the odds' that place young people at risk? Findings were published in [Youth Resilience to Drought: Learning from a Group of South African Adolescents](#).

Underpinning Research

The vision of this project was to develop a new interdisciplinary understanding of the effect of drought on young people, that will have an impact on community resilience to drought in South Africa.

Central to this project was its collaborative process. Research activities were co-designed and co-produced, and the project was co-owned between all partners and the research team. The research team was made up of: experts in social science, performance art, and climate science; Masters students; community partners; people with lived experiences of adversity; and 49 young people from the town of Leandra (Mpumalanga region) who were trained and supported as co-researchers.

“Arts-based activities often get to the parts the other research methods don’t reach and reveal new insights.”

(Professor Angie Hart, University of Brighton)

The project was an interdisciplinary research study that used a blend of approaches and methods from the sciences, arts, and social sciences:

1. Combining information from historical archive documents with monthly rainfall data to produce a community and regional timeline of drought severity
2. Series of workshops and arts-based activities to identify and communicate young peoples’ personal, family, community, cultural, and environmental responses to times of drought. Activities included: drama workshops, film-making, creative writing, body mapping, and more.
3. Gathering of oral history narratives of drought-related change from their community by the youth co-researchers and exploring how the community coped with the changes.
4. Co-production of a local community strategy, using creative mediums, to support the resilience of young people to drought-related challenges.
5. Using findings to inform the basis for a future-large scale investigation to assess the relevance of the results to other drought-stricken communities in South and sub-Saharan Africa.

The activities revealed how the impacts of drought on the young co-researchers are wide-ranging, from impeding their educational opportunities to threatening family livelihoods and causing mental anguish.

The outputs of the project were a [video](#) and [policy document](#), entitled “United We Stand” co-produced with our young co-researchers, NGOs and community partners. The project made 10 recommendations (see excerpt in box above) disseminated widely to organisations at local, provincial, national and international levels. The outputs provide evidence for policymakers of the experience of living in a drought-affected community and the impacts young people can create by being co-researchers, working with communities.

Towards Impact

POLICY AND PLANNING

- Policy makers in water use and drought management have used the project’s finding to better understand the perspectives of young people in relation to drought in South Africa
- The project’s methods have been drawn on by local and regional policy makers and NGOs to develop responses to drought.

“I have learnt team working skills...I also gained researching skills, analysing and being hypothetical about drought and research in general. I have decided to be more hands on and I need to teach people about drought and lack of infrastructure”

(Xolani Tressure Mfusi, youth co-researcher, Leandra)

CAPACITY STRENGTHENING

- The 49 young co-researchers who received training and took part in research activities have developed new skills.
- The 10 Masters students from the University of Pretoria have strengthened their co-production research, community engagement, and dissemination skills.

COMMUNITY RESILIENCE

- Co-researchers from the local community in Leandra have improved their knowledge of drought and ways of developing collective community responses.
- The findings have been used to inform local people, schools, and community groups of ways in which they can be resilient to drought and work together with policy makers.



Selected project recommendations:

- Meaningfully involve young people in drought response plans, and engage young people when drawing up educational programme materials about saving water.
- Ensure better planning and infrastructure to support young people's initiatives in saving water.
- Young people should be supported to be more involved in policy decision making in South Africa as they are very innovative.
- Support young people in spreading key messages about drought.

(Policy document: United We Stand)



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