



Scenario
DOCTORAL TRAINING PARTNERSHIP

NERC
SCIENCE OF THE
ENVIRONMENT

Pan-African Heatwave Health Hazard Forecasting

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Heatwaves are a serious meteorological hazard to human health and place significant strains on infrastructure (power, water and transport), agricultural production, retail, tourism and ecosystem services. Being able to forecast thermally-hazardous environmental conditions and the assessment of potential impacts to human health is becoming increasingly important. There is now a growing body of evidence that heatwaves are likely to get more intense, frequent and long-lasting in the future as a result of climate change. In 2002 north-eastern Nigeria suffered one of the hottest and driest spells ever, with temperatures exceeding 50°C and large numbers of people dying as a result (Dosio et al., 2017). **The number of heatwaves in Africa could be up to five times higher by 2050** (Weber et al., 2018) with a potentially catastrophic impact on mortality.

The RAINWATCH Alliance (www.rainwatch-africa.org) is a collaborative venture for climate information services to enable better decision making in sectors such as agriculture, water resource and health. It began in 2009 as a prototype system for Niger, West Africa, providing rainfall data in near-real time and tracking key seasonal characteristics. It has since expanded to consider wider climate services in an Alliance of 13 National HydroMeteorological Services (NHMS; Senegal, Mauritania, Mali, Gambia, Guinea Bissau, Sierra Leone, Ghana, Nigeria, Niger, Chad, Burkina Faso, Malawi and Uganda), NGOs, International Organizations, Government Agencies, Research Institutions, Private sector, across Sub-Saharan Africa (SSA). The provision of **heatwave early warning information was identified as a priority ‘climate service’ for supporting health sector services across Africa** at the RAINWATCH 2018 Regional Learning Event hosted in Uganda.

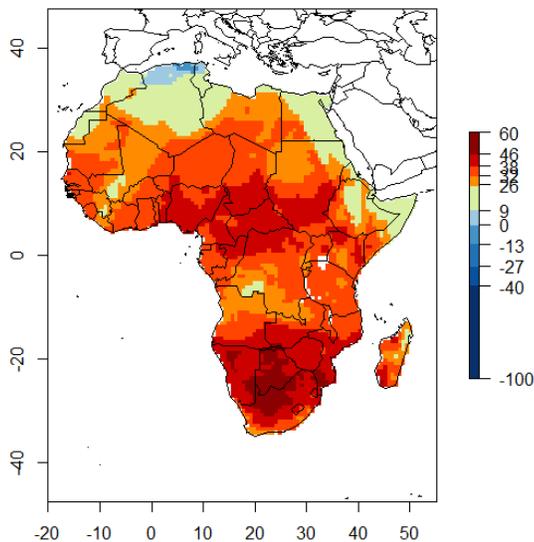


Fig 1 LEFT: Prototype heatwave health hazard index (UTCI °C) for the 2016 S Africa heatwave. RIGHT: RAINWATCH Regional Learning Event in Uganda, discussing priority climate services.

Recently there have been some key improvements in the forecasting of heatwaves and their effects on health hazard. The University of Reading, in collaboration with the European Centre for Medium-range Weather Forecasts (ECMWF) is trialling a new heatwave health hazard forecasting system (Di Napoli et al, 2018) based on a biometeorology index of the human body's response to the thermal environment (Universal Thermal Climate Index, UTCI). However, the forecasting system was designed for use in Europe and has never been tested on the African continent.

This studentship will investigate the health hazard predictability of the forecasting system at ECMWF for Africa; characterizing utility and forecast skill. The student will work in partnership with the RAINWATCH Alliance and our linked networks to the WHO and the Ministries of Health. Focal countries will include Ghana, Senegal, Uganda and Malawi. Using the latest ECMWF weather forecasting and earth system reanalysis datasets, the relationship to the driving weather regimes and how well these are represented in the weather models will be considered. National and global datasets on heatwave disasters and, where available, mortality and morbidity will be used to assess the health hazard impacts of the key heatwave events of the last few decades and test the relationship to the forecast health hazard indicators. From this new scientific understanding the student will develop new parameterisations to use in forecasts of health hazard from ECMWF and assess their potential for improving disaster preparedness.

Training opportunities:

The student will undertake the PhD training planning required by SCENARIO considering researcher development courses and Masters level modules. Bespoke training will be provided according to need in data management, utilisation of complex environmental datasets, numerical weather prediction and biometeorology, programming and international development climate change adaptation/health policy-making processes and practices.

The student will become an **ECMWF Visiting Scientist** for the whole period of the PhD and also undertake a **3 month full time placement** at ECMWF to work alongside scientists and forecasters. The

student would be expected to attend formal training courses at ECMWF (e.g. supercomputing, use of ECMWF products and their retrieval).

The student will have opportunities to participate in the annual RAINWATCH Regional Learning Events in Africa, and for networking with Walker Institute donors and researchers including African Union, national governments, the World Bank, UN agencies etc.

Through the **Walker Academy**, there will be opportunities to be part of the COP-Climate Action Studio (COP-CAS) hosted during the international COP meetings as well as Knowledge Synthesis training (CSAT) focusing on health crises. The successful student will also have access to safety and security training (SAFE) in preparation for work in developing countries.

Student profile:

This project would be suitable for students with a degree in meteorology, physical geography or environmental Science. Students will be required to work in a unix programming environment with python or similar, previous experience is not essential as training will be provided.

<http://www.reading.ac.uk/nercdtp>