



CEPHaS Project Briefing

No.1 February 2018

WHAT IS CEPHaS?

It is essential to improve the productivity of agriculture in Sub-Saharan Africa while protecting land and water resources, and this is increasingly challenging in the face of climate change. There is evidence that reduced tillage, returning crop residues to the soil (for protection and to increase its carbon status) and increased crop diversity can make cropping more resilient to dry conditions. This is known as Conservation Agriculture (CA). Our understanding of the soil under CA is limited, which makes it hard to predict when and where CA will be successful. For example, how do CA practices change the soil's structure and the behaviour of soil water? Does this improve storage of water in the soil? What are the implications for groundwater resources under CA?



Conventional (right) and CA (left) maize plots at Chitedze Experimental Farm, Malawi, during the dry growing season 2015/16. Acknowledgements to Prof. Martin Broadley (photo) and to Dr Alan Chilimba and Ms Ivy Ligowe (pictured).

CEPHaS is a project to build research capacity to answer these questions. We shall use modern methods in soil physics and hydrogeology to examine soil and groundwater under CA experiments in Malawi, Zambia and Zimbabwe, and so develop our experience and capacity as a network to answer these and similar questions on behalf of farmers, their advisers and policy makers.

WHO ARE WE?

We are soil scientists, agronomists, hydrogeologists, geophysicists, statisticians and agricultural economists from the University of Zimbabwe, the University of Zambia, Lilongwe University of Agriculture and Natural Resources, University of Nottingham, Rothamsted Research, Liverpool School of Tropical Medicine and the British Geological Survey. We are also joined by Kasisi Agricultural Training Centre as an NGO partner.

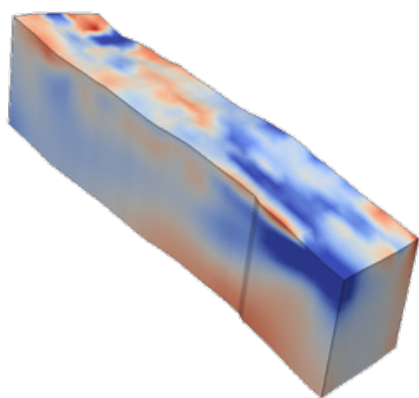
Together we constitute a unique multidisciplinary team with a wide range of experience, including in capacity strengthening.

WHAT ARE WE DOING?

The CEPHaS project began in October 2017, so we are in the first phase, with a new experiment being established at the University of Zambia's Liemphe Farm near Lusaka. We are working with established experiments in Malawi and Zimbabwe which will allow us to examine long to medium term effects of CA practices, and to add value to these trials.



Statistical training on the open R platform.



Geophysical methods allow us to measure soil water content in real time, and to visualize how it moves between surface, rooting zone and depth.

In all three countries, and as a network:

- We are establishing laboratory and field facilities to measure water in soil and its important properties.
- We are using shallow geophysical methods to visualize soil water in and below the root zone of dominant crops.
- We are establishing bore holes to measure groundwater recharge under CA systems.
- We are developing capacity in statistical design and analysis to support and extend this work, through training, checklists and other resources and methodological research.
- We are examining systematically the range of farm systems and socio-economic problems which set the context for CA and ultimately determine its success. This is to ensure that our research in the physical sciences addresses relevant knowledge gaps and therefore will have real impact for farmers.
- We are undertaking structured assessments of factors that affect research capacity and how it can be strengthened in our institutions.

HOW CAN I FIND OUT MORE?

- Contact your appropriate country lead (see below).
- Contact the principal investigator (see below).
- Look out for opportunities to attend project Stakeholder Workshops. The first of these will be at Lilongwe in July 2018.
- If you wish to subscribe to this series of project briefings, then contact the principal investigator by email.



CEPHaS is funded by Research Councils UK through its Global Challenges Research Fund programme.

Country Leads — Zambia: Dr Elijah Phiri ephiri62@yahoo.com;
Zimbabwe: Professor Paul Mapfumo paulmapfumo@gmail.com; **Malawi:** Dr Patson Nalivata, pnalivata@luanar.ac.mw
Principal Investigator: Professor Murray Lark, murray.lark@nottingham.ac.uk

