

Earth's soils are under threat, scientists warn in *Nature*

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The planet's soils are under greater threat than ever before, at a time when we need to draw on their vital role to support life more than ever, warns an expert from the University of Sheffield today in the journal *Nature*.

Professor Steve Banwart from the University's KROTO Research Institute, will be helping to tackle this challenge as part of a new programme of international research, called Critical Zone Observatories (CZO), funded initially by the USA National Science Foundation and the European Commission.

In some parts of the world, losses due to erosion are greatly outstripping the natural rate of soil formation; and the intensity of human activity is impacting the ability of soil to produce food, store carbon from the atmosphere, filter contamination from water supplies and maintain necessary biodiversity. Because of growing demand for food, intensification of agriculture alone will put a huge strain on soils over the next few decades, and [climate change](#) adds to the challenge.

Soils are at the heart of the earth's 'critical zone', the life-supporting veneer of the planet from the top of tree canopies to the bottom of drinking water aquifers that support much of humankind. CZOs are international magnets that draw together multidisciplinary experts from around the world, to focus their combined efforts to solve this soils challenge.

There are now over 30 CZOs in many different countries and they are starting to work together. One goal of this international effort is to develop mathematical models to predict how soil and the services it provides will change as humans intensify the use of soil. The aim is to pro-actively design solutions, for example to increase [crop yields](#) without compromising the other roles of [soil](#). This could be done by laying out alternative ways to raise crops and calculate the effects, to find the best solutions before soils deteriorate, and then implement these to maintain [soil quality](#) and potentially improve it.

CZOs are developing this predictive capability from fundamental scientific principles and combining data from the sites to test the models.

Key requirements that are identified to accelerate this research effort are greater international collaboration between national research programmes, and getting companies involved in research planning to help move from research to practical solutions. Given the possible doubling in food demand by 2050, critical zone scientists are arguing that we need to have this capability operational within a decade.

Professor Banwart argues: "The challenge is clear. We need rigorous forecasting methods to quantify and best utilise soil's natural capital, to assess options for maintaining or extending it, and to determine how declines can be reversed. And we need these things well within a decade."

The news follows significant research already being carried out at the University of Sheffield in the areas of global change and food security as part of Project Sunshine. Led by the Faculty of Science at the University of Sheffield, Project Sunshine aims to unite scientists across the traditional boundaries in both the pure and applied sciences to harness the power of the Sun and tackle the biggest challenge facing the world today: meeting the increasing food and energy needs of the world's

population in the context of an uncertain climate and global environment change. It is hoped that Project Sunshine will change the way scientists think and work and become the inspiration for a new generation of scientists focused on solving the world's problems.

Provided by University of Sheffield

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