

New way of monitoring environmental impact could help save rural communities in China

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University of Southampton researchers are pioneering a new way of measuring and monitoring the impact of industrial and agricultural development on the environment.

Working in collaboration with East China Normal University, the Nanjing Institute of [Geography](#) and [Limnology](#) and the University of Dundee, the team has created the world's first long-term record of ecosystem health, which examines the past condition of environmental resources in China's Yangtze basin region, and helps develop forecasts for the future.

"We have examined what effect modern [intensive farming](#) techniques have had on 'ecosystem services' – things like food, fuel, soil and clean water – in the Yangtze basin area. From this we get an overview of the condition of these resources, which are essential for the survival of local communities," says lead researcher Professor John Dearing from the University of Southampton.

The team drilled core samples at two lakes in the region, west of Shanghai, and have made detailed studies of the sediment they retrieved.

Professor Dearing explains, "The data we have compiled came from the analysis of microfossils, geo-chemistry, mineral magnetism, and sediment accumulation rates. These different analyses give us clues

about the past health of the environment – for example, pollen samples tell us about the diversity of plant species at a given time, while metal content can be used to measure air quality. By bringing all the information together, we have been able to track the condition of [environmental resources](#) over a 200 year period."

In addition, researchers have examined official statistical records and climate models to give trends on land use, population, gross domestic product (GDP), temperature and precipitation. By comparing these statistics with the core sample data they have seen that as GDP in the Yangtze region increased sharply in the 1970s, the quality of [ecosystem services](#) suffered a downward trend. Improved environmental regulation and policies encouraged a partial stabilisation in the 1980s, but the downward trend continued sharply in the 1990s and beyond. The study findings have been published in the journal the *Proceedings of the National Academy of Sciences*.

Professor Dearing comments, "Intensive agriculture has lifted many Chinese rural communities out of poverty in the last 30 years, but irrigation, mechanisation and fertilisers that came with it have degraded soils badly and there is already evidence of declining water quality.

"Economic development and an increase in regional wealth are clear trade-offs for the decline in ecosystem services. However, in the long-term, this decline will be a threat to local livelihoods and could reach a 'tipping point', becoming irreversible.

"Financial indexes, like the FTSE 100 or Dow Jones, are used to monitor the health of an economy, and this project has led us to consider that palaeoecological records could provide the basis for a regional 'ecosystem service index', monitoring the health of a region's environment."

Where suitable, researchers hope to use the technique they have developed in China for other areas of the world, with the aim of helping policymakers to prioritise the most urgent environmental problems and identify which strategies work best to tackle them.

More information: intl.pnas.org/content/109/18/E11111.full.pdf+html

Provided by University of Southampton

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