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Agricultural Memory and Sustainability

Archaeologists, historians and anthropologists have an important role to play in the decision-making around how we build a sustainable food future.

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A significant overhaul of the current global food system is needed to meet the challenges of feeding a growing world population and many stress that this is only achievable by changing diets, food production and reducing food waste.

How do we mitigate the 'climate crisis' while delivering productive, resilient, nutritious and sustainable food and farming?

A new paper in *World Archaeology* weighs into this debate, suggesting that looking to the past can offer important insights for future agricultural and food security strategies.

Inscribing memory

Archaeology, history and anthropology have been largely neglected in discussions on climate change and agricultural sustainability. However, our past contains a rich, diverse, and global dataset resulting from the successes and failures of numerous societies and their interactions with the environment.

This research provides an important source of information on food security and agricultural development over a much longer period than current studies allow and under a range of different challenges.

The memory of agriculture and food is carried by landscapes, seeds, animals, people, and technologies, as well as by oral traditions, languages, arts, rituals, culinary traditions, and unique forms of social organisation.

In many regions around the world landscapes and agricultural systems have developed often distinctive, ingenious practices that have stood the test of time in their robustness and resilience.

The value of understanding these cultural and environmental contexts is increasingly recognised by researchers, organisations and policy makers as important for addressing issues of agricultural sustainability.

Inherited systems

An example of this is rice-fish farming practiced in Asia, where a sustainable symbiotic environment provides farmers with higher crop yields and an important source of protein.

This agricultural system has a long history with models of rice-fish farming dating back to

the later Han Dynasty (25–220 AD), however, more recently these systems have been increasingly challenged.

Recognizing the vulnerability of these agricultural systems, FAO started an initiative for the conservation and sustainable management of Globally Important Agricultural Heritage Systems (GIAHS) in 2002, which has allowed farmers to increase their income from marketing their products and tourism, while preserving their ancient traditions.

Understanding these traditions is important because cultural values are not always integrated within existing policy research and implementation, resulting in many interventions failing due to a lack of understanding of their cultural and historical contexts and poor reception by the very people and societies they are intended to benefit.

Agricultural resilience

The number of crops we grow for food is also presenting challenges for agricultural sustainability across the globe.

Of Earth's estimated 400,000 plant species, 300,000 are edible, yet humans cultivate only around 150 species globally, and half of our plant-sourced protein and calories come from just three: maize, rice and wheat.

As large commercially valuable monoculture crops are grown in greater numbers around the world crop diversity is under threat.

Dr Philippa Ryan, a Research Fellow in Economic Botany at the Royal Botanic Gardens, Kew, said: "Traditional forms of farming across many areas of the globe are rapidly changing or disappearing due to major social, political, economic and environmental changes.

"This not only poses problems for agricultural resilience but also cuts down on people's ability to eat or afford foods that are culturally significant to them."

If we continue to restrict the types of food we grow and its genetic variation we increase the risk of climate change, droughts, pests and diseases wiping out parts of our food supply. Think the Irish potato famine of the late 1840's!

Cash crops

Ryan's anthropological and archaeological work in northern Sudan on past and present crop choices highlights this point.

As 'cash' crops have moved in more traditional cereals, such as hulled barley (*Hordeum vulgare*L), sorghum (*Sorghum bicolor*(L.) Moench) and the pulse crops lablab (*Dolichos lablab*L.) and *Lupinus albus*L., became marginalised.

Yet, these native crops are more suited to the local environment, requiring less chemical fertilisers and being more arid and heat tolerant, and as the archaeology has shown, have supported people in the region for hundreds of years.

Experimental growing

Ancient management systems could also hold the key to providing small-scale farmers with

relatively simple low-tech, low cost solutions.

In the mid-twentieth century, experimental crop growing in the Negev desert was able to survive extreme droughts, with little salinization of the soil, due to the implementation of Byzantine irrigation methods identified from the archaeology in the region.

The system also had a number of collection channels and underground cisterns that controlled flash floods, allowing silt to deposit and prevented erosion.

Adapting agriculture

Plant breeders and researchers are also busy searching for sources of genetic diversity for our crops to make them more resilient to tough conditions, such as drought, flooding, high temperatures or poor soils.

One project is the Adapting Agriculture to Climate Change: Collecting, Protecting and Preparing Crop Wild Relatives, launched in 2011.

Managed by the Global Crop Diversity Trust (Crop Trust) within the Royal Botanic Gardens, Kew the project aims to preserve wild crop relatives, in order to store potential traits that could contribute to climate change adaptions in crops for the future.

For decades archaeologists have also studied the impact of climate change and disasters such as tsunamis, large-scale El Niño events and volcanic eruptions and are now able to map past climate variability, offer context for human-induced climate change, and even improve future climate predictions.

The complexity of our global food system means that we must increasingly look beyond our 'traditional' sources of information in order to respond to global challenges.

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