CASE STUDY: Sustainable pathways for future wheat production in the UK

Executive Summary: The Climate Science for Service Partnership (CSSP) China project has developed a practical framework for creating climate-resilient wheat supply chains in the UK which is helping policymakers and industry stakeholders identify long-term adaptation and mitigation actions needed to protect food security from climate change. Its benefits include informing national food security and climate policy, strengthening resilience across the agricultural sector, and demonstrating global thought leadership via creating a scalable methodology that can be applied to other crops, countries, and supply chains to support sustainable equitable and climate-resilient development.

The Challenge: Wheat is the most widely grown arable crop in the UK and is the second most-prevalent grain grown in most parts of China. Climate impacts affect each part of the supply chain as well as acting to cascade and compound impacts across it. By having oversight of the whole supply chain, we can understand which impacts are the most significant for wheat production and thus food security, 'fixed' aspects of the supply chain that can't be changed, feasible strategies for mitigation and adaptation, and when to best implement these strategies, all to give us the best chance to reach a climate resilient and equitable future.



Winter wheat shooting, Hertfordshire. UK

The Approach: Expanding on existing work and collaborations under the Climate Science for Service Partnership (CSSP) China, collaborative research has been looking at climate interactions with the UK wheat supply chain, which is of direct relevance to the UK and China. It builds upon the concept of climate-resilient development pathways (CRDPs), introduced through the United Nations Intergovernmental Panel on Climate Change (IPCC), and presents a transformative framework for integrating climate adaptation, mitigation, and sustainable development. Despite its potential, practical guidance for implementing CRDPs remains limited and this work has developed a proof of concept that addresses a significant gap in practical implementation by developing and testing an operational approach to CRDPs within the UK wheat supply sector.

Engagement with key actors across the UK wheat supply chain including policymaking, supermarket retail, agricultural research, consultancy and advice, and agriculture provided an understanding of the complete farm-to-fork process. This revealed the key elements that affect the supply chain and the key weather and climate impacts, as well as potential "opportunities for change" in the system, that might lead to a more climate resilient wheat supply chain. This was used to co-develop with the same stakeholders a future vision for the 2050s that considers adaptation, mitigation, and the need for a just transition as well as short,

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medium and long-term actions needed to realise the vision.



Harvesting wheat, UK

Pathway to Impact: From this future vision, a set of policy recommendations have been proposed that are feeding into the Defra-funded Met Office climate service on Food, Farming and Natural Environment, informing policymakers on the future changes needed in the UK agri-food sector. This includes informing policy and action through Defra's 3-yearly UK Food Security Report and contributions to the Climate Change Risk Assessment and National Adaptation Programme, as well as strong links to the UK's Global Food Security Programme. This work is linked to food security which is an essential contributor towards the foundations of a stable economy, a key milestone in the UK Government's Plan for Change, therefore contributing towards ensuring the UK remains resilient and responsive in the face of potential future shocks.

The methodology developed by this project can be easily adapted to replicate the process in other countries and sectors and a toolkit and supporting guidance has been developed to enable similar initiatives in other parts of the world. This has been communicated with partners at the Chinese Academy of Agricultural Sciences (CAAS) with good engagement and discussions around applying within China. The project methodology has also been published in the peer-reviewed literature for use by the wider climate service community, as well as presented at the 5th National Climate Impacts & Risks Meeting held in Bristol in September 2025 and will be further showcased during a seminar for the Delivering Sustainable Wheat programme in December 2026.

Expanding on this work, a collaboration between CSSP China and an MSc student at the University of Exeter has explored the application of the CRDP framework to China's coffee sector, with a focus on Yunnan Province. This assessed the viability of operationalising CRDPs in an emerging agricultural sector outside the UK context and generated early insights to inform future climate service development. It identified labour availability, and policy and regulation as the dominant systemic pressures facing Yunnan's coffee sector, alongside climate-related risks including changing rainfall patterns, soil erosion, rising minimum temperatures, and increasing pest and disease pressure. It highlighted how these stressors interact across social, economic, and environmental dimensions, reinforcing the value of a systems-based CRDP approach. Although exploratory, this work provides a proof of concept for applying CRDPs to coffee in China and contributes to CSSP China's broader ambition to extend co-developed climate services beyond established crops, supporting early-stage resilience building in emerging agricultural value chains.

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