Flagship Project 5

Supply Chains: Modelling Water use for Sustainable Livelihoods

Background

Expertise in supply chain (SC) analyses from the Institute for Manufacturing at Cambridge (Srai, cv refs) will be applied to capture the multiple drivers (explanatory variables) that lead to pinch-points in water supply and demand for specific (crop/region) agricultural ecosystems. We will quantify and model socio-economic (e.g. regional urbanisation) and industrial drivers in Chandigarh/Punjab (north India) and Bangalore/Karnataka (south India) impacting current and future ecosystems. Selected food supply systems will be analysed from a scarce resource perspective, in particular water resources, examining crop-water use, production-process, and digital supply-chain technology interventions using cloud-based technology (Mishra cv refs).

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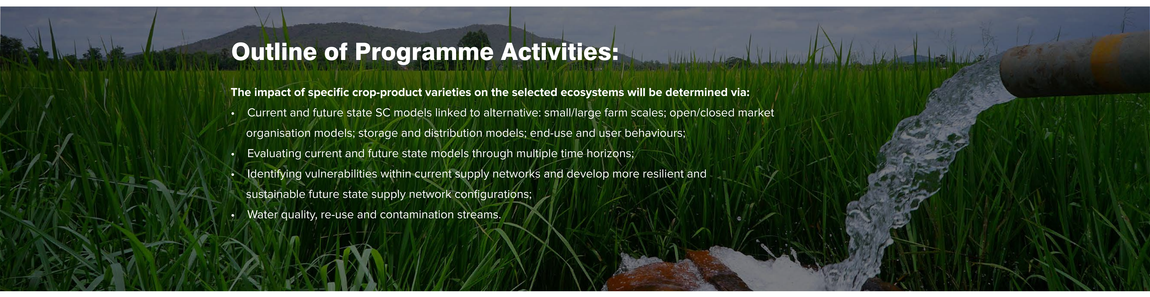

Outline of Programme Activities:

The impact of specific crop-product varieties on the selected ecosystems will be determined via:

- Current and future state SC models linked to alternative: small/large farm scales; open/closed market organisation models; storage and distribution models; end-use and user behaviours;
- Evaluating current and future state models through multiple time horizons;
- Identifying vulnerabilities within current supply networks and develop more resilient and sustainable future state supply network configurations;
- Water quality, re-use and contamination streams.

Practical Description of Research and Allocation of Responsibilities to Staff in UK and India

The UK PDRA will work with Jag Srai, (IfM), modelling water use for sustainable livelihoods via small and large-scale production systems for delivery to an urbanised society, and with Nishikant Mishra (UEA) to integrate decision support systems for waste minimisation, risk mitigation, increased productivity and use of ICT in agri-food SC. In India, one PDRA will be deployed to work in northern India (PAU, IIT), and the other at NIAS Bangalore (Prof. Baldev Raj), linking outputs to Institutional and Industrial responses to current 'Manufacturing in India' and 'Digital India' programmes that will shape the industrial landscape over the next 10 years and beyond. Through alternative crop, production process and digital technologies, and resulting alternative supply network configurations, more informed, resource-efficient practices will be supported.

Engagement with Stakeholders

Selected implementation case studies will include:

- Innovators in production processes and digital supply chain technologies will impact resource efficiency, and empower key stakeholders, as part of a more equitable supply-demand model
- Examining food supply chain e-Commerce developments, at both farm and urban-retail levels, and within the developing country context to identify 'thin-integration' models and more integrated end-to-end supply chains
- Developing distributed food manufacturing models that encourage multi-actor participation as part of a democratisation of food supply chains, enabled through digital transformation.
- Case studies linked to water use and supply chain issues in other work streams.

Outcomes, Deliverables and Impact

Increase UK research base on supply network design, water-resource assessment, resource/water stewardship, supply chain digitalisation, and e-Commerce last mile logistics.	Industrial (Innocent UK, Global Green India) institutional partners have been involved in the co-creation of key research questions, their implementation and will support enduring partnerships.	Analyse, design and operate alternative food supply network models enabled by new crop, production process and digital supply chain technologies to support a more resilient, resource efficient food system and sustainable water use in northern and southern India.	Suggest interventions for future regional (State) products and their digital supply chains to influence institutional/ industrial/ user behaviours and transform livelihoods.

Cambridge Lead:
J. Srai; UEA Co-I: Nishikant Mishra; India: Dr Sandeep Kapur, (PAU), Dr Harpreet Singh (IIT, Ropar, Punjab); Prof. Baldev Raj (NIAS Bangalore).
HR career stage requirements:
Employment in UK: 1.5 PDRA; India: 2 PDRA at key institutions
Capacity Building India-UK and UK-India Exchanges:
3 Senior Investigators; 3 PDRA/PhD extended exchanges; Pre and Post FP workshops.