



## **Assessing and improving resilience of cereal production in South Asia to climate variability and change**

### **Supervisors (including Title; Dr, Prof etc):**

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### **Funding:**

This project is fully funded (fees and annual stipend at standard research council rates) for a period of 3 years. Financial support is available to students to enable attendance at conferences and workshops, and to support travel to engage and collaborate with partners in South Asia. Due to funding restrictions, only UK and EU nationals are eligible for this PhD scholarship. Non-EU applicants are encouraged to contact the supervisors to discuss potential alternative funding sources.

### **Project Summary**

Cereal production systems, in particular wheat and rice, constitute the main source of food security and incomes for millions of smallholder farmers across South Asia. However, cereal production in the region also remains highly exposed to risks posed by extreme weather events such as droughts and heatwaves, which limit agricultural productivity and trap farmers in persistent poverty. Given the expected increase in the frequency and magnitude of extreme weather events due to climate change, there is therefore an urgent need to identify management strategies and policies to increase resilience of smallholder cereal farmers in South Asia to climate shocks.

Design of effective solutions to enhance farmers' resilience to climate variability and change in South Asia is predicated on accurate knowledge of the type, frequency and severity of the weather shocks that drive spatial and temporal variability in agricultural productivity. Research in this area is currently constrained by a lack of understanding about the reliability and accuracy of available meteorological data for the South Asia, and about how weather dataset uncertainty influences the performance of associated agricultural risk assessments. Moreover, there remains limited understanding about how models of crop yield response to weather shocks should be designed. Existing yield models consider only a small subset of seasonally aggregated explanatory weather variables, but commonly neglect other factors that are expected to be important drivers of yield losses such as the intraseasonal timing of weather extremes, local heterogeneity in management practices, and broader socio-economic changes influencing farmers' ability to adapt to climate shocks (e.g. rural out-migration and labour shortages).

This project will address these important knowledge gaps to develop new predictive models of the relationships between weather shocks and agricultural outcomes in cereal production systems across South Asia. Using combinations of station and gridded weather data, local and regional agricultural surveys, and satellite remote sensing, you will evaluate and improve the quality of weather forcing datasets and weather-crop yield impact models for the major wheat and rice production systems in South Asia. In the later stages of the project, you will apply your generated weather-yield models together with newly developed state-of-the-art climate projections from the Coupled Model Intercomparison Project Phase 6 (CMIP6) to assess the ability of alternative climate risk reduction

(e.g. improved irrigation access, changing crop varieties/calendars) and transfer (e.g. agricultural insurance) solutions to sustainably improve food security and farmer livelihoods.

### **Supervision and Partnerships:**

You will join a dynamic and growing group of PhD students and research staff working to improve the productivity and sustainability of farming systems in Africa, Asia, and North America. You will be supported and mentored by a multi-disciplinary supervisor team with expertise in climate impacts and agricultural systems research. Both supervisors have a range of active research projects and collaborations focused on climate risks to farming systems across South Asia. Through these connections you will have access to a wide range of datasets and models required to support your research. You will also be actively supported to collaborate and engage with major international agricultural research centres in the South Asian region, including International Maize and Wheat Improvement Centre (CIMMYT), International Food Policy Research Institute (IFPRI), the International Water Management Institute (IWMI), along with regional and national government and private sector (e.g. insurers) agencies supporting agricultural development.

### **Required Skills:**

We encourage applications from a range of backgrounds for this project – you do not need to have undertaken a specific undergraduate or masters degree program to apply. We are looking for a student with a strong quantitative background – whether from engineering, physical or social sciences – who is passionate and interested in addressing global challenges of improving livelihoods and food security of smallholder farmers. Prior experience in programming, statistical analysis, and/or agriculture-related research would be beneficial, but are not prerequisites for applying.

### **How to Apply:**

Students are encouraged to contact the supervisors informally via email before applying to discuss the project and their interests. To apply for this project, please complete an online application form using the following link: <https://www.manchester.ac.uk/study/postgraduate-research/admissions/how-to-apply/>. As part of your application, please ensure to state the name of the project and supervisors, and that the source of funding is 'Internal'. As part of your application, you should upload a current CV, two reference letters, degree transcripts and certificates, and a personal statement outlining your interests in the project and position. The project will remain open until a suitable candidate is selected, and is available for start dates from October 2019.