

Reducing Vulnerability of Food Systems of the Indo-Gangetic Plain to Global Environmental Change

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The Indo-Gangetic Plain (IGP; including regions of Pakistan, India, Nepal and Bangladesh) is generally characterised by fertile soils, favourable climate and an abundant supply of water. Nevertheless, the challenge of increasing food production in the IGP in line with demand grows ever greater; any perturbation in agriculture will considerably affect the food systems of the region and increase the vulnerability of the resource-poor population. Increasing regional production is already complicated by increasing competition for land by non-agricultural sectors and by the deterioration of agri-environments and water resources. Changes in climate and climate variability, together with other aspects of global environmental change (GEC), will further complicate the agricultural situation and will have serious implications for food systems of the region. Moreover, the highly-intensive production approaches currently used in much of the region are further degrading water resources and are a major source of greenhouse gases. In the face of GEC, policy requirements are to develop strategies that promote agricultural competitiveness while limiting further environmental degradation; food provision systems which enhance the social security of the more vulnerable; and rural employment opportunities, reducing intra-IGP labour migration and urbanisation.

Climate variability in relation to water availability, and its management and governance, are central issues for the IGP, and new technical, policy and institutional options need to be developed. Regional research in collaboration with the international project Global Environmental Change and Food Systems (GECAFS) will therefore aim to increase water productivity, enhance livelihood opportunities and reduce the water-related vulnerability of IGP food systems to environmental change by improving policy formulation capacity for water management at national and regional levels. Specific research objectives include developing:

- (i) improved assessment of the spatial and temporal vulnerability of food provision systems across the IGP to a changing environment and increasing non-farm demands for water.
- (ii) refined decision support systems to address stakeholder needs relating to potential policy and technical interventions for improving water productivity and enhancing resilience of food systems.
- (iii) improved water governance from enhanced capacity of stakeholders to use different types of decision support systems for analysing socioeconomic and environmental tradeoffs of alternative policies and water management technologies.

Strategies to reduce the vulnerability of the region's food system to GEC need to be based on a combination of technical and policy options, but they must be developed in recognition of the concurrent changes in socio-economic stresses. Adaptation options need to be assessed with regard to their socio-economic and environmental efficacy, but a greater understanding of the interactions of food systems with GEC is needed to be able to do this with confidence. Potential adaptation strategies include augmenting production and its sustainability, increasing income from agricultural enterprises, diversification from rice-wheat systems, improved land use and natural resource management, and more flexible policies and institutions.