

# MODELING CLIMATE-SMART AGRICULTURAL SYSTEMS

According to the Food and Agriculture Organization of the United Nations (FAO), agricultural systems must increase production 60 percent by 2050 to meet the nutritional needs of 9 billion people while at the same time adapting to climate change. In order to address the inter-related challenges of food security, FAO initiated the concept of Climate-Smart Agriculture (CSA). CSA promotes practices that sustainably increase productivity, improve resilience via adaptation, reduce or eliminate greenhouse gas emissions via mitigation, and enhance achievements of national food security and development goals.

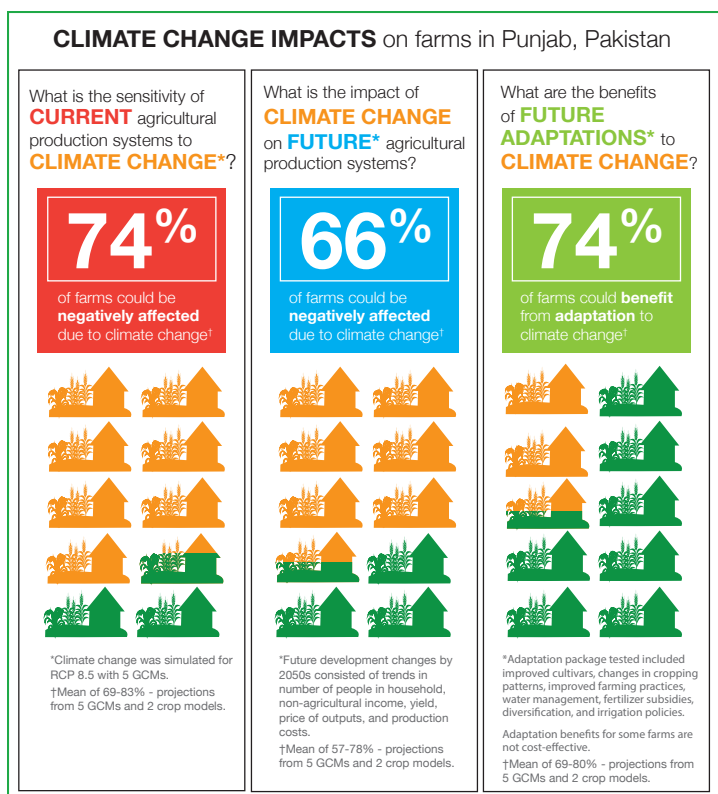
AgMIP's mission to address challenges of climate variability and change using decision-making models and assessments complements the goals of CSA. These models and assessments simulate pathways to sustainable farming systems to achieve local-to-global food security. The tools and protocols AgMIP scientists are developing can be used worldwide to assist stakeholders in their ongoing climate-smart decisions.

*AgMIP protocols link climate, crop and economic models with emerging technology and adaptations of interest to stakeholders to simulate current and future climate-smart investments.*

Since 2010 AgMIP has been working with regional research teams in Sub-Saharan Africa and South Asia, funded by UK-AID, to create protocols for integrated assessments of the impacts of climate and other factors on regional food security. These protocols link climate, crop, livestock, and economic models with emerging tech-

nology and adaptations of interest to stakeholders to simulate current and future investments in climate-smart adaptations. AgMIP's scientific approach includes a range of possible stakeholder decisions under plausible future conditions to allow stakeholders to investigate pathways more appropriate to climate change adaptation and mitigation on farming systems.

In 2014, the Global Alliance for Climate-Smart Agriculture (GACSA) was launched to work with stakeholders from farmers to governments to withstand the effects of climate change in agriculture, forestry, fisheries, food systems and social policies to help promote sustainability in natural resource use. AgMIP joined GACSA in 2015 and serves as facilitator for the Knowledge Action Group on Integrated Planning and Monitoring for CSA. The objectives of the Knowledge Action Group are to promote knowledge, research and development, and sharing of technologies, practices, and policy approaches for CSA. The Knowledge Action Group also works to improve communication among participants via outreach, extension, and technical assistance.



The Agricultural Model Intercomparison and Improvement Project (AgMIP; Rosenzweig et al., 2013), co-developed protocols for Regional Integrated Assessments with teams in South Asia and Sub-Saharan Africa (agmip.org). Results and methodology are published in "Handbook of Climate Change and Agroecosystems: The Agricultural Model Intercomparison and Improvement Project (AgMIP) Integrated Crop and Economic Assessments" edited by Cynthia Rosenzweig and Daniel Hillel, and features the work of over 200 scientists.