

Climate change and emerging agriculture complexities

Mini review

At the outset, there seems to be a nagging question that ‘how come Climate Change has become the only burning problem in the agricultural sector, of late? What about farm penury? What about farmers’ suicides? What about food security? What about health impacts of pesticide use? What about alarming rate of groundwater depletion?’ Certainly all these issues are already part of the agricultural situation and the ‘inconvenient truth’ is that climate change is only likely to aggravate some or many, if not all. And since climatic factors serve as direct inputs to agriculture, any change in climatic factors is bound to have a significant impact on crop yields and production.¹⁻⁹ In addition, in a scenario of diversion of food crops towards commercial or high value crops, the implications of climate change often crisscrosses the boundaries between food security and poverty. It has become more pertinent that farmers in general, now, had to adjust to the implications of climatic variability while also simultaneously battle out the economic stress which itself being the product of ever-spiraling farm crisis.

But, in fact, climate change *per se* is not necessarily harmful; the problems arise from its extreme events that are difficult to predict.¹⁰ Climate change implications have already set in as measured by increasing temperatures, variable and unreliable rainfall and an increase in climate-related extreme events such as floods, droughts, cyclone, sea level rise, salinity and soil erosion.¹¹ Changes in seasons and seasonal length are an indicator, as well as an effect, of climate change. Seasonal change profoundly affects the balance of life in ecosystems and impacts essential human activities including agriculture and irrigation. The world nations have good reasons to be concerned about climate change as it could adversely affect the achievement of vital development goals related to socio economic development, human welfare, health, energy availability and use, and infrastructure.

Besides, food security is directly related to climate change because any variability in climatic factor can directly affect a country’s ability to feed its people.¹² It affects all the components (i.e. production, distribution, processing, marketing, and consumption) of food security.¹³ Availability of food gets affected by climate change directly through its impact on crop yields, crop pests and diseases and soil fertility.¹⁴ Thereby, stability of food, crop yields, and food supplied are negatively affected due to any variation in climatic variables. The economic capacity of population to access the food may also get affected due to any increment in food prices. Overall, the impact of climate change may result in the reduction of agricultural production and employment opportunities of population and it would pose serious threat for hunger, food insecurity, poverty and malnutrition. It is now widely recognized that developing countries are particularly vulnerable to the impact of climate variability and change especially when compared to developed countries.⁷ This is because in developing countries ecological environments are fragile and the susceptibility of economic systems to risks is high. Besides, there is low level of technological progress, lack of resources to mitigate the adverse effect

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of climate change; and due to their greater dependence on agriculture for livelihood of large populations.¹⁵

A country’s vulnerability to climate change is decided by the presence of appropriate mitigation and adaptation interventions. Various studies¹⁶⁻¹⁹ provide abundant evidence that such interventions have a direct and indirect positive impact on farm efficiency. In addition, as interventions disseminate information on crop and livestock practices; optimal input use; and consultation directly with farmers on specific production problems, they result in facilitating a shift to more efficient methods of production. This way, these agricultural interventions not only accelerate the diffusion process of the adoption of new varieties and technologies but also improve the managerial ability of farmers, besides contributing to the efficient utilization of existing technologies by improving farmers’ technical know-how. It is certainly becoming true that the presence of uncertainty in the farming sector has certainly lead farmers to value interventions that are comprehensive, real-time and idiosyncratic contrary to the more generic or piecemeal information usually provided, in general, by public and private extension agencies.²⁰

In this connection, the role of development leading to the building of capacities, institutions and human capital, emerges *ipso facto* as the key for enhancing adaptive capacities. As a virtuous circle, enhanced adaptive capacities can itself stimulate further development. For instance, for the vast rain-dependent small, marginal and medium-level farmers in many developing countries, an insurance cover against crop failures due to a bad monsoon as an adaptation measure to climate change impacts could provide more stable economic conditions to plan at least 2-3 years ahead, otherwise farmers can only plan ahead from crop-to-crop with no chance for any planning for the future.^{21,22} Such rural stability is needed for sustained implementation of rural development policies such as land reforms, institutionalization of sources of credits, providing direct market access for farming inputs and selling produce, extending electricity access and affordability, and extending quality education and healthcare. Thereby, interventions are

strongly needed for developing the technical, policy and investment conditions in a region for achieving sustainable agricultural development and food security under the current precipitous scenario climate variability-farm vulnerability nexus.

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Conflict of interest

The author declares no conflict of interest.

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