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Food insecurity in India in light of growing climate change concern

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ABSTRACT

This paper examines current climate predictions and how climate shifts in various regions may impact global agricultural production and food security. The purposes of this paper are to (i) outline the notion of food systems, their relation to food security, and links to climate change; (ii) explore the vulnerability of food systems to environmental change; (iii) examine some prospects for adaptation of food systems in response to climate change. It was in September 2013 that the National Food Security Act (NFSA) was enacted. Though a landmark legislation, and despite its life-cycle approach, the NFSA falls short of realizing this objective due to lack of universalized coverage, concerns exist about the inordinate delay in implementing the law as the tasks of framing rules and identifying beneficiaries. Problems lie with the PDS scheme of the Act, suggestions for the same is given. It concludes that agricultural practices will need to be modified or adapted to correlate with anticipated shifts in weather patterns if food security is to be maintained into the future. The first chapter talks about climate change, food security, and food systems. It further explains the interrelationship between climate change and food security. The second part deals with analyzing the effects of climate change on Indian agriculture. The third part talks about the National Food Security Act, 2013 followed by its shortcomings in the fourth section. The article closes by discussing various adaptation efforts that could help to maintain Indian food security."

Keywords— Food security, Climate change, Food systems, Scientific agriculture, Food security act

1. INTRODUCTION

Climate change is a growing concern worldwide. It can be defined as the unnatural change in the climatic conditions of an area. The UNFCCC defines climate change as “means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. [1]”. While there has been considerable progress in understanding the sensitivities of crop yield to climate change, assessments of climate change effects on food security remain rather limited.

Food security is concerned not only with food availability but also with access to and utilization of, food so that studies, which focus only on crop production provide only a partial assessment of food security-climate change relationships [2]. This is of particular concern as many of the policy-based issues that are relevant to the international and sustainable development communities are posed in the context of food security prospects. Engagement of these policy communities requires a much broader and comprehensive research framework. Many regions that lack food security rely on local agricultural production to meet their food needs. Primarily tropical and subtropical, these regions are substantially affected by both global climate variations and global commodity price fluctuations. Not only will climate change have a differential effect on ecosystems in the tropics due to their already warmer climates, but also poor farmers in the tropics will be less able to cope with changes in climate because they have far fewer options in their agricultural system, to begin with. Climate change impacts on farmers will vary by region, depending on their use of technology. Technological sophistication determines a farm's productivity far more than its climatic and agricultural endowments. Food insecurity, therefore, is not solely a product of "climatic determinism" and can be addressed by improvements in economic, political, and agricultural policies at local and global scales. Today, millions of hungry people subsist on what they produce. If climate change reduced production while populations increase, there is likely to be more hunger. However, it may still be possible to reduce world hunger through programs that feed the poor during crises and by investing in agricultural inputs such as fertilizer and improved varieties that can dramatically increase yields. Improved environmental monitoring and prediction systems can provide more effective early warnings, which may help governments to take action to preserve the thin agriculture production margins by which many make ends meet. [3] Early warning systems involve extensive climate monitoring and prediction tools that could be used to enhance agricultural development programs. Crop insurance programs that are triggered by remote sensing data products may ensure farmer's livelihoods even in drought years. Investments in improved seeds and varieties and an augmented use of inorganic fertilizer

can increase yields. Improved local governance, reduced developed-world agricultural subsidies, and more nuanced food aid policies that protect local markets could together produce rapid improvements in food access and availability, reducing hunger while providing for more people [4].

With 194 million people designated as food insecure, India has the world's largest number of hungry people. Despite this inordinately high figure, the state till 2013 did not recognize the need for a law-based entitlement to food. It was in September 2013 that the National Food Security Act (NFSA) was enacted. Though a landmark legislation, and despite its life-cycle approach, the NFSA falls short of realizing this objective due to lack of universalized coverage, non-inclusion of pulses and edible oils in the food basket, inadequate quantity of food grains provided in it and non-inclusion of entitlements of the homeless, destitute and disabled persons. With a change in the political regime and its overriding thrust on reducing fiscal deficit, there are apprehensions of entitlements and coverage getting reduced and food grains entitlement being replaced with the cash transfer. Concerns exist about the inordinate delay in implementing the law as the tasks of framing rules and identifying beneficiaries, converting Integrated Child Development Scheme into a legal entitlement and redesigning Maternity Entitlement to incorporate universalization and portability have not been accomplished.

Food systems encompass food availability (production, distribution, and exchange), food access (affordability, allocation, and preference) and food utilization (nutritional and societal values and safety), so that food security is, therefore, diminished when food systems are stressed [5]. Climate change may affect food systems in several ways ranging from direct effects on crop production (e.g. changes in rainfall leading to drought or flooding, or warmer or cooler temperatures leading to changes in the length of growing season), to changes in markets, food prices, and supply chain infrastructure. The relative importance of climate change for food security differs between regions. For example, in southern Africa, the climate is among the most frequently cited drivers of food insecurity because it acts both as an underlying, ongoing issue and as a short-lived shock [6]. The low ability to cope with shocks and to mitigate long-term stresses means that coping strategies that might be available in other regions are unavailable or inappropriate. In other regions, though, such as parts of the Indo-Gangetic Plain of India, other drivers, such as labor issues and the availability and quality of groundwater for irrigation, rank higher than the direct effects of climate change as factors influencing food security [7]. Because of the multiple socio-economic and biophysical factors affecting food systems and hence food security, the capacity to adapt food systems to reduce their vulnerability to climate change is not uniform. Improved systems of food production, food distribution, and economic access may all contribute to food systems adapted to cope with climate change, but in adopting such changes it will be important to ensure that they contribute to sustainability.

While there has been considerable progress in understanding the sensitivities of crop yield to climate change, assessments of climate change effects on food security remain rather limited [2]. Food security is concerned not only with food availability but also with access to and utilization of, food so that studies, which focus only on crop production provide only a partial assessment of food security-climate change relationships. This is of particular concern as many of the policy-based issues that are relevant to the international and sustainable development communities are posed in the context of food security prospects [2]. Engagement of these policy communities requires a much broader and comprehensive research framework.

There are several definitions of what constitutes food systems each formulated in relation to a specific range of issues (e.g. globalization of the agri-food system). Food systems, then, involve much broader considerations than productivity and production alone. They underpin food security, which is the state achieved when food systems operate such that 'all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy.

Not all food systems or parts of food systems are equally vulnerable to environmental changes because the capacity to cope with existing variability in biophysical and socio-economic systems, and the ability of humans to perceive environmental changes and to adapt food systems, differs [8]. Food insecurity is experienced at a range of spatial scales from individual households to regions, as well as a range of time-scales, and reductions of vulnerability at one scale do not automatically flow to the next scale. For example, regional policy decisions do not always convert to successful local implementation especially if distribution services are inadequate, or food preferences are ignored. The vulnerability of food systems is not determined by the nature and magnitude of environmental stress per se, but by the combination of the societal capacity to cope with, and/or recover from environmental change, coupled with the degree of exposure to stress.

Initial research in the Indo-Gangetic Plain (IGP) has used this more integrated approach to help define the vulnerability of the region's food systems [4]. It has demonstrated that the conditions underpinning vulnerability are not uniform throughout the region. In the western IGP (a region of general surplus production), food systems are most vulnerable to issues related to the availability of water; excessive irrigation has led to rising water tables and soil salinization in some areas while in others water shortage has resulted in falling water tables, rapidly increasing costs of pumping and shortage of drinking water [9]. In the eastern IGP, resource-poor farmers, who have very limited options to cope with and recover from external stresses, are most vulnerable to environmental changes such as rising sea-level, and climate change and climate variability leading to increased risk of flooding [9]. Overall, this analysis suggests that food insecurity concerns cannot be effectively addressed by a single region-wide policy.

2. IMPACT OF CLIMATE CHANGE ON AGRICULTURAL OUTPUT

Estimating the impact of temperature and climate on agriculture has become an increasing focus of economic research. Many of the concerns relate to developing countries because climate impacts seem to be either present only or disproportionately, in hotter and less rich parts of the world. This chapter uses data at the district level—on temperature, weather, and crop production, yields, and prices—to answer a number of important questions.⁷ The analysis is conducted for the cropping seasons of Kharif and rabi separately. The present analysis yields two key findings. The first—and one with significant implications in the context of looming

climate changes—is that the impact of temperature and rainfall is highly non-linear and felt almost only when temperature increases and rainfall shortfalls are extreme [4]. The second is that these extreme shocks have highly divergent effects between unirrigated and irrigated areas (and consequently between crops that are dependent on rainfall), almost twice as high in the former compared with the latter [4]. The analysis in this chapter suggests that in the Indian context, such marginal changes in weather have little or no impact and that the adverse effects of weather are concentrated in the extremes. These findings have important implications for the impact of climate change on agriculture (discussed later in this chapter) since most climate change models predict an increase in extreme weather events.

A next finding relates to the varied susceptibility of different crops to temperature and precipitation. The clear pattern that emerges is that crops are grown in rainfed areas—pulses in both Kharif and rabi—are vulnerable to weather shocks while the cereals—both rice and wheat—are relatively more immune.

Have the impacts changed over time? To answer this question, the analysis was redone by decade. In the last decade for which data is available (2004-2014) [4], the impact of rainfall shocks in yields remains unchanged, but the effect of temperature shock increases threefold (relative to the first decade). However, since there is no secular trend in this impact, it cannot be ascertained whether the findings for the last decade are a one-off or the start of a new long-run trend with dramatically adverse consequences for Indian agriculture.

3. NATIONAL FOOD SECURITY ACT, 2013

The NFSA, 2013 is a landmark legislation as it provides the essential ingredients for the enjoyment of the right of life (Article 21 of the Constitution) as interpreted by the Supreme Court. The new legislation was enacted after a lot of pressure exerted by a massive campaign for the right to food launched by civil society and overcoming resistance from the neoliberal economists, corporates, and media. Its main features included: the extension of coverage of TPDS to 67 per cent of the population (75 per cent in rural and 50 per cent in urban areas); abolition of the earlier distinction between BPL and above poverty line (APL) categories of households in entitlement to subsidised food grains; universal maternal entitlements to free meals during pregnancy and six months after childbirth and cash maternity benefit of ₹ 6,000; the supply of a hot cooked meal to children in the age group 6 months–14 years, conforming to the prescribed nutritional standards; institutional arrangements for transparency and accountability; reforms in the public distribution system (PDS); assurance for measures to revitalise agriculture; decentralised procurement and storage of food grains; access to drinking water, sanitation and health care; and pension for senior citizens.

NFSA, despite its life cycle approach, fails to comprehensively address all aspects of nutritional and food security of citizens [3]. While some of the factors contributing to progressive realisation of food security, such as, ensuring adequate food production, promoting small and marginal farming, decentralised procurement and access to health, drinking water and sanitation, have been proposed to be undertaken under Schedule III of the Act, ensuring nutritional security by provision of pulses and edible oil, universal coverage, adequate entitlement to food grains as per calorific requirements, protection from commercial interests in the food market and provisioning, entitlements for homeless, destitute and disabled persons do not find a place in the Act despite pressures and demands from civil society [3]. The implementation of law also faces several constraints. These include: an inadequate resource capacity of some states; dismal performance in respect of several right-based welfare legislation enacted earlier due to the lack of adequate political commitment and absence of bureaucratic accountability; apprehension of entitlements getting diluted and coverage reduced as a result of pressures to reduce fiscal deficit; and food grains entitlement being replaced with cash transfer [10]. The NFSA, 2013 lays down entitlements for various categories of beneficiaries, such as priority households, households covered under the AAY, women, and children. It also lays down norms of coverage under rural and urban areas separately. Within this norm of coverage, the duty is cast on the state governments to identify households to be covered under them.

4. SHORTCOMINGS OF THE ACT IN MITIGATING CLIMATE CHANGE EFFECTS

The government should specify measures it proposes to take to conserve and rejuvenate ecological resources—soil, seeds, biodiversity, water systems, and forest—to ensure sustainable food security [11]. Taking into account the increasing climate change-related threats to agriculture, which are bound to affect food security in the long run, the government should also specify measures it proposes to take for climate-resilient food production system. Agricultural research and development (R&D) in the country should be reoriented towards supporting local crops and breeds that are climate resilient. For this purpose, decentralized seed production, specific to the agro-ecological unit, should be taken up by involving local farmers for 468 Social Change 45(3) addressing the crisis of seed availability, promoting farmers' autonomy, ensuring quality and containing cost in the production of local food grains [3].

The seeds of main crops should be stocked with a network of community-level seed banks. The National Food Security Mission of the Government of India should not be allowed to become a conduit for hybrid seeds of multinational seed corporations and their local partners. On the contrary, local, climate adaptive, farmer-developed seeds should be encouraged to revitalize agriculture (as also mandated in Section 31 and Schedule III of the NFSA, 2013). Agriculture research should focus on knowledge-intensive rather than input-intensive approach for improving the viability of farming and enabling farmers to adapt to vulnerabilities resulting from climate change. The research agenda should prioritize semi-arid and rain-fed areas which constitute 60 percent of our cultivated area for developing a production model which is low cost, free from dependence on external inputs, environmentally sustainable and protects farmers against climate-related yield losses.

For expeditious enforcement of PDS reforms, doorstep delivery must be prioritized at the earliest since 80 percent of leakages take place before reaching fair price shops, and end-to-end computerization must be speeded up for this purpose [10]. User-friendly 'Unique Identification System' should be developed for eligible households to access their entitlements.

Adequate information dissemination should be undertaken to ensure that there are no difficulties in receiving the entitled food items. There should be a proactive display of information and records as well as the dispensation of entitlements at public gatherings such as local 'has', besides the panchayat office and the gram sabha meeting place, as is in practice in Odisha [3].

Government should vigorously pursue the objective of local production, local procurement, and local distribution. This will help reduce the subsidy bill on food security that is required every year and thereby reduce fiscal deficit. This would require careful area-wise planning, with the participation of experts and local farmers, for which detailed guidelines may be issued.

With respect to the PDS reforms, decentralized initiatives should be encouraged which states can implement by putting in additional resources of their own if required. Such initiatives in the past have contributed to the revival of PDS in recent years, such as reduction in PDS price, expanded coverage, and the introduction of pulses and edible oil in the food basket entitlements. States have also used unique methods for ensuring transparency and prevention of leakages.

5. CONCLUSION AND SUGGESTION

A key finding—and one with significant implications as climate change looms—is that the impact of temperature and rainfall is felt only in the extreme; that is, when temperatures are much higher, rainfall significantly lower, and the number of “dry days” greater, than normal. A second key finding is that these impacts are significantly more adverse in unirrigated areas (and hence rainfed crops such as pulses) compared to irrigated areas (and hence crops such as cereals).

The policy implications are stark. India needs to spread irrigation – and do so against a backdrop of rising water scarcity and depleting groundwater resources. The Indo-Gangetic plain, and parts of Gujarat and Madhya Pradesh are well irrigated. But parts of Karnataka, Maharashtra, Madhya Pradesh, Rajasthan, Chattisgarh, and Jharkhand are still extremely vulnerable to climate change on account of not being well irrigated. Fully irrigating Indian agriculture, that too against the backdrop of water scarcity and limited efficiency in existing irrigation schemes will be a defining challenge for the future. Technologies of drip irrigation, sprinklers, and water management—captured in the “more crop for every drop” campaign—may well hold the key to future Indian agriculture.

Another conclusion is the need to embrace agricultural science and technology with renewed ardor. Swaminathan (2010) urged that anticipatory research is undertaken to pre-empt the adverse impact of a rise in mean temperature. Agricultural research will be vital in increasing yields but also in increasing reliance to all the pathologies that climate change threatens to bring in its wake: extreme heat and precipitation, pests, and crop disease. The analysis shows that research will be especially important for crops such as pulses and soybean that are most vulnerable to weather and climate. Of course, climate change will increase farmer uncertainty, necessitating effective insurance. Building on the current crop insurance program needs to be used to determine losses and compensate farmers within weeks. The cooperative federalism “technology” of the GST Council that brings together the Center and States could be promisingly deployed to further agricultural reforms and durably raise farmers' incomes.

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