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Tackling regional climate change and food security issues: An introduction

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CHAPTER 1

Tackling Regional Climate Change and Food Security Issues: An Introduction

The world population now stands at 7.8 billion and one in seven of these people is hungry. By 2050, the population is expected to reach 9.9 billion (IISD 2020; WFP 2011). What does that mean for food security and hunger? The number of hungry people in the world remains unacceptably high with over one billion people reported to be chronically undernourished. This situation is further exacerbated by the global COVID-19 pandemic that accentuated the plight of the underprivileged. Most of these people are ironically found in Asia (FAO et al. 2019; FAO 2012). From the regional impacts of the 2008 food crisis, it is clear that one central challenge for the Asia-Pacific region is how to "make progress in guaranteeing food security in a context where the production of food will be increasingly stressed in the face of decreasing resources pitched against continually expanding demand" (Mukherjee 2009: 1). The growing impacts of climate change have exacerbated this challenge even further (Economist Intelligence Unit 2014).

Despite Asia's unprecedented economic growth and advances in science and technology, there has been an increase in poverty and stagnation in average crop yields. The problem of food security remains a major challenge because of destabilizing factors such as competition for land, rural–urban migration, rapid urbanization, population growth, climate change, and the increasing shortages of energy and water. Currently, the

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region is home to two-thirds of the world's poor, with 947 million living on less than US$ 1.25 per day (Teng 2010: 6). To feed the growing population, the region may need to raise productivity by 70% by 2050. However, the attempt to increase food production has become a major food security challenge, which is now compounded by climate change. Similar to food security, climate change is a multidimensional issue. Therefore, the impacts of climate change on the four dimensions of food security, namely, availability, physical and economic access, and utilization, are complex as these impacts are also linked to other factors influencing the changing climate (*Public Forum* 2010; Rayfuse and Weisfelt 2012; Islam and Kieu 2020).

On the historical impacts of climate change on food production, scientific findings have shown that rising temperatures increasingly affect crops. It is projected that, based on a scenario of an increase of 2 degrees Celsius, without taking into account changes in rainfall patterns, production of major crops would decline. Climate change produces several challenges. First, there will be regional changes in available water and in rainfall patterns, causing changes in land productivity due to the reduced availability of both surface water and groundwater for irrigation in some regions as well as increased competition and demand. Second, the competition for land will intensify due to biofuel production and products for livestock. Third, elevated carbon dioxide (CO2) levels will have interactive impacts on temperature, rainfall, pollution, pests, diseases, and weeds especially for non-key cereal grains and for developing nations. Fourth, there is a lack of knowledge on available adaptation options, modes of resilience, and their costs and benefits. Although climate change is happening faster than anticipated, adaptation policies still lack clear directions. The incorporation of basic knowledge and science into adaptation measures for food production, which would likely provide a great return on investment, is still nascent. Finally, lack of regional and global initiatives to face these challenges will likely to generate "tragedy of the commons" (*Public Forum* 2010; Pearson 2012; Vyas 2005; Rayfuse and Weisfelt 2012; Tookey 2007). These compelling scenarios have given rise to a number of pressing questions: How can we address the complex issue of food security which is complicated by other issues such as climate change? Is solution lies in science and technological developments such as biotechnological (or gene) revolution as well as supply chain management? More production with fewer resources? More effective distributive mechanisms? How are individual countries addressing this

pressing problem? What is regional cooperation doing in addressing this issue? Are country-specific initiatives enough while the problem is global in nature? These questions need a very thorough and robust investigation.

In the last one century, dietary patterns of the world shifted from traditional food to wheat-based diet (driven largely by the green revolution and American Public Law 480) to animal protein and other high-value foods such as meat, fruits, and vegetables (driven by biotechnology, retail power, and supermarket revolution) to different exotic foods (shark fins, wheal meat, etc.) for wealthy buyers (Islam 2013; McMichael 2008). Despite these food revolutions, food security remains a critical issue for many. While scholars have argued that an increase in food production to meet future demand is inevitable, we argue that in order to accelerate hunger reduction, economic growth needs to be accompanied by purposeful and decisive public action as well as participation of the poor in the growth process while reaping its benefits. Climate change is exacerbating a trajectory of widening inequality if the poor are unable to contribute and partake meaningfully in the process of policy formulation and implementation. Increased productivity is perhaps a part of the solution, but the real solution lies in "global food justice" (that includes creating access to food, finding alternative sources of food such as in oceans, changing food habits away from exotic to more environmentally friendly ones, global food bank for the impoverished ones, and global food governance). Regional initiatives can play vital roles.

Objectives and Central Themes

This interdisciplinary monograph has two initial related objectives. The first objective is to assess the regional initiatives on addressing climate change and food security issues. We have examined current cooperative mechanisms and modalities on tackling climate change and food security in order to identify best practices as well as gaps in those arrangements and to evaluate their likely impact on the future of food security in the Asia-Pacific region. We have focused on three important regions: the South Asian Association for Regional Cooperation (SAARC), the Association of Southeast Asian Nations (ASEAN), and the Pacific Island Forum (PIF). The second objective is to assess the current state of and the future prospects for mitigations and resilience with regard to climate change and food security issues of the Asia-Pacific region vis-à-vis other regions of the world. For this objective, we have tried to promote intellectual exchange

on the climate change dynamics, security dimensions of food scarcity and adaptation mechanisms, as well as to deepen mutual understanding of the complexities of effective governance arrangements for food security. We have assessed the impacts of the climate change such as drought, loss of biodiversity, disaster vulnerabilities, new weather patterns, climate refugees, new diseases, etc. and their impacts on food productivity, food distribution, and food safety. Then we have also investigated whether climate change (increased temperature) can enhance food production, for example, in the colder regions of the world. While our focus remains on the Asia-Pacific region in the current stage, it has a wider implication for making a global analysis on the critical nexus of climate change and food security.

There are three inter-related central themes emanated out of our study: First, as the discourse of climate change is becoming powerful and its effects are becoming clearer, it generates a new kind of "resource war" that defines our future with an apparent polarizing trajectory: The "climate change haves" get more business opportunities, access to resources, and morally upstanding green products and services; the "climate change have-nots," on the other hand, languish in the smoke, fumes, toxic chemicals, and illnesses of the old pollution-based economy. This polarizing trajectory is becoming evident within a country and between countries. "Climate change is widening the world's gap between the haves and have-nots, worsening economic inequality between rich and poor countries…The difference between the economic output of the world's cool wealthy nations and hot struggling nations is 25% larger today than it would have been without global warming" (Krieger 2019). Second, climate change pushes for the national and regional actors to take numerous initiatives on, for example, food security. As these initiatives are largely driven not by a genuine intention to protect the environment, ensure food security, and address the need of the poor, but by protecting a "green image" and finding economic opportunities alone, the success is very little. While there are prospects for regional cooperation and opportunities, competing interests on power and resources further fragment the region. Third, economic growth is necessary but not sufficient to tackle climate change as well as to accelerate reduction of hunger and malnutrition unless it is accompanied by robust public policies and meaningful participations of the poor. Food security can be sufficiently solved by higher income and trade, with distribution/equality improvements. Since neoliberal logics (profits and power) largely dictate over social and

environmental logics (equity and sustainability), the levels of consumption remain unsustainable, inequitable, and inaccessible to majority of humans in the Asia-Pacific region.

There are currently few relevant studies that focus on regional governance arrangement for food security in the context of climate change. The significance of the project lies in its relevance for policymakers and other communities of practice. While this is clearly an important issue for countries in the regions, it is only now that governments are beginning to realize the risks and threats posed by climate change and food insecurity. This project explores and examines the imminent threats of climate change and food insecurity from local, regional, and global contexts and therefore has profound policy implications for academic institutions, governments, corporations, and NGOs.

Conceptual Threads

The project has been framed by three conceptual threads—climate change, food security, and resilience. *Climate change* means a significant change in the measures of climate, such as temperature, rainfall, or wind, lasting for an extended period—decades or longer—resulting in increased air and ocean temperatures, drought, melting ice and snow, rising sea levels, increased rainfall, flooding and other influences (EPA 2013). Climate change is real, and human beings are responsible for a substantial part of it. It is putting our planet into peril, resulting in, among other far-reaching impacts, the loss of biodiversity, disaster vulnerabilities, and millions of climate refugees (Islam 2013; Islam and Kieu 2020). Currently, there are over 20 million climate refugees, and this number will increase to 50 million within the next few decades (McMichael 2008). The world was expecting a conclusive and successful climate deal to be sealed during the Copenhagen talks in December 2009. However, a lack of consensus over issues including the character of differentiated responsibilities, financial support, technology transfer, trade subsidies, and trade sanctions hindered the progress of a successful deal (Islam 2013). The World Food Program (WFP 2011) released an alarming report on seven facts about climate change and hunger a decade earlier:

- Climate change is expected to add another 10–20% to the total number of hungry people by the year 2050.

- By 2050, we can expect twenty-four million more malnourished children as a result of climate change. Almost half of this increase, ten million children, will be in Sub-Saharan Africa.
- Between 1980 and 2006, the number of climate-related disasters quadrupled.
- The number of people affected by climate-related disasters is expected to reach 375 million per year by 2015.
- In 2010, climate-related extreme events and disasters affected some 300 million people, most often in countries that have little capacity to cope.
- With climate change, two-thirds of the arable land in Africa could be lost by 2025, according to the UN Food and Agriculture Organization.
- By 2030, climate change could push food prices up 50–90% more than they would otherwise be expected to rise, according to a recent report by Oxfam.

The world's poor, women and children in particular, will bear the brunt of the effects of climate change. As rainfall becomes increasingly unpredictable, smallholder farmers will find it harder than ever to grow the food they need. The poor, who have no support structures to protect themselves, will most likely suffer from the severe hunger resulting from a potential increase in the frequency of natural disasters. More often than not, the people who suffer first and worst during climate disasters are not the main contributors to the problem. An analysis of 4040 climate-related disasters between 1980 and 2002 found that some poor nations had mortality and homelessness rates from climate disasters that were 200–300 times worse than in the United States (Roberts and Parks 2007). They have far less capacity to deal with and to recover from disasters. As the economy grows, and wealth increasingly concentrates from few to fewer hands, the woes of these marginalized masses are also constantly piling up (Islam 2013).

The World Food Summit of 1996 defined *food security* as existing "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life" (Quoted in WHO 2013). Commonly, the concept of food security is defined as physical and economic access to food that meets people's dietary needs as well as their food preferences. Due to pressures from the global food supply chain, there is an inter-relationship between food supply and demand at

the regional and global levels. Food security can be considered from the perspective of the individual, the family unit (households), the community (country), and the region as well.

Our conceptualization of "food security" includes the essential components such as *acceptability* (access to culturally acceptable food, which is produced and obtained in ways that do not compromise people's dignity, self-respect, or human rights), *availability* (providing a sufficient supply of food for all people at all times), *accessibility* (the equality of access to food), *adequacy* (adequate measures are in place at all levels of the food system to guarantee the sustainability of production, distribution, consumption, and waste management), and *agency* (Koc et al. 1999). Drawing on this conceptualization, along with transitory and chronic threats related to, for example, climate change, we will locate and examine four-dimensional threats related to food security:

a. Food availability: This involves issues of production, imports, and stockpiles;
b. Physical access to food: This involves access to markets and infrastructure;
c. Economic access to food: This involves issues such as employment, overseas remittances, foreign direct investment and trade; and
d. Food utilization: This involves issues of health and nutrition, sanitation or hygiene, storage and processing facilities as well as clean water.

The concept of *resilience* has its origins in the field of ecology (e.g., Hollings 1973) and in the works of early sociologists. In the past resilience as a general concept was understood as "how altered ecological conditions shaped changes in the organization of social groups and societies" (Smith et al. 2012: 381), it is now understood quite broadly such as community and urban resilience. Urban resilience generally refers to "the ability of a city or urban system to withstand a wide array of shocks and stresses" (Leichenko 2011: 164). With increasing threats posed by, for example, climate change and food insecurity, the term "resilience" is increasingly employed across various academic disciplines and policy debates. However, understanding resilience as the ability to withstand shocks and stresses may stagnate a nation's development and progress. "While a system ought to have a decent degree of robustness

to withstand shocks, modernity is characterized by constant change; societies need to possess the ability to constantly transform itself in face of such changes. A focus on 'bouncing back' and building robustness into a system may unwittingly promote stagnation and stubborn resistance to change" (Islam and RiAn 2014: 207). Sovacool et al. (2012: 113) outlined three dimensions of urban resilience, formulated as adaptations to climate change:

a. *Infrastructural adaptation* refers to the assets, technologies, or "hardware" in place that could be disrupted by climate change, such as irrigation systems, roads, or electricity networks.
b. *Organizational adaptation* refers to the endurance of an institution or set of institutions, usually government ministries or departments, in charge of planning and policy.
c. *Social adaptation* refers to the cohesion of communities and the livelihoods of the people that compose them."

Approach and Methods

Climate change and food security issues are multi-faceted and transcend national boundaries. Regional organizations are therefore optimally positioned to address climate change and food security issues, while actively engaging global partners to slow down or reverse current trajectories (Islam and Kieu 2020; Beddington et al. 2012). We have therefore taken "regional initiatives" as an approach for our study to understanding the intra-regional environmental and social politics at the regional level as opposed to relying merely on anthropocentric activities affecting the natural environment. Because of the global nature of climate change and global food chains, we posit that regional organizations are key to effectively addressing current and future impacts. We can discern five main reasons why regional initiatives framework to address food security are vital (Table 1.1).

Regional initiatives to deal with critical issues like food insecurity and climate change are of paramount need for climate-related information exchange (Glantz 1994). They also provide wider scale arrangements that can be called on in periods of crisis, while purely local systems can be too shaky and vulnerable to disruptions from natural disasters and other crises (Wahlqvist et al. 2012). The global food crisis in 2007–08 taught us

Table 1.1 Critical functions of regional organizations

	Role of regional organizations	*Critical functions*
1.	Market regulation	Regional initiatives can regulate regional markets effectively by implementing controls over volatile global food markets. Such controls will ensure the stability and dependability of imports and exports of vital food resources.
2.	Internal supply chain	Regional initiatives can enhance food security internally by supplying essential food resources that are relevant to regional needs. Internal supply chains can act as a buffer from price volatility and the monopoly of major multinational corporations over global food supply and the commodity market.
3.	Cooperation and good governance	It is vital to encourage cooperation between stakeholders and ensure good security sector governance. Cooperation means that decision-making is objective and responsive to public needs and demands and provides a multi-level concept of security while promoting the transfer and sharing of knowledge.
4.	Need-based food production	It is necessary to increase food security by directing and managing food production in line with food consumption patterns, which could account for regional socio-economic shifts that are not bounded within nations. National development agendas that focus on industrialism otherwise lead to declining investments in agriculture, thus making nations reliant on food imports and subject to market fluctuations and possible shortfalls
5.	Protecting the marginal communities	Regional initiatives are vital to ensure food security for marginalized communities, which are often minorities that have been displaced and persecuted by their own governments. Hence, regional involvement could provide the necessary blanket of security for marginalized populations facing internal persecution

Source Islam and Kieu (2020); Islam and De Jesus (2012) [no copyright issue]

that the reliance on the state or market mechanism alone is not sufficient to ensure regional food security at the time of crisis. National or state-centric approaches are sometimes important in stabilizing domestic food prices and in providing effective protection for some domestic consumers, producers, as well as the vulnerable segment of the population such as rural landless laborers, small-scale farmers, and the urban poor who suffer most from food insecurity, hunger, and malnutrition. However, the state-centric approaches to food security can benefit some countries to the detriment of others in the region. Regional cooperation is therefore vital and it plays a pivotal role in reassuring member states about food availability during crises and in discouraging them from pursuing detrimental trade restrictions and panicked hoarding. Trade facilitation and sharing information about food production and national reserves and various other cooperative measures during a crisis can enhance transparency, counter mistrust, and assist in stabilizing regional food markets (Belesky 2014).

Along with local as well as international reserves, regional food reserves can play an important role in alleviating food insecurity in times of crisis and emergency situations. Historically, stockpiling of agricultural commodities—particularly staple grains—has played an important role as a buffer to address the likely adverse impact of natural disasters, calamities, seasonal discrepancies, and market turbulences. Regional food reserves can also function as a safeguard mechanism to tackle after-effects of major production failures due to, for example, climate change, and global and local price upsurge and trade restrictions (Rahman et al. 2018).

With respect to the climate change issue, at least three features of regional organizations make them important: (a) their political influence, deriving from the consensus of several governments, acting in common self-interest, and often in non-traditional groupings based on shared impacts of climate change; (b) their ability to mobilize financial resources; and (c) their relatively narrow focus compared to global organizations (Glantz 1994). In an era of climate change with increasing frequencies and intensities of disasters, multilateral cooperation and maintaining a substantive regional food reserve is an increasingly important aspect of a regional strategy as well as a policy framework for ensuring regional food security. Since disasters and calamities induced and driven largely by climate change often transcend national boundaries, an effective response

needs to be multilateral, relying on regional cooperation between countries that share the common geography, history, cultures, and increasingly interconnected economies (Belesky 2014).

For a robust and exhaustive investigation on the regional initiatives as well as mitigations and resilience with regard to climate change and food security issues in the Asia-Pacific region vis-à-vis other regions of the world, we employ a triangulation of methods: multi-sited ethnography, archival study, institutional collaboration, and professional workshop. While both multi-sited ethnography and archival study provided the bulk of data and information needed to address both objectives of this research, two additional approaches—institutional collaboration, and a professional workshop were used in the later stage in order to (a) promote intellectual exchange on the climate change dynamics, security dimensions of food scarcity, and adaptation mechanisms, (b) enhance mutual understanding of the complexities of effective governance arrangements for food security, and (c) make a final consistency check on the collected data.

Multi-sited Ethnography is the primary method used in this study that enables the researcher to grasp a holistic view of the world system (Marcus 1995). A multi-sited ethnography was useful for the study because the case is situated at the global level that requires multiple observations at different locations. To achieve the objectives of our study, we conducted a detailed research in the three countries: Australia, Singapore, and Bangladesh. We have chosen these three countries to represent the three regions of the Asia-Pacific region, namely the Pacific Island Forum (PIF), the Association of Southeast Asian Nations (ASEAN), and the South Asian Association for Regional Cooperation (SAARC). While we recognize the dynamics in these three regions of the Asia-Pacific, we were assertive in delving into both country-specific as well as regional initiatives on addressing climate change and food security challenges. To make a comparative study between the Asia-Pacific and other regions including the North America, we also made a field-visit in Canada, a country known for its various green initiatives in addressing the challenges of food security and global climate change.

The objective of doing fieldwork across different places and different contexts was to capture narratives, discourses, and knowledge circulated among food security and climate change experts and to analyze how these narratives, discourses, and knowledge potentially shift toward and translate into regional initiatives and adaptation mechanisms. During

fieldwork, we collected first-hand data in three forms, namely (a) verbal accounts, (b) technical documents and archives, (c) images and videos. The fieldwork involved conducting in-depth interviews with scholars and policymakers, and attending academic seminars or meetings. Interview questions and the seminars aimed to get data and information that can be used to address both objectives of this research. Four categories of sites were visited during fieldwork: universities, research institutions/think-tanks, NGOs, and governmental offices. This multi-sited ethnography was employed to map out a broader picture dealing with, for example, food availability (issues of production, imports, and stockpiles), physical access to food (access to markets and infrastructure), economic access to food (issues such as employment, overseas remittances, foreign direct investment and trade), and food utilization (issues of health and nutrition, sanitation or hygiene, storage and processing facilities as well as clean water).

The goal of *archival study* was to collect data and information from printed sources such as government policy documents, technical papers, journal articles, meeting minutes, working papers, brochures, and notes. Thus, we visited libraries and public offices where related archives are placed. These materials were retrieved and catalogued. To complement the regional and country-specific data, we also drew on data collected through the information available on websites maintained by research organizations, industry and business organizations, food and climate change related institutions, NGOs, FAO, WHO, and other government agencies to map out climate change trajectories and their impacts on food security and sustainability initiatives. Difficulties emerged from the circumstances in which the sources of data were inaccessible due to sensitivity of the subject explored. It was caused in part by secrecy that generally shrouds security and vulnerability issues in which not all information related to disaster, risk, and scientific progress in food security and resilience are disclosed to the public. *Institutional collaboration* (with MIT's Abdul Latif Jameel Water and Food Systems Lab, University of Canberra, University of Nottingham Malaysia Campus, to name a few) and various *professional workshops* within and beyond Singapore were used to cope with these potential impediments.

Taken as a whole, methodological techniques used in this study are quite robust to understand the comprehensive dynamics of the Asia-Pacific region. The response and resilience focusing on the overall efficacy

of regional initiatives for climate change and food security have been analyzed through five major factors: planning, implementation, cooperation, legal obligation, and international contribution.

The Prospectus

With this opening context and background, Chapter 2 unpacks further the complex relationship between climate change and food (in)security, focusing on how climate change is affecting food security and how the current food system exacerbates the problem of climate change. Chapters 3–5 then cover ASEAN, SAARC and PIF, respectively, providing background and history of the regions and their member states, examining the impacts of climate change and food security on the respective region and analyzing the regional initiatives and their effectiveness to mitigate regional risks of food security considering climate change impacts.

Within the Asia-Pacific region, China and India's economic development in recent decades brought both countries to the forefront as the two largest emitters today, facing threats from ecological degradation, food and water scarcity due to agricultural shifts from the impacts of climate change. Chapter 6 examines Chindia's (China and India) dilemma by looking at the challenges both countries face, examining economic developments thus far, the impacts of climate change on food security and the approaches both countries undertake to address the associated problems. Taking the cases of two Asian Tigers, Singapore and Hong Kong, Chapter 7 offers an understanding of how vulnerable highly dependent food-importing cities can survive in an increasingly urbanized, capitalistic, and environmentally eroding world. The chapter explains why and how cities in the world are vulnerable to food security despite economic prosperity, and examines broader responses to battle food insecurity for its growing inhabitants. Chapter 8 then returns to the cases of India and China again in their involvements in local and global land and water grabs.

Chapter 9 examines the food movements in Asia. Food security extends beyond the provision of relief from economic woes and environmental disasters, but rather, it should be designed in ways that enable the disadvantaged sections of the population to break out of a vicious cycle of poverty and insecurity. As such, food security echoes the need for sustainable and actionable ways where people from all walks of life have the means and ability to ensure both equitable and sustainable production and

consumption of food—food justice and food sovereignty. This chapter highlights the importance of food sovereignty and food justice, and examines both top-down and bottom-up organized green movements within Asia, as well as the impact of green movements on food security. The closing chapter (Chapter 10) concludes the book by summarizing the findings, showing patterns and pitfalls across the regions, and pathways for a sustainable food system in Asia-Pacific.

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