

NTS ISSUES BRIEF

Impact of climate change on ASEAN food security: Downscaling analysis and response

Abstract: This NTS Issues Brief is based on the proceedings of the Expert Group Meeting on the Impact of Climate Change on ASEAN Food Security held in June 2013. The Meeting called for higher priority to be given to research on climate shifts at national and local scales, as well as greater focus on agricultural research and development (R&D). It also highlighted the need for resource and knowledge inputs from actors throughout food value chains in the region.

Introduction

Climate change is one of the most pressing issues affecting ASEAN food security. The Intergovernmental Panel on Climate Change (IPCC) projects that temperatures will rise between 1.5 to 3 degrees Celsius by 2100 given foreseeable levels of greenhouse gas (GHG) emissions.

Higher temperatures have significant ramifications for food production, through: (1) continuous impacts – such as changes in yield due to temperature increase, shifting season lengths, and increased salinity in coastal areas; (2) discontinuous impacts – such as increases in harvest failure due to extreme weather- and climate-related events, pests and disease outbreaks; and (3) permanent impacts – such as the permanent loss of land due to inundation as a result of sea level rise.

Existing studies highlight several ways in which such impacts might affect Southeast Asia. As a result of higher temperatures, the region will likely experience more extreme and intense heat and rainfall events. It is also projected that sea level will rise at accelerating rates compared to past decades, resulting in increasing inundation of agricultural land. Impacts of climate change such as ocean acidification and warming water temperatures are already affecting fish catches in coral and pelagic areas and threatening the livelihood of fishing communities. These impacts are set to become more pronounced.

On land, climatic changes are having a myriad of second- and third-order effects on agriculture such as making rainfall patterns and dry periods less predictable and affecting rivers fed by upstream ice and snowmelt. More directly, simple increases in temperatures can affect the germination and gestation processes of key crops, and potentially undermine the food production growth levels that the region requires.

Addressing these climate change effects on food production will require concerted, informed attention from various stakeholders. To this end, the Expert Working Group Meeting on the Impact of Climate

Change in ASEAN Food Security brought together leading experts in the region on climate change, agriculture and food security, from the private sector, non-governmental organisations (NGOs), academe and think tanks. This Meeting was jointly organised by the Centre for Non-Traditional Security (NTS) Studies at the S. Rajaratnam School of International Studies (RSIS) and the Economic Research Institute for ASEAN and East Asia (ERIA).

The Meeting fostered targeted dialogue on climate change challenges to regional food systems, and yielded the following policy pointers:

- **There is a need for existing global climate scenarios and projections to be further downscaled to national and local levels.**

Studies on the changes in surface temperature and weather patterns in Southeast Asia reveal significant variations in different areas. For instance, increases in La Niña rainfall have been seen in countries such as Lao PDR, Cambodia, Indonesia and the Philippines, whereas other parts of the region have experienced instances of rainfall declines.

A climate analysis of Vietnam shows that the repercussions of climate change on food production are already evident, and are occurring in different ways throughout the country. Changes in temperature and rainfall patterns have led to increased frequency of extreme weather and occurrence of soil erosion in some areas. For example, the cold spell that occurred from December 2007 to January 2008 destroyed at least 80,000 hectares of rice and vegetables. Such changes threaten Vietnam's status as one of the leading producers and exporters of agricultural commodities.

The variation in the climate impacts in the region suggests the need to scale efforts down to national and local levels in order to better understand their effects on key producing areas and specific crops. However, currently, leading climate change projections largely concern global, regional or otherwise systems-

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level scales. Regional actors will thus need to build their capacities to understand local climate conditions and their potential impacts. In this regard, existing climate change projections and models can serve as the foundation for increased collaboration between various actors in research and development (R&D) and for more effective information exchanges – both of which have room for significant improvement. Joint projects spearheaded by leading research institutions in the region, more robust interactions between state and local governments and the attraction of resources from beyond the region can all help bolster Southeast Asia's climate change preparedness and response capacities.

As such efforts progress, existing projections and models can be used as a starting point for integrating mitigation and adaptation strategies into food systems planning. Local communities and smallholders in particular must be brought into these processes, both to share their experiences on the changing climate and to help drive appropriate response measures.

- **Cooperation and collaboration between the public and private sector can spur climate-smart strategies for key sectors of the regional food system.**

The effects of climate change are already evident in key sectors of the regional food system, in particular the region's marine ecosystems and its rice and vegetable production systems. These effects threaten the livelihoods of agricultural producers while raising the spectre of caloric deficits and malnutrition among populations.

The degradation of marine ecosystems and phenomena such as coral bleaching, thus far a result of modest water temperature increases over short durations, have affected fish stocks and catch. These events will likely become more pronounced with rising temperatures. Moreover, sea level rise has led to saltwater intrusion and erosion in coastal zones. This has made conditions for fisheries less predictable, and has disproportionately impacted small-scale operators.

Temperature increases and higher frequency of natural disasters have also adversely affected rice production. Specifically, heat stresses impact gestation periods and can cause pollen sterility that results in lower yields. Similarly, vegetable production has been affected by higher temperatures, changing precipitation patterns and saltwater intrusion in the region. As with marine ecosystem changes, such crop impacts can disrupt local and national economies, stress the social fabric of communities and in acute cases create impediments to food access.

The threats posed by climate change to various sectors of the ASEAN food supply system could motivate collaboration by stakeholders along different parts of the supply chain. These actors have incentives to bring their respective strengths to bear in tackling climate challenges to existing and future food systems. The private sector has the necessary resources for R&D and the development of new technologies (e.g., drought-resistant or salinity-tolerant rice strains). The public sector has a record of supporting these strategic developments, and it possesses the institutions and systems to make such technologies accessible for farmers. Like other climate change responses, local knowledge is important in the development and deployment of new technologies to ensure that they are appropriate for the unique circumstances of given locations.

The challenges relating to these collaborative processes are to (1) ensure that private-sector investments can be financially viable in the longer term; (2) provide the support and insurance systems to food-producing actors that will encourage the adoption of climate-smart methods and inputs; and (3) create robust public-private partnerships that are inclusive of multiple – and at times competing – interests and resilient to disputes where they arise.

- **The effects of climate change on food security accelerate the need to build resilient supply and value chains at regional, national and sub-national levels.**

Climate change has impacts on total food availability in the region and its respective member countries. Changes in the availability of food also have implications for world prices and the region's capacity to obtain food from the global market. The International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) by the Asian Development Bank (ADB) shows that prices of key crops increase sharply when bio-physical impacts of climate change are factored in. The model projects that, by 2050, rice prices may increase by 29–37 per cent, wheat prices by 81–102 per cent, corn prices by 58–97 per cent and soybean prices by 14–49 per cent.

If such price increases transpire, ASEAN member countries will be affected in several ways. Price increases will create direct food security concerns for import-dependent countries such as Indonesia, the Philippines and Singapore. At the same time, net exporters of food commodities such as Thailand and Vietnam may opt to impose export restrictions to bring stability to their domestic markets.

Such market volatility and price increases are far from inevitable, however, and actors throughout food value chains can help create food systems that are more robust. For example, downstream players in the

supply chain such as processors, wholesalers and retailers could play a crucial role in facilitating long-term investments to reduce the impact of climate change on food security. These groups can drive improvements in post-harvest practices and facilities to take into account changing climatic conditions, to manage perishability as well as to benefit from increased yields.

At the regional level, there is an opportunity to strengthen partnership capacities within ASEAN and use existing frameworks for evidence-based interventions. As the region moves towards enhanced economic integration, there is a need for it to recognise the link between food security and climate change, and to incorporate such understanding into concrete action plans. Similarly, national planning efforts should take into consideration regional weather-related events and potential external shocks from major trading partners. For instance, the changes in the consumption patterns of China, India and Japan could impact food markets that Southeast Asia depends on, while storms and droughts concurrently impact its regional food sources.

Building a resilient supply and value chain necessarily involves integrating the capacities and expertise of various stakeholders. The public sector is well placed to strengthen the adaptive capacity of farmers and downstream actors and provide them with the necessary information about the effects of climate change. Private sector actors could take the lead in raising awareness and understanding of climate adaptation among suppliers, producers and retailers and other key players along food value chains.

Conclusion

Climate change presents an encompassing range of food security challenges. It affects a myriad of systems and trends: from major production areas to smallholder farms; from land-use allocations to energy strategies; from habitats of fisheries to transportation infrastructure. Given its formidable scope, there is a need to develop more coherent analysis about the ways that climate is affecting – and will likely affect in the future – specific parts of Southeast Asia's food value chains. Such analysis must then be used to improve the knowledge capacities of key regional stakeholders and lead to tangible strategies for adapting to the uncertainty that climate change brings to the food sector. At present, studies and cases of best practices on adaptation and mitigation strategies exist but are often not widely known and disseminated. There is thus a need to increase awareness with regard to existing climate-smart approaches and upscale such efforts. Best practices need to be disseminated to the national and local levels, a process that can be effective only when it engages a range of stakeholders.

Current trends and future projections on the impacts of climate change imply that isolated adaptation and mitigation efforts are no longer enough to ensure food security in Southeast Asia. Instead, adaptation and mitigation strategies should be incorporated into food systems planning at multiple levels. This approach entails multisectoral involvement that will not only facilitate increased cooperation in R&D but also its application into relevant climate response policies. At the same time, the need to heighten awareness on the effects of climate change on food production calls for a bottom-up approach wherein local knowledge should be incorporated in adaptation and mitigation strategies.

Ultimately, involvement of stakeholders from the regional, national and local levels is crucial, as are interventions that foster partnerships between the public and private sector. Such collaboration is often messy, needs buy-in from multiple parties and runs counter to entrenched modes of operation. Nonetheless, there is no viable alternative to such shifts in Southeast Asia, and the ability of the region to evolve its food systems in light of climate change will be a key indicator of its future progress.

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About the RSIS Centre for Non-Traditional Security (NTS) Studies

The RSIS Centre for Non-Traditional Security (NTS) Studies, Nanyang Technological University, was inaugurated by ASEAN Secretary-General Dr Surin Pitsuwan in May 2008. The Centre maintains research in the fields of Food Security, Climate Change, Energy Security, Health Security as well as Internal and Cross-Border Conflict. It produces policy-relevant analyses aimed at furthering awareness and building capacity to address NTS issues and challenges in the Asia-Pacific region and beyond. The Centre also provides a platform for scholars and policymakers within and outside Asia to discuss and analyse NTS issues in the region.

In 2009, the Centre was chosen by the MacArthur Foundation as a lead institution for the MacArthur Asia Security Initiative, to develop policy research capacity and recommend policies on the critical security challenges facing the Asia-Pacific.

The Centre is also a founding member of and the Secretariat for the Consortium of Non-Traditional Security (NTS) Studies in Asia (NTS-Asia). More information on the Centre can be found at www.rsis.edu.sg/nts.