



Climate Change: A Roadmap for Thailand 2021-2050

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Abstract

Being vulnerable to the alteration of climate change, Thailand engages with climate change resilience and sustainable low carbon growth by organizing “The National Climate Change Master Plan (2015-2050)” to deal with these problems. To achieve the targets, the Thai Government has announced that Thailand has ratified the Paris Agreement on 21 September 2016. Joining the Paris Agreement is an important agenda to confirm the commitment of Thailand to move towards a low-carbon and climate-resilient society. By the year 2030, Thailand has a roadmap to reduce at least 25 percent of the release of greenhouse gas emissions when compared to commerce as usual scenario. Thailand intends to use more renewable and eco-friendly energy; recovery of energy by conversion of non-recyclable; promote afforestation and halting deforestation; promote the use of hybrid and electric cars. To accomplish sustainable development by 2030, Thailand will have to deal with a big challenge in engaging all key parties concerned in order to undertake effective participation of all the sections in climate action. Thailand needs a more rapid onset of action to deal with national big data and present-day statistical data which play an important role in policy planning and decision-making processes. Nevertheless, we still face several challenges such as the availability of up-to-date and high-quality disaggregated data and the complex process of evaluation at the global level. This complicated task involves the development of comprehensive, accurate, well-timed, and convenient data analysis and synthesis.

Disciplinary: Environmental Management & Sustainability, Climate Change & Global Warming.

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1 Introduction

Earth's average surface temperature has risen more quickly since the late 1970s. The driver of greenhouse gas emissions is widely recognized as the main cause of climate change and global warming. The average temperature of the earth has increased by 0.6°C since the pre-industrial period (1850–1900). The Intergovernmental Panel on Climate Change (IPCC—the United Nations – sponsored scientific body on climate change) approximates future climate change on a worldwide scale as follows:

- Between 2090-2099, the average air temperature will be changed from 1.8°C to 4°C higher than the average temperature between 1980-1999.
- The land surface temperature will increase more rapidly than the ocean.
- Sea ice and snow cover will continue to shrink and melt due to the increase in average temperatures.
- From 1990 to 2100, the sea level in the ocean will rise by 1.8–3.1 millimeters/year.
- Severe droughts will take longer and become more extreme due to excessively hot temperatures and changing amounts of rainfall.
- The precipitation rate will become more changeable.
- Extreme weather incidences such as waves of heat, floods, surges, storms, and droughts will become more periodical.

Ensuring global actions and policies to refrain from catastrophic climate change through greater practical methodologies, Thailand places great emphasis on the concept of sustainable development which has been long established in the nation. The master plan of climate change action in Thailand is being developed by the Office of National Resources and Environmental Policy and Planning (ONEP), Ministry of Natural Resources and Environment (MoNRE). Thailand Climate Change Master Plan is gazed at contributing to widespread climate-policy planning in the Kingdom relating to climate change scenario. The target is to advocate climate change preparedness initiatives so that they are in accordance with Thailand's socio-cultural and commercial contexts as well as sufficiency economy philosophy. Several extensive measures such as diffusion of low-carbon technical knowledge in the domestic sector, energy-efficient architecture, energy-efficient enterprise and fuel-switching, fuel substitution and new public-transportation systems in the transport sector, and clean&green electricity generation sector are required to mitigate emissions to a lower level (Luenguthai, 2013).

This report reviews research for the climate change implementation and the roadmap in Thailand 2021–2050. This report gives an overview of Thailand's policies on mitigation, Thailand's framework policies, and sectoral plans and policies supporting the global climate agenda (Nationally Appropriate Mitigation Actions; NAMA and Intended Nationally Determined

Contributions (INDC)) are also reviewed. Finally, this report issues a broad view of the climate change roadmap in Thailand in the short-, medium-, and long-term goals.

2 Literature Review

The climate of Thailand is mainly influenced by two monsoon systems – the northeast and southwest monsoons. In May, the southwest monsoon carries a stream of warm moist air from the Indian Ocean towards Thailand, affecting abundant rainfall. Later in October, the northeast monsoon from mainland China takes an anticyclone with full of cold dry air to the northern part of Thailand. In times past, Thailand has experienced several crucial natural disasters. For example, in 1989, Typhoon Gay struck the Gulf of Thailand, killing more than 800 people and destroyed over US\$497 million in damage. The Department of Disaster Prevention and Mitigation (DDPM) accounted that floods have caused over 1,000 deaths and economic losses of more than US\$1.1 million from 2002-2010.

The following year in 2011, Thailand suffered from an even more violent storm, the Typhoon Nock-Ten which was one of the deadliest cyclones in the country's record. The great flood affected 65 of 77 provinces in the northern, northeastern and central regions. More than 800 people were killed in the floods, while over 13.6 million were displaced and affected. About 20,000 km² of farmland was damaged, causing huge economic losses with an estimated US\$ 45.7 billion in damage, according to the World Bank's estimate. The 9.2 million hectares of rice production areas in Thailand are particularly vulnerable to drought. The DDPM estimated that an average of 14.9 million people in 59 provinces suffered from the effects of major droughts during the period 2007 to 2013, with damages amounting to US\$23.30 million (Kuntiyawichai et al, 2015).

3 Method

This article describes an overview of a climate change roadmap for Thailand 2021-2050 through a systematic literature review (SLR). Multi-sources documents are collected for review from the Internet, research articles, and government reports. The obtained data are classified into useful information for further analysis and synthesis.

4 Result and Discussion

4.1 Research Studies Related to Climate Change in Thailand

Over the past 20 years, research reviews on the effects of climate change in Thailand have been collected. The level of development is not different from other Asian countries. The major limitation of the past studies has been the high uncertainty in climate projections. From 2000 to the present, Thailand has supported more than 15 climate-related scenario projects, to increase scientific and technological knowledge of climate change and its impacts, especially related to uncertainty issues. There have been few projects that have focused on the system's vulnerability to climate change. Currently, Thailand's climate change policy still continues to emphasize technical know-how, particularly on relationships between impacts and vulnerability of major sectors. We shall explore linkages between impact and vulnerability in order to develop adaptation selections to cope with climate change. Comparing to other countries, in Thailand scientific uncertainties

considerably obstruct the analysis of adaptation selections and their combination into national development planning. Presently, all related sectors are making efforts to promote research and development in this area. Table 1 shows thematic analysis of literature on climate change in Thailand in several themes.

Anuchiracheeva and Pinkaew (2009) studied adapting rice farming to climate change in Northeast Thailand. This work was a part of series of Oxfam and Earth Net Foundation (ENF) projects to assist program practitioners in sharing and studying climate change adaptation. The project focused on educating about climate change and its potential impacts on people involved in the target area in Thailand. In consequence of this project, the communities maintained a sufficient level of rice output despite the harsh conditions to minimize their food insecurity and diversified their food crops to get profit from other fruits and vegetables. In the lower Mekong Basin, Mainuddin et al (2013) also evaluated the potential impact of climate change on the yield of rainfed rice and some adaptation options. From 2010 to 2030 and 2030–2050, they used IPCC SRES A2 and B2 scenarios as imitated by downscaling global climate model (ECHAM4) for the Mekong Basin. They found that the impact was principally a result of the change in rainfall and carbon dioxide (CO₂) concentration in the airspace. Manandhar et al (2015) investigated the perceptions of local people on climate change and related hazards in northern Thailand. The results showed that nearly 45 percent of households had personally understood climate change in terms of increasing rainfall, decreasing the number of rainy days in the last two decades, and of extraordinarily late rainfall in recent year's rainy season. Additionally, over 70 percent of households had realized extreme weather incidences as droughts and floods impacting their livelihoods, however, they had not clearly recognized the source of problems. Bastakoti (2014) examined the recognition of climate risks, their impacts, and existing adaptation practices at the local level, together with the role of local organizations in two selected settings in Vietnam and Thailand. They reported that several adaptation practices existed at the local level to cope with the recognition of climate of drought, floods, and salinity violation. A large number of the adaptation practices were autonomous drawing on coping with short-term risks rather than long-term climate risks.

Table 1: Thematic analysis of literature on climate change in Thailand

Themes Studied	Anuchiracheeva (2009)	Marks (2011)	Jampanil et al (2012)	Limjirakan (2012)	Mainuddin et al (2013)	Bastakoti (2014)	Manandhar et al (2015)
Impacts	✓	✓	✓		✓	✓	✓
Problems		✓				✓	✓
Policies		✓	✓				
Temperature				✓			
GHG					✓		
Climate-related hazard	✓		✓	✓	✓	✓	✓
Agriculture	✓	✓			✓	✓	
Future projection					✓		

In 2011, Marks confirmed the impacts of climate change in Thailand. He clarified the serious issues as extended droughts, declined farming and fishing yields, rise in the sea level, severe flooding, and health-sector matters. He also raised the point about the Thai government framework policies to both to adapt to and mitigate climate change which its responses so far had been restricted due to insufficiencies in both the planning and implementation processes. Thailand's ongoing political crisis at that time also redirected decision-makers from turning away from this matter. Jampanil et al. (2012) revealed water resources arrangement under the policy and climate change in Rayong province which is widely known as the biggest and most important industrial zone in Thailand. The estimated water use in each manufacturing sector in Rayong Province utilizing Input-Output Table as a tool for assessing impact from policy and estimate water deficit in each sector. This tool can be used as a tool to evaluate water use resulting from the economic policy change. More than that, the Input-Output Table can be utilized as a tool to examine the impact of water resource planning for climate change scenarios. In the same year, Limjirakan and Limsakul (2012) surveyed movements of the surface temperature of the air and their severity from 1970 to 2009 in Thailand. Results showed that Thailand had undoubtedly experienced remarkable country-wide warming over the last four decades, and extreme incidents related to both the heat and cold inordinate of daily lower and higher temperature spreadings had changed consequently.

4.2 Thailand's Policies on Adaptation and Mitigation

Since the world oil crisis in the 1970s, researchers and policymakers have initiated knowledge and exploration on conserving energy and management in the electric power systems, especially generation of electricity, manufacturing, and field of transportation (Chunark et al., 2015). Furthermore, the climate change issue has delivered major motivation to enhance scholarly discussions. As a consequence, not only exploration of greenhouse gas (GHG) mitigation potential but observation of mitigation schemes is also a key question, which has been discussed at great length in the field of power scheduling and environmental monitoring. The National Climate Change Master Plan (2015-2050) is recommended to help the country ensure the sustainability low carbon emission growth and climate change resilience by 2050, by following the missions in each term:

Short-term (2016)

- Vulnerability/Risk Maps formulated
- National Adaptation Plan (NAP) Process

Medium-term (2020)

- Predicting and hazard-warning
- Climate insurance systems
- Local Adaptation Action Plan

Long-term (2050& Beyond)

- Agriculture and agricultural workers with an irrigational system
- Agriculture outside irrigation area with water resource development
- Agricultural workers with climate insurance -climate-related agricultural loss per agricultural GDP

The major barriers to policy implementation related to climate change vulnerability and adaptation are the confidentiality and rationality of research results. Unpredictability in climate change scenarios poses a key difficulty for adaptation planning. The lengthy period and local idiosyncrasies are also key components of success in developing climate change policies. Scientific investigation research and innovation research projects to cope with the above constraints and problems are of great importance. In recent years, there has been increasing evidence of climate change effects and their outcomes, which suggests the crucial need to act. There is also a strong need for innovative approaches to evaluate vulnerability and adaptation, in the short- and long term. Global collaboration in this matter will certainly improve the investigation capacity of Thai researchers. Thailand's national strategy on climate change has given high priority attention to this issue at the top of the agenda.

5 Conclusion

This article contributes a revised conceptualization of climate change in Thailand. Even the most rigorous mitigation efforts cannot avoid some impacts of climate change in the coming decades. Definitely, the Thai government is turning to pay more attention to these impacts at the moment. This makes adaptation more significant, especially in tackling near-term impacts. Even though, unmitigated climate change would be expected to exceed a national capacity to adapt. Not only that, it is essential to develop a folder or mix of methods that includes mitigation, adaptation in the short-, medium- and long-term to enhance both adaptation and mitigation, and research on the meteorological study of climates. It is very important to remark that these gaps in Thai awareness are located promptly. Stakeholders' engagement also plays an important role in climate change adaptation. Accordingly, their education should also be emphasized through facilitation skills, practicing, employment, financial support, and incentives for collaboration among researchers and parties involved.

6 Availability of Data and Material

All relevant information is included in this article.

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