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International Experience In Agricultural Development To Respond To Climate Change, Lessons For Vietnam

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Abstract
According to studies presented at the COP25 Climate Change Conference, climate change has been changing the basic patterns of weather, leading to an increase in the incidence of natural disasters, and seriously affecting the livelihood and safety of human life. Vietnam is among the countries most affected by this phenomenon. This study has selected three countries, namely China, Thailand, and India to consider and study agricultural policies related to climate change response. All three countries are located in Asia and possess developed agriculture. Their climates are quite similar to Vietnam's.
China, Thailand, and India are all the most developed countries in the field of agriculture whether in the world or in the region. As a result, these countries have all achieved certain goals in response to climate change. However, these policies still have some shortcomings, as well as positive impacts on the environment and climate that still need to have greater influence.
Pointing out some lessons learned from many aspects of the three countries' agricultural policies responding to climate change, this study is aimed to support Vietnam's effective policy planning and implementation. Climate change is still becoming more complex and serious. With experiences from these three countries, Vietnam needs to quickly implement agricultural policies to respond and adapt to this problem.

Keywords: climate change, weather, policy, agriculture,

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I. Pose the problem

According to studies presented at the COP25 Climate Change Conference, climate change has been changing the basic patterns of weather, leading to an increase in the incidence of natural disasters, seriously affecting the livelihood and safety of human life. Vietnam is among the countries most affected by this phenomenon. At the international workshop "Impacts of Climate Change on the enjoyment of rights by vulnerable groups: Sharing experiences and best practices", the United Nations (UN) Resident Coordinator in Vietnam Nam - Ms. Pauline Tamesis emphasized that climate change could affect more than 74% of the Vietnamese population. Climate change can cause weather conditions beyond human tolerance if emissions are not reduced. The increase in temperature will promote the formation of storms, heavy rains, floods and cause water to evaporate from vegetation and soil, creating a high risk of drought, and increasing the number of forest fires.

Many different agricultural policies have been applied by countries around the world to respond to climate change. Vietnam's agriculture can fully learn from the successes and failures of countries around the world. This study has selected three countries, namely China, Thailand, and India to consider and study agricultural policies related to climate change responses. All three countries are located in Asia and possess developed agriculture. Their climates are quite similar to Vietnam. In particular, climate change has quite evident consequences in these countries and causes considerable damage to agriculture.

II. Current status and achievements

2.1. China

2.1.1. Typical agricultural policies related to climate change response in China

In 2017, Chinese President Xi Jinping began to pay attention to the "implementation of the rural recovery strategy". Since then, the strategy has appeared many times in the national policies and plans of the Communist Party of China. In the period 2018 - 2022, the Central Committee of the Communist Party of China and the State Council issued the Strategic Plan for the regeneration of rural areas. Recently, rural regeneration has become an important part of 14th China's Five-Year Socio-Economic Development Plan for the 2021-2025 period. The common goal will be to turn China into "a modern, prosperous, strong, democratic, culturally advanced and harmonious country" by 2049. The rural regeneration strategy also aims to promote sustainable

development and protect arable land because the environment in China has been severely degraded in recent years due to overexploitation.

On September 8, 2021, The Chinese government announced the 14th Five-Year National Green Agriculture Development Plan. The goals include measures related to climate and sustainability as well as the development of rural areas in China. To accomplish the above objectives, the Plan has been divided into many small projects to help the authorities closely monitor and effectively implement. Compared to the 2007 Plan, it can be seen that the 2021 Plan is much more comprehensive as well as focused on reducing environmental pollution from agriculture, helping agriculture develop sustainably.

In addition, some prominent policies such as agricultural pollution regulation standards and rules have been established to reduce water pollution from livestock, agrochemicals, and air pollution caused by livestock biomass burning. For example, burning biomass during the harvest season causes serious air pollution in rural areas. Therefore, this action is strictly prohibited and monitored by remote sensing technology; The rest of the crop is encouraged to be recycled on-site or used for animal feed and bioenergy production with the support of the Government or biomass processing companies. In 2015, China's Ministry of Agriculture set targets for controlling the use of agrochemicals, aiming to limit the growth of fertilizer and pesticide use by 2020. Alternative approaches include improving the efficiency of chemical use, applying fertilizer formulations determined by soil testing, recycling agricultural wastes (such as cattle manure, and crop residues), etc., according to the report, the target was achieved in 2017, 3 years ahead of schedule. Conservation policies were also adopted by the former State Forestry Administration to reduce the ecological impact of agriculture.

2.1.2. Policies' results

Air quality has improved, with about 87% of days having good quality or more in 2020. According to China's National Bureau of Statistics, 2016 saw a decline in the use of chemical fertilizers in China to below 60 million tons, with nitrogen fertilizer use at 41 million tons - the first decline since the 1970s. China Dialogue calculates that increasing soil carbon, reducing fertilizer use, and using rice straw for biochar and other purposes could reduce China's total agricultural emissions by up to 540 million tons of CO2. (China Dialogue, 2021).
However, besides air quality, the improvement in other aspects of environmental pollution and climate change has not been really outstanding. It will probably be a few more years before China's Plan 2021 begins to bear fruit before we can assess the effectiveness of China's policies on other problems of climate change such as mangrove water, natural disasters, etc.

2.2. Thailand

2.2.1. Some agricultural policies related to climate change response in Thailand

The Thailand Government has developed a 20-year agricultural and cooperative strategy (2017-2036) and a 5-year agricultural development plan (2017-2021) following the objectives of the 20-year National Strategy and the 12th National Economic and Social Development Plan. The strategy includes several objectives related to farmers' incomes, the increase of productivity and quality standards, and the need to develop "smart farming" (or "smart farmers") and promote sustainable management of agricultural resources. Human resources are divided into five groups: Farmers and farming groups; enterprises processing agricultural products; exporters; experts and consumers. The groups were instructed to use the Bio – Circular – Green(BCG) economic model as a development mechanism to ensure agricultural goods and meet market demand, and at the same time fulfill commitments on responding to climate change. In the category of promoting sustainable management of agricultural resources, the government sets targets around increasing certain types of farmland to promote the revitalization and sustainable conservation of agricultural resources.

Thailand has also set the Nama (Nationally Appropriate Mitigation Action) target within the framework of the United Nations Framework Convention on Climate Change (UNFCCC). Nama's partner farmers are trained to reduce production costs, increase yields, and use fertilizers and chemicals sensibly to minimize harm to the environment. To support the people, the government has developed and applied high technology. One of the typical technologies supported by the Thai government is laser land leveling. This technology helps to reduce input costs by saving water for irrigation, saving herbicides, reducing the amount of seed sowing, and fertilizer; pest control; promoting mechanization; reducing loss during harvesting, and significantly increasing productivity. While there is no specific target to reduce greenhouse gas emissions in the agricultural sector, the Thai Rice NAMA (2018-2023) aims to reduce emissions from rice production by 26% over these five years.

In addition, the Thai government also pays special attention to the development of organic agriculture. Organic farming reduces the number of chemicals such as pesticides, herbicides, and fertilizers, and reduces the amount of agricultural waste released into the environment.

2.2.2. Policies' results

In 2010, the country's agricultural methane emissions reached 60,400 thousand tons of CO_2, but by 2019 this figure had dropped to 48,200 thousand tons. The volume of pesticides and herbicides is also significantly reduced. The total cost of imported pesticides has fallen sharply from 36.296 million baht in 2018 to 21.168 million baht in 2019. Although organic agriculture in Thailand is not new, it still shows great development potential when it creates good business opportunities and better and stable livelihoods for the people. However, the development of organic agriculture will take more effort than before due to the limitation of using specialized chemicals.

However, the outcome of the agricultural response to climate change in Thailand is not really obvious. There is still a gap between research, policy, and policy implementation. The majority of Thailand's contributions to climate change improvement come from the energy sector, and recent policies have focused mainly on the energy sector also.

2.3. India

2.3.1. Typical agricultural policies related to climate change response in India

India has launched the National Mission on Sustainable Agriculture (NMSA) which seeks to address issues related to sustainable agriculture to devise suitable adaptation strategies to ensure food security, improve livelihood opportunities and stabilize the economy. The NMSA identified 10 key aspects of adaptation, including improving crop varieties, livestock and fish farming; efficient use of water; eliminating bugs; improving farm operation methods; improving nutrient management; agricultural insurance; credit support; market; access to information, and diversifying livelihoods.

Based on the initial initiatives of the 10th Five-Year Plan, the Department of Agriculture launched the National Innovations in Climate Resilient Agriculture (NICRA), which is a flagship program of the Indian Council of Agricultural Research (ICAR) to conduct systematic long-term research on the impacts of climate change on Indian agriculture and the adaptability of cereal crops, horticulture, natural resources, livestock and aquaculture production. The program involved the participation of more than 21 Central Academies and several State Agricultural Universities. This program was one of the largest projects in any developing country at that time. This initiative is implemented in 130 vulnerable districts across India.

In rainwater agriculture, which is prone to risk and covers nearly 68% of the net sown area, ICAR has developed some in-situ and off-site water conservation technologies and has improved agricultural technologies for dry land industries. ICAR also plans to advance agricultural best practices through NICRA across nearly 160 counties in the 12th Five-Year Plan. These modalities include four modules: natural resource management, crop production, livestock and fisheries development, and institutional intervention. NMSA will be provided with NICRA's experience for wider adoption in the country.

In addition, India reckons the view of coping with and adapting to climate change by using modern techniques and methodologies to forecast crop and drought conditions. Forecasting Agricultural output using Space, Agro-meteorology and Land based observations (FASAL) is a multi-institutional program that integrates the activities of many organizations. Some of these organizations aim to provide pre-harvest production forecasts for crops at the National, State, and District levels. A few other organizations will track various parameters, such as rainfall, water storage, seeding status, fertilizers, pests, prices, and seed availability.

2.3.2. Policies' results

In terms of preventing and ensuring resilience to climate change, ICAR has made the following impacts: a) Create large-scale awareness and improve resilience to climate change for farmers through seminars, talks, village organization, and field visits,.....; b) Set up the seed system and farm machinery through the Custom Hire Center for timely seeding and farm operation; c) Create the priority technologies needed for agriculture to create high resilience; d) The sown area in drought years (2014, 2015, 2016) has been compensated and recovered by 6% - 9%. There are151climate-resilient villages established by ICAR that are being replicated in state Government programs.

However, India's performance has not completely convinced other countries and international organizations. Unlike other major emitters, India has yet to commit to net zero carbon emissions by 2050. This shows that India's response to climate change has yet to come when the country's policies have not really made any significant contributions to environmental protection and global climate change.

3.Experiential lessons

Firstly*, the policy and implementation plan must be consistent from the discussion to the implementation, avoiding overlaps and contradictions*. There is aproblem in China's policy implementation, which is that the goals of economic development and those of climate change response conflict. Green agriculture requires much

effort.It is difficult to compare the crop productivity and output of green agriculture with those of traditional agriculture using traditional chemicals and fertilizers.

***Secondly**, the application of scientific and technical achievements is an important factor in shaping agricultural policies toward climate change adaptation.* The experience of China, Thailand, and India shows that applying high technology in agriculture plays an important role in agricultural development, improving productivity and mitigating negative impacts on the environment (protecting the environment), forecasting, and saving costs and effort for workers.

However, scientific and technical achievements have also made many toxic chemicals appear. Therefore, Vietnam should pay attention to applying scientific and technical achievements, and creating a strict legal corridor, strictly controlling toxic chemicals in agriculture, building an environment-friendly, healthy green agriculture, becoming a trusted brand when exporting to the world market.

***Thirdly**, organic agriculture is a trend creating big opportunities*. Not only organic agriculture helps reduce environmental pollution,leading to climate change improvement, but also organic products are often more expensive than average, compensating for the effort and time involved in organic farming, and helping farmers have better livelihoods. However, the development of agricultural products is quite fragmented, small, and not synchronized. In terms of national management, developing organic agriculture needs a strict monitoring mechanism, science and technology application, and the use of chemicals.

***Fourthly**, the role of international organizations in agricultural development is linked with climate change response*. In the process of researching, conceptualizing, promulgating, and implementing policies, China, Thailand, and India have received the support and advice of many highly specialized international organizations such as the World Bank (World Bank), UN (United Nations), FAO (United Nations Food and Agriculture Organization), GIZ (German Organization for International Cooperation),... Third-party consultation will help the government have a new perspective, opinion, and overview of the issue, thereby assessing and having a more objective, multi-dimensional view.

***Fifthly**, strengthen communication and raise people's intellectual standards, especiallypolicy beneficiaries*. Thailand and China are two typical cases of propaganda and increasing people's knowledge about agricultural policies in response to climate change. People in many rural areas apply quite well scientific and technical achievements in agriculture, and many households export large-scale agricultural products to the world market. These outcomesresult from the work of propaganda, education, professional knowledge training, and especially the uniformity in agricultural policies and the companionship of local authorities.

III. Conclusion

China, Thailand, and India are all the most developed countries in the field of agriculture whether in the world or in the region. The policies of these countries are well conceived and implemented quite comprehensively and effectively. As a result, these countries have all achieved certain goals in response to climate change. However, these policies still have some shortcomings, as well as their positive impacts on the environment and climate still need to have greater influence.

Pointing out some lessons learned from many aspects of the three countries' agricultural policies responding to climate change, this study is aimed to support Vietnam's effective policy planning and implementation. Climate change is still becoming more complex and serious. With experiences from these three countries, Vietnam needs to quickly implement agricultural policies to respond and adapt to this problem.

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