



INITIATIVE ON
Low-Emission
Food Systems

A low-emission food system in the Mekong Delta

Trends, policies and practice

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Occasional Paper 13

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Occasional Paper 13

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DOI: 10.17528/cifor-icraf/009050

Pham TT, Tran NMH, Nguyen TVA, Nguyen TTA, Nguyen TV, Nguyen DT, Tang TKH, Nguyen DYK, Nguyen TS and Tran VN. 2023. A low-emission food system in the Mekong Delta: Trends, policies and practice. Occasional Paper 13. Bogor, Indonesia: Tổ chức Nghiên cứu Lâm nghiệp Quốc tế (CIFOR); Nairobi, Kenya: Tổ chức Nông Lâm Thế Giới (ICRAF).

Translation of: Phạm TT, Trần NMH, Nguyễn TVA, Nguyễn TTA, Nguyễn TV, Nguyễn DT, Tăng TKH, Nguyễn DYK, Nguyễn TS và Trần VN. 2023. *Hệ thống lương thực thực phẩm phát thải thấp tại Đồng bằng sông Cửu Long: Chính sách và thực tiễn*. Báo cáo chuyên đề 11. Bogor, Indonesia: Tổ chức Nghiên cứu Lâm nghiệp Quốc tế (CIFOR); Nairobi, Kenya: Tổ chức Nông Lâm Thế Giới (ICRAF).

Photo by: Le Phat Quoi/Center of Science, Environment and Ecology in Ho Chi Minh City.
Agroforestry system in An Giang province.

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Acknowledgements

We would like to express our special thanks to the CGIAR Initiative on Low Emission Food Systems for providing support for this study

We would also thank the donors who supported this research through contributions to the CGIAR Trust Fund. The Low Emission Food Systems Initiative is coordinated by the Alliance Biodiversity and CIAT, with participation from the International Maize and Wheat Improvement Center, International Food Policy Research Institute, International Center for Tropical Agriculture, International Livestock Research Institute, International Rice Research Institute, International Water Management Institute and World Fish, among many other partners.

We would also like to express our heartfelt thanks to participants who contributed to the workshop on low-emission food system development in the Mekong Delta on 7 November 2023 at Nong Lam University.

Summary

This report provides an overview of the policies, programmes and actors involved in implementing a low-emission food system in the Mekong Delta, Vietnam's largest food producing and supplying region. The report is based on a review of the legal and policy framework, Vietnamese governmental decisions, secondary documents, and expert opinions shared at a national consultation workshop. The report identifies opportunities and challenges for developing and implementing a low-emission food system in this region.

According to our findings, the Mekong Delta has significant potential to achieve the dual goals of ensuring food security and reducing emissions. Vietnamese agricultural products – particularly those from the Mekong Delta – are connected with international brands, and the 13 provinces that make up the region are actively developing and implementing policies to ensure food security and reduce emissions. Moving away from the previous approach that separated individual agricultural sectors, these innovative policies recognize the importance of multi-sectoral coordination across scales. Financial resources for climate change adaptation and mitigation in Mekong Delta provinces have also increased in recent years, demonstrating government and stakeholder interest and commitment in transitioning from traditional agriculture to a low-emissions food system. As well as the changes seen in macro-level policies, actual implementation has also revealed local-level shifts towards large-scale production models that are both economically and environmentally sustainable. Multiple studies and demonstration models on low-emission food systems have also been conducted, providing scientific evidence and the foundations for future replication.

The Vietnamese government and Mekong Delta provincial authorities have proposed various solutions to support Vietnam and the Mekong Delta in developing a low-emission food system; these have included fine-tuning policy mechanisms, restructuring production in the forestry, fisheries and agriculture sectors, capacity building, and science and technology development. However, the stability of the Mekong Delta food system is threatened by climate change, pollution and coastal subsidence. The region also faces economic barriers; while resources to 'green' agricultural products and reduce emissions have increased, they are currently insufficient to meet actual need on the ground. Meanwhile, agricultural product prices continue to fluctuate widely across international markets. There are also social pressures as the population grows and urbanizes; while the capacity of relevant actors needs to be improved to effectively implement a low-emission food system. Lack of guidelines, data, and tracking and monitoring systems on food system emissions likewise create significant challenges for Vietnam and the Mekong Delta region in developing and implementing regulations and effective measures to reduce emissions in agricultural, forestry and fishery production, and ensure food security.

Vietnam recognizes ensuring food security and reducing greenhouse gas emissions as national policy goals, but also as a contribution to global food security and political stability. To establish the Mekong Delta as a regional food production hub, it is critical to promote cooperation between domestic and foreign organizations, as well as coordination across state management levels, industries, the private sector and local communities. Despite guidelines and regulations existing to promote intersectoral coordination, implementation of these is limited. A number of improvements are needed, including streamlining policies and promoting intersectoral cooperation, so as to fully address the diverse components of a comprehensive food system, as well as ensure food security, quality, quantity and nutrition, not to mention equitable access to food across all social groups, including women, children, disadvantaged and vulnerable groups.

1 Introduction

The Mekong Delta is the southernmost region of Vietnam, and is made up of 13 provinces and centrally-run cities. These include Can Tho, An Giang, Kien Giang, Ca Mau, Dong Thap, Long An, Tien Giang, Vinh Long, Ben Tre, Tra Vinh, Hau Giang, Soc Trang and Bac Lieu. According to Resolution 81/2023/QH15, which provides socioeconomic zones based on a national master plan, the area holds an important political, economic and military position in Vietnam, as well as being an agricultural production and export centre, and the country's largest marine economic region (Vietnam National Assembly 2023). The Mekong Delta region produces 50% of Vietnam's rice, 95% of its rice exports, 65% of its aquaculture output, 60% of its fish exports, and 70% of its fruits (VNA 2022). Can Tho, An Giang, Kien Giang and Ca Mau are the region's four key cities economically; they are Vietnam's leading centres for rice production, farming, fishing and seafood processing (Truong 2022; VUSTA 2010). Total export turnover for agricultural, forestry and fishery products from the region reached USD 29.13 billion in the first seven months of 2023, a 9.1% decrease from the same period in 2022. Businesses in some industries are capitalizing on market opportunities. Exports of vegetables (USD 3.2 billion, up 68.1%), rice (USD 2.58 billion, up 29.6%), coffee (USD 2.76 billion, up 6%) and cashew nuts (USD 1.95 billion, up 9.8%) have increased (Anh Phuong 2023). Although the agricultural sector is critical to Vietnam's economic development and social security, it is also a significant emitter of greenhouse gases (World Bank 2022). In Vietnam, three sectors lead on emissions: rice farming, livestock farming and land use. Livestock farming and land use contribute at least 20% of greenhouse gas emissions, while rice farming accounts for just half of that (Nguyen and Minh 2023). According to the Ministry of

Agriculture and Rural Development (MARD), the livestock industry in Vietnam contributes 25% towards the agricultural sector's GDP. One of the fastest-growing agricultural subsectors, this industry emits more than 15 million metric tons of CO₂ equivalent annually (Nguyen 2023b).

The Mekong Delta is the first region in Vietnam to have provinces sign a commitment with the Ministry of Agriculture and Rural Development to reduce greenhouse gas emissions in agriculture and develop an action plan for achieving the emissions reduction commitments mentioned in the National Voluntary Commitments (Van Khuong 2022). However, in order to achieve the goal of reducing emissions and ensuring food security for the entire country, the Mekong Delta faces numerous challenges. These include increasing population pressure and climate change; market requirements that are becoming increasingly stringent; fluctuations in product prices having an impact on people's lives; and a lack of uniformity in policy mechanisms and intersectoral coordination to reduce emissions across the product supply chain as a whole, rather than focusing on single agricultural products. There is also a lack of clarity on food systems definitions, as well as a scarcity of databases and scientific evidence on low-emission food system solutions in Vietnam and the Mekong Delta. This makes it difficult for policymakers and other stakeholders to implement effective policies and operations.

This report details some of the opportunities and challenges for reducing emissions in the Mekong Delta food production system. It also provides recommendations on how to improve this system in future, based on review and analysis of existing policies, analysis of secondary documents, and the results of

national consultation workshops with relevant stakeholders¹. The report also discusses the Vietnamese government's conceptualisations of the food systems, as well as the direction Vietnam is taking to achieve the dual goals of food security and greenhouse gas reduction. The report is divided into six sections. Section 2 follows this introduction with a definition of food systems as they are currently practiced around the world. Section 3 delves into Vietnam's approach to and

definition of food systems. Section 4 presents opportunities and benefits for the Mekong Delta in implementing a low-emission food system, while Section 5 explores challenges for this region when reducing food system emissions. The final section of the report provides recommendations to help the Mekong Delta achieve its dual goals of lowering emissions and developing agriculture to ensure food security.

¹ A national conference entitled 'Low-emission food system development in the Mekong Delta: Opportunities, challenges and future pathways' was held at Nong Lam University in Ho Chi Minh City on 7 November 2023. More than 92 delegates from central agencies and 13 Mekong Delta provinces shared their experiences and perspectives on the potential, benefits and challenges of implementing a low-emission food system in the Mekong Delta.

2 Low-emission food systems

There is global debate around definitions and concepts related to food systems in general, and low-emission food systems in particular. With no unified concept, each country defines food systems and low-emission food systems differently. This report incorporates the definition proposed by the High Level Panel of Experts on Food Security and Nutrition in 2014, as well as the perspective of the Low-Emission Food Systems project (MITIGATE+ Low-Emission Food Systems, CGIAR²).

By this definition, a food system is a system that encompasses “all elements and factors (environment, people, inputs, processing, infrastructure, institutions, etc.), activities related to the production, processing, distribution, preparation, use, and sale of food, and the outputs of these activities, including socio-economic and environment” (HLPE 2014), see also Figure 1.

The following must be considered when designing and implementing policies and interventions aimed at improving food systems in a sustainable way that results in lower emissions:

- i. *Causes and factors affecting the food system, including:*
 - Demographic-related factors (e.g., population growth, urbanization)
 - Socioeconomic factors (e.g., market demand and forecast, labour structure, financial income between regions)
 - Social and cultural factors (e.g., social values, stakeholder perspectives and preferences, knowledge and literacy, gender equality, stakeholder engagement)

- Natural and environmental conditions and the impacts of climate change
 - Regulations and legal systems around land-use management, urban planning, benefit sharing, food security, taxes and gender equality, economic and social development and national defence
 - Science and technology application in the agricultural sector for sustainable development and reduced emissions
 - Global politics and trade
- ii. *Activities relating to the production, harvesting, storage, transportation, purchasing, processing, packaging, distribution, preparation, use (e.g., cooking methods and serving), buying and selling of food.* Even activities and behaviours that lead to food loss and waste need to be considered.
 - iii. *Food system stakeholders, including households, companies, businesses, researchers, policymakers, investors and financiers, media and press, buyers and intermediaries, women and vulnerable groups, and civil society organizations.*
 - iv. *Objectives and expected output.* A sustainable food system is one that provides food security and nutrition in a way that is sustainable in terms of the environment, economy and society, without negatively impacting future generations (HLPE 2014). A low-emission food system does not mean prioritizing emissions reduction, but rather a system that ensures food security, poverty reduction, and economic and social development while reducing emissions as much as possible.

² The CGIAR Initiative on Low Emission Food Systems, also known as Mitigate+, collaborates with stakeholders in a variety of countries to provide them with the knowledge, information and tools they need to make decisions and overcome challenges in developing and implementing policies to reduce food system emissions based on scientific evidence.

THE FOOD SYSTEM

DRIVERS • ACTIVITIES • ACTORS • OUTCOMES

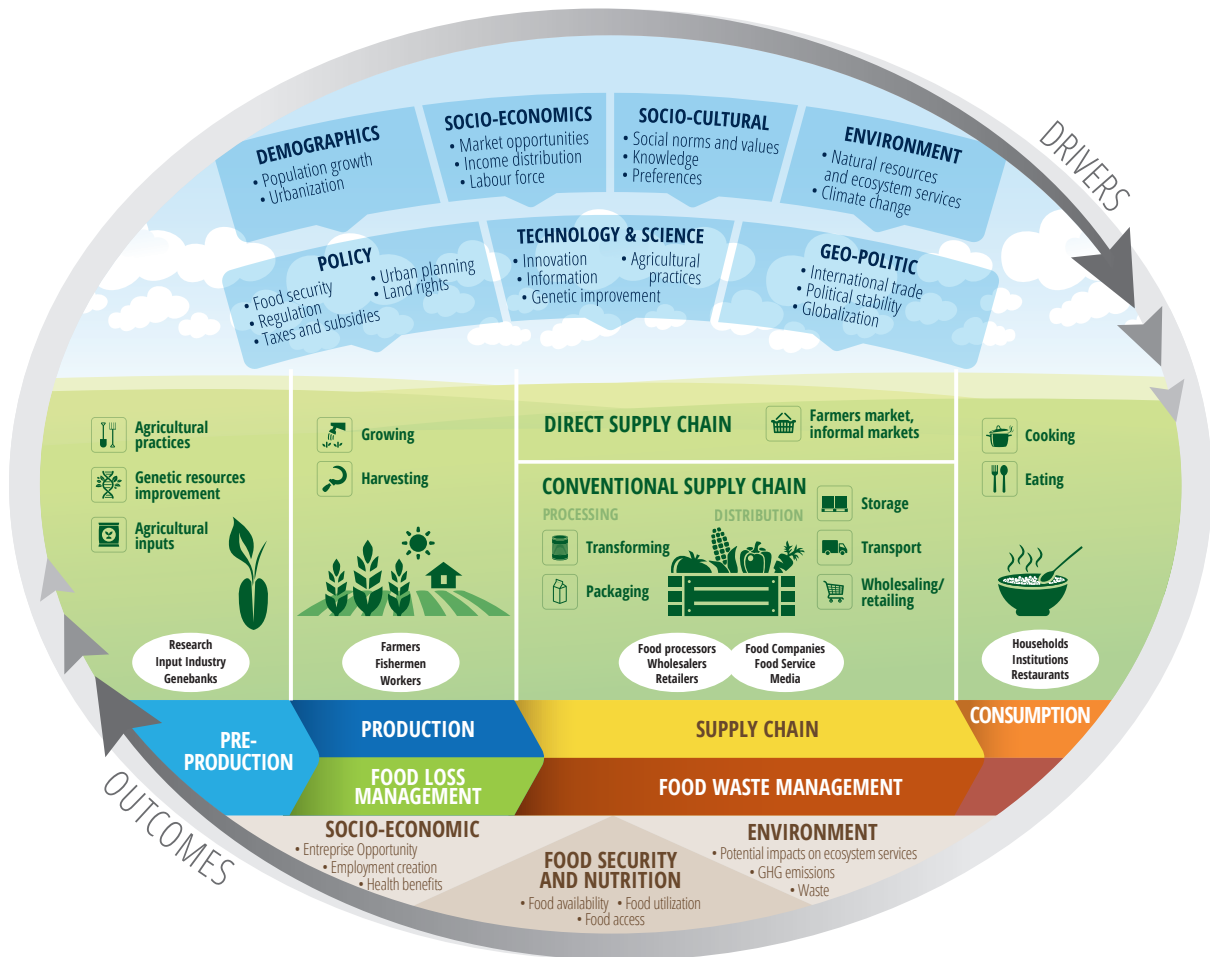


Figure 1. An overview of the food system

Source: CIAT 2017

3 Vietnam's definition of food security and low-emission food systems

The review of secondary documents revealed there is no clear definition of the food system in legal documents issued by Vietnam. Instead, Vietnam focuses its policies around food security, and reducing emissions for socioeconomic development and environmental protection.

3.1 Food security

The Vietnamese government views food security from many angles and considers it a problem that requires a multisectoral, coordinated approach at both the international and national levels, as well as across regions and provinces (Government of Vietnam 2021), as seen in Figure 2.

Resolution 34 NQ-CP (Government of Vietnam 2021) on ensuring national food security by 2030 also specifies the direction of policy and specific solutions to achieve this goal (Figure 3 and Figure 4).

Vietnam's national food security programme focuses on developing key agricultural sectors including rice, livestock and fisheries, fruit trees and crops with the goal of improving rural people's income and ensuring the nutritional needs of all people, especially young children.

3.2 Reducing food system emissions

The secondary document review shows that reducing emissions in agricultural production is of concern to the Vietnamese government, and there are many policies guiding provinces on how to carry out this important task.

Without directly mentioning a low-emission food system, Vietnam's policies and directions do consider the four elements that compose the food system:

- i. *Causes and factors affecting the food system:*
 - Current policies consider the population growth rates of Vietnam and the Mekong Delta while also considering urban development needs. During 2009–2019, the region's population growth rate was just 0.1%, much lower than the national population growth rate of 1.1%. The Mekong Delta has a higher rate of migrants leaving the region to work elsewhere, compared with other regions in the country; this is due to underdeveloped economic and social conditions (Ho 2022). If the working age population increases by 1%, economic growth increases by about 0.5%; for every 1% increase in the employed population of the 15–59 age group and the 60+ age group, GDP increases by 0.36% and 0.32%, respectively (UNFPA 2017). Based on population dynamics, the Mekong Delta has huge potential for socioeconomic development but the region is yet to take advantage of this; working age unemployment remains at 2.51%, of which unemployment in the 15–24 age group accounts for 9.24% (GSO 2019). Meanwhile, over the last ten years the proportion of the population aged 65 and over has increased faster than other age groups. This shows that the Mekong Delta labour force is aging. The aging dependency ratio and population aging index have increased rapidly from 2009 to 2019, which has posed a challenge for the region, in that the population aging process is happening quickly (Phan and Lam 2020).
 - Policies on food security and emissions reduction are also based on the principle of gradually reducing labour

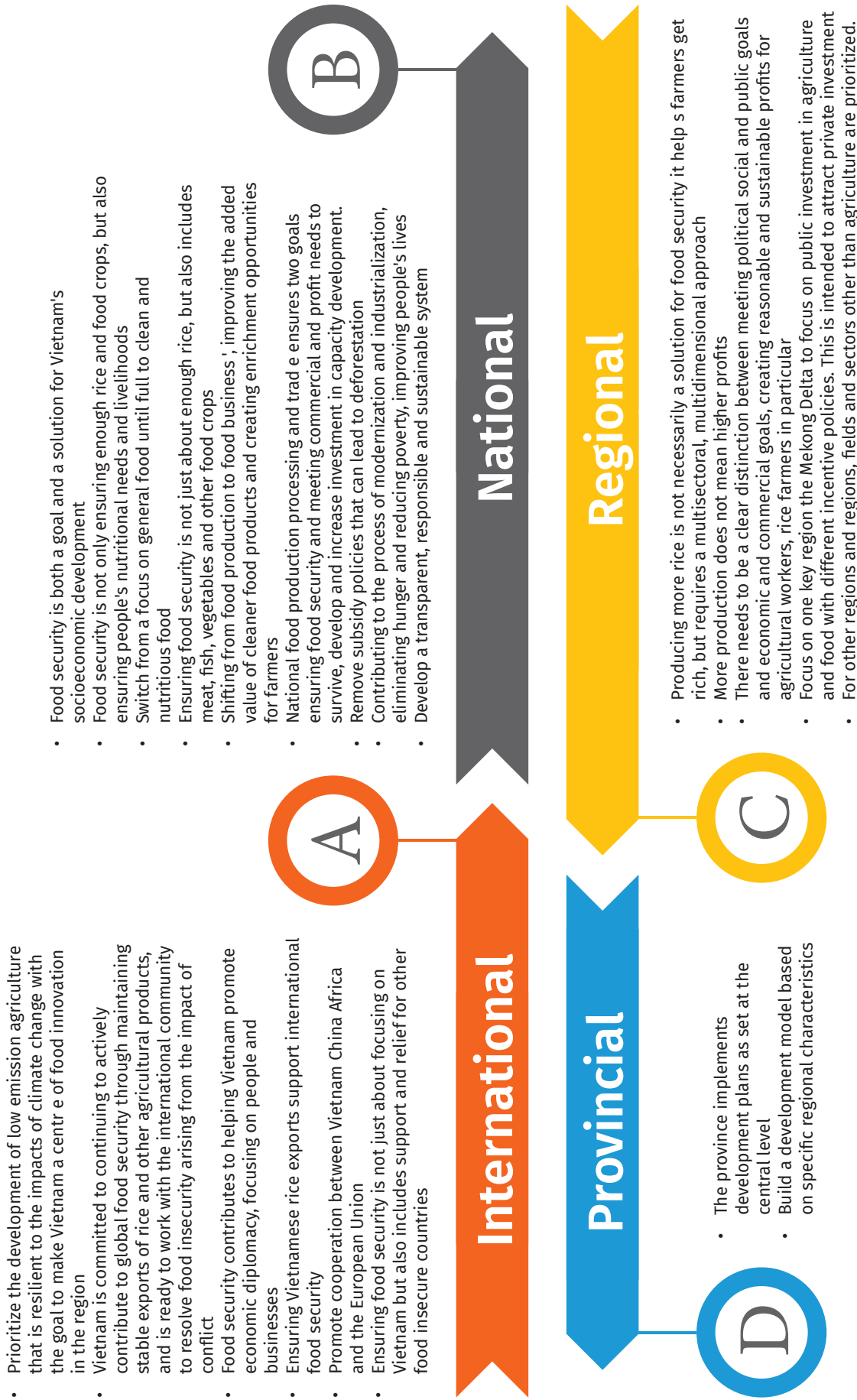


Figure 2. Vietnam's definitions, governance and goals for food security
 Source: Compiled and drawn by author based on Le 2020; Anh Phuong 2023; Huyen Vy 2023; Thanh Hang 2023; VNA 2023a.



Figure 3. Vietnam's perspective on ensuring national food security until 2030

Note: Food safety is defined in the Law on Food Safety 2010 as the assurance that food does not cause harm to human health and life.

in agriculture to increase the workforce in industry and services. However, changes in occupational structures and the Mekong Delta workforce remain slow compared to the rest of Vietnam. Regionally, agricultural, forestry and fishery labour still accounts for 47.8% of the workforce. Between 2010 and 2016, the country's agricultural, forestry and fisheries workforce decreased from 49.5% to 41.7% (a decrease of 7.8%); in the Mekong Delta meanwhile, this decrease was just 4.8% in the same period (Phan 2019).

- Considering social and cultural factors (e.g., social values, stakeholder perspectives and preferences, knowledge and educational levels, gender equality, stakeholder engagement), during 2009–2016, the rate of untrained workers in the Mekong Delta decreased from 96.4% to 87.9% and the rate of workers with

university degrees or higher increased from 0.4% in 2009 to 5.5% in 2016 (Phan 2019). While this increase in the university-educated workforce is a positive change in terms of the quality of human resources in the region, the majority of workers in the Mekong Delta do not have the skills required to meet the current socioeconomic development needs, thus restricting employment opportunities and stable household income levels (Phan 2019). The Ministry of Planning and Investment put forward a national green growth strategy for 2021 to 2030 with a vision until 2045. This outlines four closely linked goals for the food production chain: (i) reduce greenhouse gas emissions per GDP and balance this with economic development, based on which the region will undertake local green growth actions; (ii) green living through sustainable production

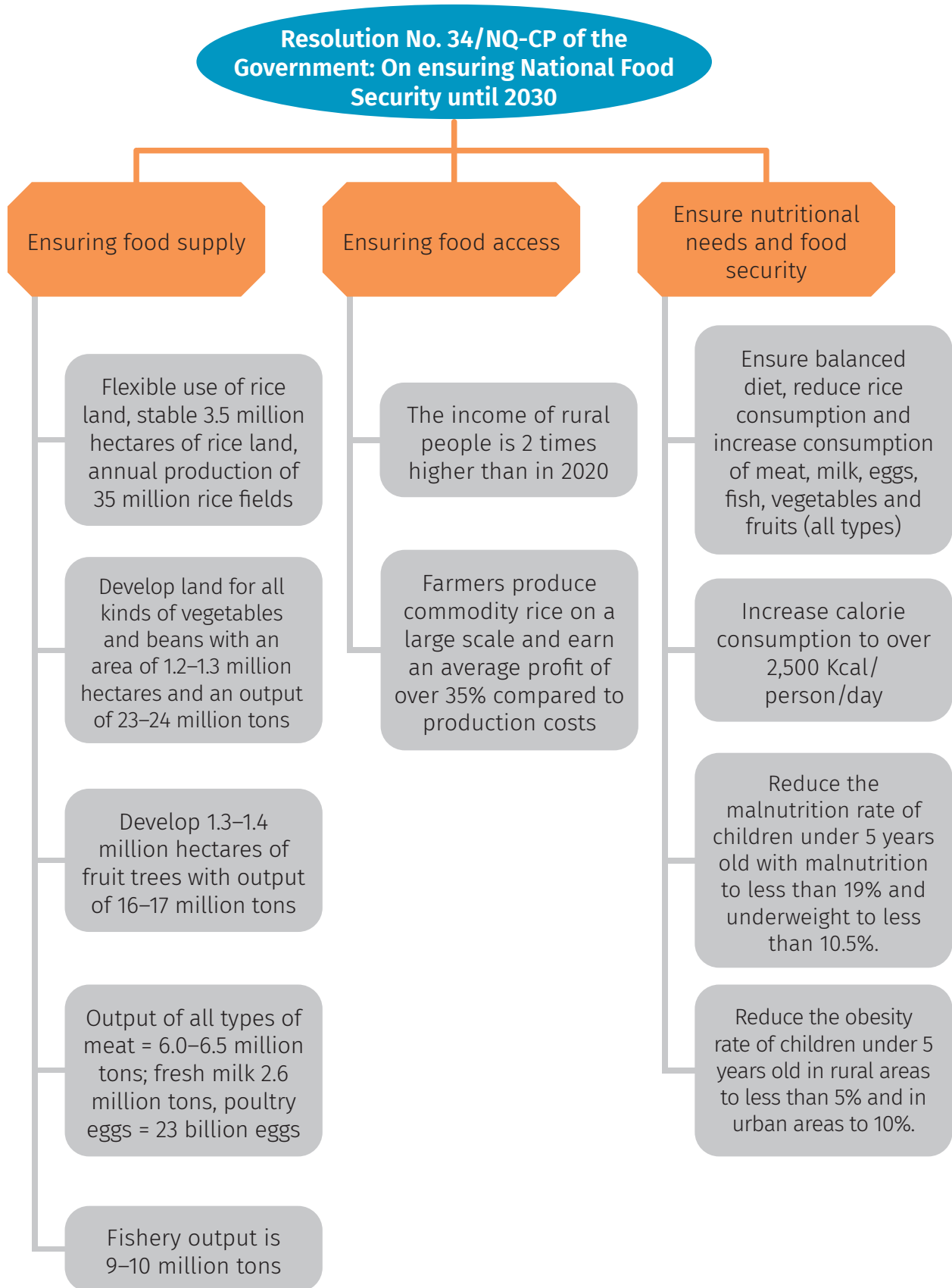


Figure 4. Objectives of the national food security programme until 2030

and consumption, helping to change both producers and consumers' mindsets; (iii) the Ministry of Investment Planning will implement a green classification policy to determine what are green projects; these will motivate international banks and commercial banks to provide capital; (iv) develop green industry with a focus on seafood, fruit and rice products, linking economic restructuring with innovative products to develop a green economy.

- ii. *Activities relating to the production, harvesting, storage, transportation, purchasing, processing, packaging, distribution, preparation, use (e.g., cooking and serving methods), buying and selling of food.* According to MARD and MONRE representatives at the consultation workshop, there lacks information and data relating to the emissions generated during food storage, transportation, purchasing, processing and use. Activities and behaviours that lead to food loss and waste are also not being investigated and monitored in Vietnam; this is an area that needs future research.

- iii. *Stakeholders.* Policy documents show that Vietnam emphasizes facilitating connections between four actor groups: farmers, scientists, business and government. The country also encourages the participation of financial and banking sectors to provide financial schemes to support low emission practice.

- iv. *Purposes and outcome.* The goal of reducing emissions in agricultural production and food systems is associated with that of green transformation; that is, transitioning to a circular, low-emission economy. In Vietnamese legal documents, issues of ecosystem, food, energy and water resource management are thus linked with the issue of climate change. Vietnam's development perspective is based on developing the key economic sector of agriculture towards ecological agriculture, modern rural areas, and a highly skillful farming workforce. Legal documents also emphasize shifting strategic thinking from a local to a global development perspective.

4 Opportunities to develop low-emission food systems in Vietnam and the Mekong Delta

Being central to food production and security in Vietnam, the Mekong Delta is considered a model for implementing the vision of a sustainable food system and reducing emissions, as described in Section 3. The secondary document review and national workshop discussions both highlight many opportunities for the Mekong Delta in implementing a low-emission food system.

4.1 Increased financial commitment to support climate mitigation and food system emissions reduction

The World Bank estimates that mitigating climate change for Vietnam in general and the Mekong Delta region in particular requires reducing emissions and increasing economic resilience, necessitating at least USD 114 million initially and USD 254 million by 2040 (Tran 2023).

During 2016–2020, across the Mekong Delta the average annual budget allocated to 28 provinces and cities for ensuring food security and responding to climate change increased by 53%. This effectively amounted to an increase from 16% to 21% of the total allocated budget (VNS 2022a). As well as state budget allocations, foreign sources of capital relating to emission reduction and food security also generated conditions for policy and practice actions to be implemented more quickly. The World Bank, for example, has provided USD 40 million of funding support for the 1 million hectares of rice emission reduction project, along with USD 60 million for a project to develop the future carbon credit market. USD 20 million of support has also been granted by the World Bank on a non-refundable basis to support the project ‘Developing 1 million hectares of high-quality rice cultivation to reduce emissions associated with green growth in the Mekong Delta to reduce emissions’. This project is also expected to receive VND 12,000 billion of state investment and VND 8,400 billion from the private sector, and the remainder is from

other sources (Do 2023). Nationwide projects that combine rice with aquatic products (like shrimp and rice, or catfish and rice) to reduce emissions, improve economic efficiency, and meet the specific conditions of each locality, are also receiving total funding support of about VND 9,500 billion from the state budget (Cao and Hoang 2018; MARD 2023). The formation of a Vietnamese carbon market, coupled with international carbon market needs, has also created additional incentives, in the form of reducing emissions from the agriculture, forestry and fishery sectors to be able to sell credits and increase income.

The government decision approving the plan to reduce greenhouse gas emissions (including a plan to reduce methane emissions) in the agriculture and rural development sector to 2030, with a vision to 2050 (MARD 2023) provides a number of focuses for the agriculture and forestry sector. These include: replicating agroforestry models to increase carbon stocks and conserve soil; evaluating and selecting successful agroforestry models in diverse ecological regions; providing investment support to replicate selected agroforestry farming models; training and coaching for households, individuals and communities; investment and technical support of agricultural and forestry products; and increasing market access. The associated budget amounts to around VND 704 billion, of which 50% comes from international sources.

In October 2023, the government signed Decision No. 1162/QĐ-TTg dated 8 October 2023 of the Prime Minister, to provide VND 4,000 billion of central budget resources to provinces in the Mekong Delta, to support them to implement projects preventing and controlling riverbank and coastal erosion. To support the region’s economic development through agricultural development, total state budget

capital support for locally-managed projects is expected to be about VND 320,000 billion in 2021–2025, an increase of 23.3% compared to 2016–2020. State budget capital invested through the ministries of transport, agriculture and rural development and health reached about VND 140,000 billion to support implementation of projects in the region (Thanh Liem 2022). Overall, the estimated total for state budget investment in the region during 2021–2025 is about VND 460,000 billion (Thanh Liem 2022).

In addition to state financial resources, the Mekong Delta receives support from the private sector, both within Vietnam and overseas. Six development banks (World Bank, Asian Development Bank, the Agence Française de Développement, KfW Development Bank, the Japan International Cooperation Agency,

the Export–Import Bank of Korea) have collectively committed to sponsoring 20 sustainable development projects in the Mekong Delta during 2021–2025, with a total of about USD 2.2 billion, including overseas development capital and preferential loans (Minh Ngoc 2022).

4.2 Legal foundations for food security are gradually being put in place

The Vietnamese government has instigated many policies on food security and emissions reduction (Bao An 2022; Duy Linh 2023; Nhan Dan Newspaper 2023), providing foundations for development in the Mekong Delta. These policies focus on reducing emissions connected to key agricultural products (Table 1), and range from macro-level to specific policies for the Mekong Delta (Table 2).

Table 1. Emissions reduction strategies for key agricultural, forestry and fishery industries in Vietnam

Industries	Policies, programmes and projects to reduce emissions
Rice	<p><i>Program to develop 1 million hectares of high-quality rice cultivation to reduce emissions in the Mekong Delta</i></p> <p>The project's goal is to form a specialized high-quality rice production area with a production system organized according to the value chain, applying sustainability standards to adapt to climate change and reduce greenhouse gas emissions, improve the efficiency of production and business systems, increase rice growers' income, ensure national food security and social stability, and improve the quality and reputation of Vietnamese rice products on the global market. The aim is for greenhouse gas emissions to decrease by more than 10%, Vietnamese branded rice exports to account for more than 30% of the total rice exports of the entire specialized farming region; and the average profit of rice farmers to be stable and reach more than 40% of total revenue.</p>
Livestock	<p><i>1. Biogas programme for the livestock industry</i></p> <p>Supported by the Dutch government and SNV, the Netherlands Development Organization, this was implemented by the Vietnamese Ministry of Agriculture and Rural Development (MARD) from 2003 to 2020.</p> <ul style="list-style-type: none"> • The biogas programme supported with policies for Vietnam's livestock industry, non-refundable ODA capital from the Dutch government and sponsor Endev Energy Development Fund, starting in 2003. By 2014, support of VND 1.2 million/project also helped Vietnam reduce emissions in livestock farming. • Policy action programme for the transition to sustainable agriculture and food: <ul style="list-style-type: none"> – Using biogas to replace coal and gas for family cooking in rural areas', the goal is that by 2030, 5% of the total number of rural households will use biogas from livestock for cooking purposes. – Biogas power development', 30 MW of biogas power will be installed by 2030 to replace thermal plants, increasing to 150 MW by 2050. <p>Deployed in 53 provinces, to date 181,683 biogas plants have been built, benefiting 1 million people in rural areas. Through this programme, Vietnam has sold 3,072,265 carbon credit units, contributing USD 8.1 million to the budget. The application of biogas plants contributes to reducing emissions from manure and replacing synthetic fertilizers with biological waste.</p>

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Table 1. continued

Industries	Policies, programmes and projects to reduce emissions
	<p data-bbox="416 331 1090 358"><i>2.Livestock development strategy for 2021–2030, vision to 2045</i></p> <p data-bbox="416 369 651 396">This strategy aims to:</p> <ul data-bbox="416 407 1433 705" style="list-style-type: none"> <li data-bbox="416 407 1433 468">• create a favourable environment for livestock enterprises to improve breeding, nutritional feed, livestock processing, science and technology and reduce environmental pollution. <li data-bbox="416 479 1433 568">• support the livestock industry to promote implementation of measures to ensure disease prevention through biosecure livestock farming and strengthen trade promotion to expand Vietnam’s market share in other countries. <li data-bbox="416 580 1433 705">• reorganize the livestock industry towards industrial and semi-industrial farming (associated with traditional and organic livestock), gradually reducing small-scale farming; at the same time as building a centralized industrial slaughtering and processing system. <p data-bbox="416 716 1433 871">to develop a livestock value chain that links farmers into cooperative groups to facilitate capital support and investment into feed, breeding, animal welfare and consumption of animals. Through cooperatives, it is necessary to promote the role of businesses and associations to control epidemics, cut down intermediaries, and ensure the safety of food; at the same time as regulating market supply and demand.</p> <p data-bbox="416 922 1410 1012"><i>3.Decision No. 1693/KH-BNN-KHCN, approving the Plan to reduce greenhouse gas emissions (including a plan to reduce methane emissions) in the agricultural and rural development sector until 2030, with a vision to 2050</i></p> <p data-bbox="416 1023 1345 1050">This also specifies emission reduction directions for the livestock industry, including:</p> <p data-bbox="416 1061 1225 1088">(i) Improving food rations for dairy cows, beef cattle, buffaloes, and goats:</p> <ul data-bbox="416 1099 1401 1245" style="list-style-type: none"> <li data-bbox="416 1099 1106 1126">• use silage forage in the diet to minimize methane emissions <li data-bbox="416 1137 818 1164">• use food mixing analysis software <li data-bbox="416 1176 1401 1245">• use preparations that inhibit methane synthesis or absorption (3NOP, activated carbon, Zeolite) and roughage with high tannin content in the diet <p data-bbox="416 1256 1390 1346">(ii) Improving technology to reuse livestock waste as organic fertilizer: applying microbial technology in composting, and faeces and urine separation technology in pig farming to improve the efficiency of livestock waste treatment and organic fertilizer production.</p>
Fisheries	<p data-bbox="416 1361 1230 1388"><i>Environmental protection programme for the fisheries sector for 2021–2030</i></p> <p data-bbox="416 1400 1414 1460">This identifies development goals for the fisheries industry as developing circular economy and green economic models for environmental protection and sustainable development.</p> <p data-bbox="416 1471 1433 1722">To reduce emissions, the fisheries industry is striving to develop a circular economy model, in which design, production, consumption and service activities aim to reduce the exploitation of raw materials, extend product life cycles, limit waste generated and minimize negative environmental impacts. The circular economy model will encourage the application of technical advances in processing, preserving and transporting seafood, reducing post-harvest losses to utilize and save input materials, encourage research and development, and produce economically valuable products from by-products to reduce emissions and utilize resources.</p> <p data-bbox="416 1733 1409 1859">A sustainable approach is also important for international markets; the EU imposed a ‘yellow card’ on Vietnamese seafood exports in 2017 in relation to illegal, unreported, and unregulated (IUU) fishing. Sustainability must be guaranteed if the EU are to lift this yellow card status (VnExpress International 2023).</p>

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Table 1. continued

Industries	Policies, programmes and projects to reduce emissions
	<p>The ultimate goal is to preserve biodiversity and resources in the sea. The shrimp industry in particular needs to convert to a circular economy production model. The goal is to encourage 'green' inputs, and the reuse of all waste sources for other production processes. Shrimp farming households and farms should therefore convert to closed circulation, multi-species farming in one pond and combined production farms (that produce shrimp alongside other species), as well as use 'green' inputs like solar power, stop using chemical fertilizers, increase organic absorbing species (suspended matter), and increase inorganic absorbing species (nitrogen, phosphorus) (Chu Khoi 2023).</p> <p>The Department of Fisheries is also tasked with investigating, evaluating, cataloguing, monitoring and producing statistical data on substances that deplete the ozone layer, as well as energy use in fisheries, to identify activities to reduce GHG emissions in the fisheries sector after 2030 (MARD 2023).</p>
Agricultural	<p><i>Decision approving the greenhouse gas emissions mitigation plan (including a methane emission reduction plan) in the agriculture and rural development sector to 2030, with a vision to 2050 (MARD 2023)</i></p> <p>Scaling up agroforestry models to improve carbon stocks and conserve soil; evaluating and selecting successful agroforestry models in diverse ecological regions; investment into replicating selected agroforestry farming models; training and coaching for households, individuals and communities; investment and preliminary processing of agricultural and forestry products; and market access. These goals are supported with a budget of about VND 704 billion, of which 50% of the budget is from international sources.</p> <p>The state has a mechanism to provide capital support to households participating in forest protection and development, to develop agroforestry, non-timber forest products, livestock raising, and growing agricultural crops. This financial support is given as alternative income to farmers who have not generated income from forest-related activities, thereby reducing the clearing of forests.</p> <p>The state also has objectives for land area intended for production forest development: 0.62 million hectares of depleted natural forest land will be used for forest restoration and agroforestry production. Various forest garden, agroforestry and forestry extension models will be used to implement this project. These have proven highly effective, with the result that many agroforestry models yield an average harvest of VND 8–10 million/ha/year</p>
Vegetables	<p><i>Decision No. 1693/KH-BNN-KHCN approving the plan to reduce greenhouse gas emissions (including a plan to reduce methane emissions) in the agricultural and rural development sector until 2030, with a vision to 2050</i></p> <p>Improve economic efficiency by converting ineffective rice land to upland crops suited to the specific conditions of each locality.</p> <ul style="list-style-type: none"> • Expand application of technical cultivation and management measures for upland crops (e.g., fertilizer application, pest and disease management, economical water management). • Replace urea nitrogen fertilizers with slow-release fertilizers, controlled-release fertilizers and high-quality complex fertilizers, improve fertilizer use efficiency, and reduce GHG emissions. • Collection, management and reuse of crop residues; apply centralized collection, treatment and reuse processes and technologies to improve economic efficiency and reduce emissions.

Source: MARD (2021, 2023), Hai Anh (2022), Anh Quang and Ngoc Son (2023), Prime Minister (2022a), Pham Hai (2023), Phung (2023).

Table 2. Macro-level policies with significant influence on the implementation of low-emission food production systems

Year	Policy	Contents
2017	Resolution No. 120/NQ-CP dated 17 November 2017 on sustainable and climate-resilient development of the Mekong River Delta	The government directed the Ministry of Planning and Investment to formulate a masterplan for development of the Mekong Delta, as well as assigned the Ministry of Planning and Investment and the Ministry of Finance to develop mechanisms and policies to mobilize, manage and effectively use resources for the development of the Mekong Delta region.
2021	Resolution No. 41/NQ-CP dated 1 April 2021 of the Government on the Government’s regular meeting in March 2021	The government agreed to borrow USD 2 billion from foreign development partners in the form of development project financing to respond to climate change in the Mekong Delta.
2022	Decision approving development of the Mekong Delta region for 2021–2030, vision to 2050	<ul style="list-style-type: none"> • Develop the Mekong Delta in the direction of sustainable development, green growth and climate change adaptation; focus on protecting, improving and developing natural, social and economic capital; take a people-centred approach; consider water resources as key; integrated management of water resources throughout the basin to ensure environmental resources are maintained for both environment and people; transforming livelihood models in subregions towards proactive climate change adaptation. • Transform from a growth model towards increased efficiency and value, focusing on effectively promoting human resources, science and technology, innovation, promoting urban and industrial development, and digital transformation in natural resources development. • Transforming the development model from distributed and small to centralized; developing agricultural economic clusters associated with urbanized and industrialized areas to catalyse development. • Strengthen links between localities within the Mekong Delta, with Ho Chi Minh City and across the southeast region; expand trade with countries in the ASEAN region, particularly countries in the Mekong subregion. • Streamline socioeconomic development with ensuring national defence and security, maintaining political stability and social order and safety; focus on ensuring food security, and protecting water resources, borders, seas and islands. <p>Improvements and reforms that, if actioned, could ensure a better food production system in the Mekong Delta include:</p> <ul style="list-style-type: none"> • Promote scientific research in new fields like circular economy and payments for ecosystem services, and improve the application of science and technology to increase the added value of products. • Comprehensive development of the product chain according to the competitive advantages of each segment. • Innovation in land management to encourage concentration and accumulation of land to serve large-scale, highly competitive and effective agricultural commodity production. Although encouraging large-scale production and land accumulation will reduce the costs of export reduction, land accumulation often has a disproportionately large impact on vulnerable groups. If there is no social safety policy to support this group, it can lead to negative consequences.

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Table 2. continued

Year	Policy	Contents
		<ul style="list-style-type: none"> • Focus on a regional approach based on the Mekong Delta Coordination Council model, and strengthen cooperation with Mekong subregion countries. Resolving cross-border issues through alliances and the Coordination Council not only helps Vietnam enhance its position in the region, but also solves macro issues of institutions and policies. Awareness raising in the agricultural, forestry and fisheries sectors using a mechanism to encourage businesses, organizations, communities and people to participate in the value chain through production, processing and consumption of key products, and develop agricultural economic clusters in the region. • Mobilize sustainable financial resources from foreign organizations and businesses, and build a market to pay for environmental and ecosystem services to ensure investment in ecosystem restoration. • Transform agricultural production models.
2023	<p>Resolution on Government's Action Plan for implementation of Resolution no. 31-Nq/TW dated 30 December 2022 of the Politburo of Vietnam on Tasks and Directions for the Development of Ho Chi Minh City by 2030, with a vision to 2045</p>	<ul style="list-style-type: none"> • Improve institutions and development policies and promote regional connectivity. • Develop development plans for each locality in the region on the basis of the Mekong Delta Regional Plan for 2021–2030 with a vision to 2050, ensuring a connected, streamlined, unified approach that is efficient and effective in the long term. • Accelerate the pace of urbanization and improve the quality of life of people living in urban areas in response to climate change; develop economic zones in key urban areas, as well as industrial parks and industrial clusters. • Develop agricultural hubs associated with specific agricultural produce areas, connecting with urban centres, including: a generalized hub in the city of Can Tho connected to logistics and services development in Hau Giang; hubs in An Giang and Dong Thap connected to areas producing fruit, freshwater aquatic products and rice; hubs in Kien Giang, Ca Mau, Soc Trang connected to coastal aquatic raw produce areas; and a hub in Tien Giang and Ben Tre for fruit and vegetable growing areas. • Invest in new construction and modernization of irrigation systems to upgrade and ensure sustainable agricultural development in diverse ecological subregions; integrate irrigation works and basic infrastructure in areas needing immigration; implement a project to prevent and control riverbank and coastal erosion by 2030. • Prioritize the development of socioeconomic infrastructure systems, especially transportation infrastructure, and improve the transportation network; rapidly develop infrastructure to respond to climate change; develop modern, efficient information technology infrastructure; promote links between, and integration of, urban economic corridors. • Promote regional economic restructuring, moving from a growth model to enhanced application of scientific and technological innovations so as to develop a digital, green and circular economy that considers the ecosystem, respecting the biodiversity, culture and people of the Mekong Delta. • Developing a green industry using clean, renewable energy associated with forest and coastal protection; develop industry by focusing on processing and information technology. • Develop sustainable, ecological agricultural commodities focusing on key products, including seafood, fruit and rice, associated with agricultural, forestry and fisheries clusters and hubs; focus on improving agricultural production efficiency, and developing high-tech clean, organic agriculture in new rural areas.

continued to next page

Table 2. continued

Year	Policy	Contents
		<ul style="list-style-type: none"> • Develop the marine economy, with a focus on tourism, marine services, maritime economy, oil and gas exploitation, renewable energy, offshore aquaculture, economic zones, coastal industrial zones, regenerating aquatic resources and protecting marine biodiversity, developing Kien Giang into a national marine economic centre. • Strengthen the management and effective use of resources, especially land and water resources; protect the environment, respond to natural disasters and proactively adapt to climate change. Use a zoning system to extract, use and protect water sources; control and limit use of underground water sources and pilot flow regulation; put in place policies and financial mechanisms specific to the region's water sector; promote international cooperation to protect and effectively use Mekong River water resources. Proactively control floods, prevent and combat riverbank erosion; invest in irrigation systems to control water sources; increase the region's capacity to proactively extract, store and drain water and regulate floods; establish a biodiversity corridor connecting Ca Mau Cape National Park, Dam Doi Bird Sanctuary, and Can Gio Biosphere Reserve; form a biodiversity research centre in Phu Quoc. • Develop science and technology, using innovation and digital transformation to drive regional economic growth. Develop and apply biotechnology and environmental technology to develop circular economic models. • Focus on investing and developing digital infrastructure to support a digital government and economy. Improve operational efficiency in high-tech and information technology parks; develop a Regional Centre for Entrepreneurship and Innovation in the city of Can Tho; and ensure Can Tho High-Tech Park becomes a national example which can be learnt from. • Ensure adequate budget allocation to the region; prioritize resources and appropriately phase investment for key projects. Improve the environment for business investment, attract and effectively use loans and private capital through public-private partnerships (PPP).
2023	Resolution No. 78/NQ-CP dated 18 June 2022 of the Government	Prime Minister Pham Minh Chinh signed Resolution No. 78/NQ-CP dated 18 June 2022 of the Government on the Government's Action Programme to implement Resolution No. 13-NQ/TW dated 2 April 2022 on the direction of socioeconomic development and ensuring national defence and security in the Mekong Delta until 2030, with a vision to 2045.
2021	Decision No. 854/QĐ-TTg approving the project to improve agricultural cooperatives' capacity to adapt to climate change in the Mekong Delta, 2021–2025.	<p>Project aims are to:</p> <ul style="list-style-type: none"> • Enhance capacity to proactively apply adaptation measures, limit negative impacts, and take advantage of any opportunities brought on by climate change to support sustainable economic development. • By 2025: <ul style="list-style-type: none"> – 100% of agricultural cooperatives in the Mekong Delta will receive capacity building and training to increase their awareness of climate change and potential adaptation measures in business, production, processing and preservation within agriculture, forestry and fisheries; – Each province will have 3–5 agricultural cooperatives using effective climate change adaptation measures, as well as circular economy models that based on research, education and replication; – 100% of agricultural cooperatives in the Cai Lon–Cai Be watershed will be applying effective climate change adaptation measures; – Basin cooperatives will increase economic efficiency per unit of agricultural land area by an average of 10% or more; – Collective economic forums, information sharing on climate change, and application of science and technology initiatives will all support agricultural cooperatives to adapt to climate change in the Mekong Delta.

In addition to developing more streamlined macro-level policies, the Vietnamese government is also implementing domestic price stabilization policies. For example, to stabilize domestic rice prices, the Ministry of Industry and Trade has a policy to limit and manage the amount of rice exported, while MARD has a policy to limit the number of seeds exported (Ha and Ha 2023).

In parallel with macro policies, institutional and financial solutions (Figure 5 and Figure 6), Vietnam is also developing region-specific policies for the Mekong Delta (Table 2).

Alongside these central policies, sectors and provinces in the Mekong Delta also have their own development policies (Table 3).

4.3 Brand superiority and international market dominance of Mekong Delta products

Agricultural and forestry products from the Mekong Delta have dominated various international markets.

Rice. Vietnam is the second largest rice exporter in the world after India. Most of Vietnam's rice exports come from the Mekong Delta. Vietnamese rice is high quality and competitively priced, so is favoured by many markets around the world, especially Asian markets like those of China, Japan and Korea (Song Ha 2022). Market demand for Vietnamese rice products increased sharply after India, United Arab Emirates and Russia banned food exports to ensure food security for their countries. China, the Philippines, Indonesia, Turkey and Chile have since competed to buy 40% more rice from Vietnam, and are willing to pay a higher price (USD 20–40/ton) than prices before these bans were issued (Ha and Ha 2023). In August 2023, the export price of rice from Vietnam increased by 22% from the previous month, averaging USD 654 /ton (USDA 2023). Following the export bans, the volume of rice exports from Vietnam also increased by 40%, reaching 921 million tons. In August 2023, Vietnam surpassed Thailand to become the world's second-largest rice exporter, with a total volume of 5.9 million tons. Vietnam's main export markets are currently the Philippines, Indonesia, Ghana, China and Malaysia (USDA 2023).

Aquaculture. The Mekong Delta accounts for approximately 70% of Vietnam's total aquaculture area. It is the largest region in terms of production value, contributing about 65% towards total production value nationwide (VASEP 2023). The main aquatic products exported from the Mekong Delta to European and American markets include shrimp and tra fish (Anh Duong 2020a). The two main aquatic species in the region are tra fish, which contributes about 98%, and shrimp, which contributes about 63% of the total national production (VASEP 2023). In 2021, export of aquatic products from the 13 Mekong Delta provinces reached approximately USD 2 billion, accounting for 60% of total exports, compared to 6 provinces in the Southeast region which accounted for 18% of exports with USD 602 million, and the remaining exports coming from provinces in the Central and North regions (VFM 2021). The Tra Fish Association said price and demand for tra fish – which mostly comes from the Mekong Delta – increased from 40% to 200% in most markets; in 2023, China and the United States were the largest markets for Vietnamese tra fish, accounting for 30% and 23%, respectively (VFM 2022).

Fruit. This has been a rapidly growing agricultural export product in the Mekong Delta in recent years. The area of fruit trees has been steadily increasing across the region, from 287,000 hectares in 2010 to 377,000 hectares in 2020 (Cao Phong 2021). In 2020, across Vietnam, the export value of fruit reached USD 3.36 billion, with major markets being China, the United States, Thailand and Korea. In 2021, many specialty fruits from the Mekong Delta increased production, including: grapefruit reaching 143,300 tons, up 2.4%; dragon fruit reaching 326,300 tons, up 4.3%; mango 236,700 tons, up 1.3%; pineapple 134,300 tons, up 7%; and bananas 653,400 tons, up 2.5% compared to the same period in 2020 (Gia Bao 2021).

According to the participants of the consultation workshop, international trade agreements relating to the traceability of agricultural products, environmental requirements and reducing emissions will be a positive lever for the Mekong Delta to develop its food production system in a comprehensive manner, particularly since Vietnam is the only country in the

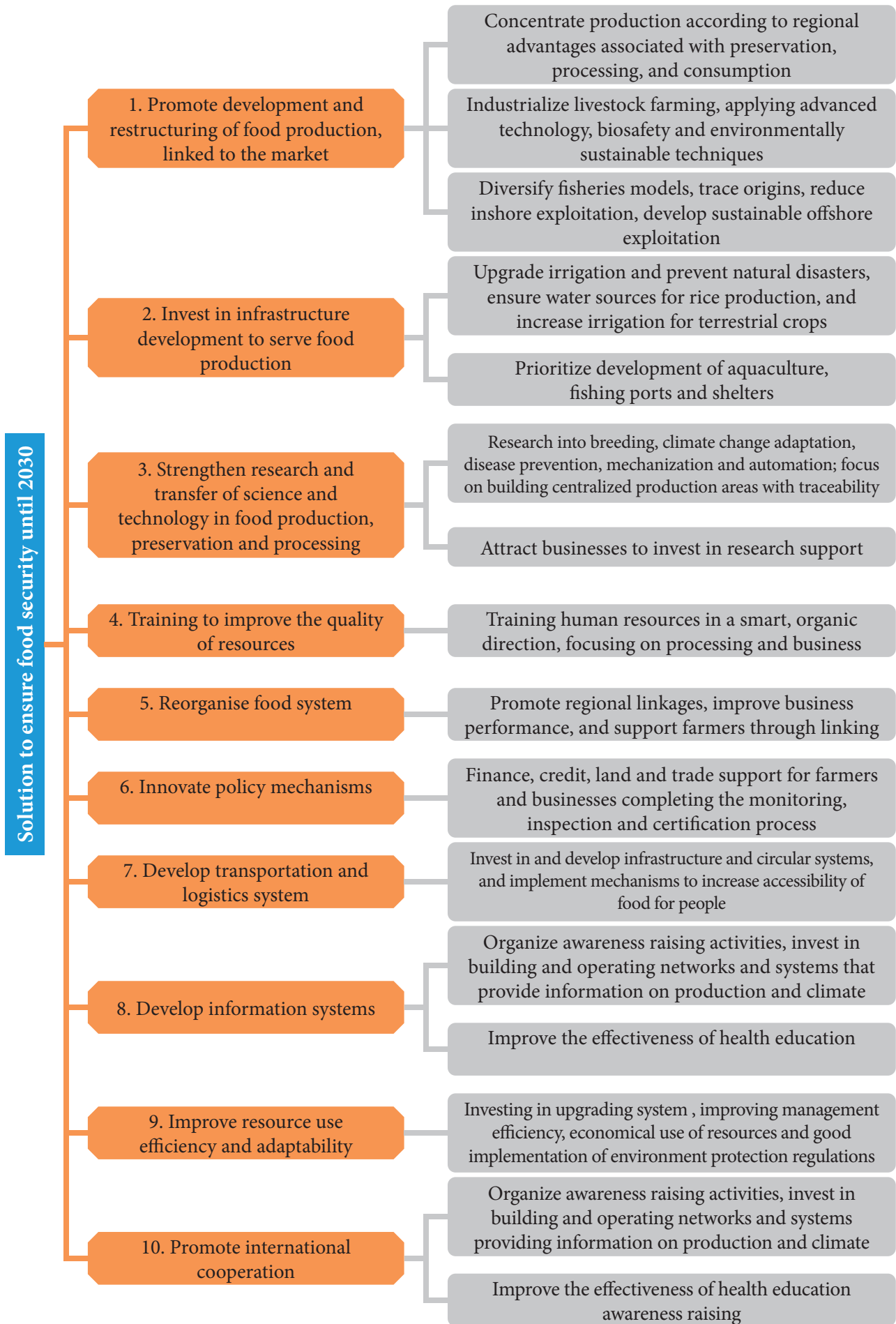


Figure 5. Solutions to ensure food security until 2023

Source: Government of Vietnam 2021

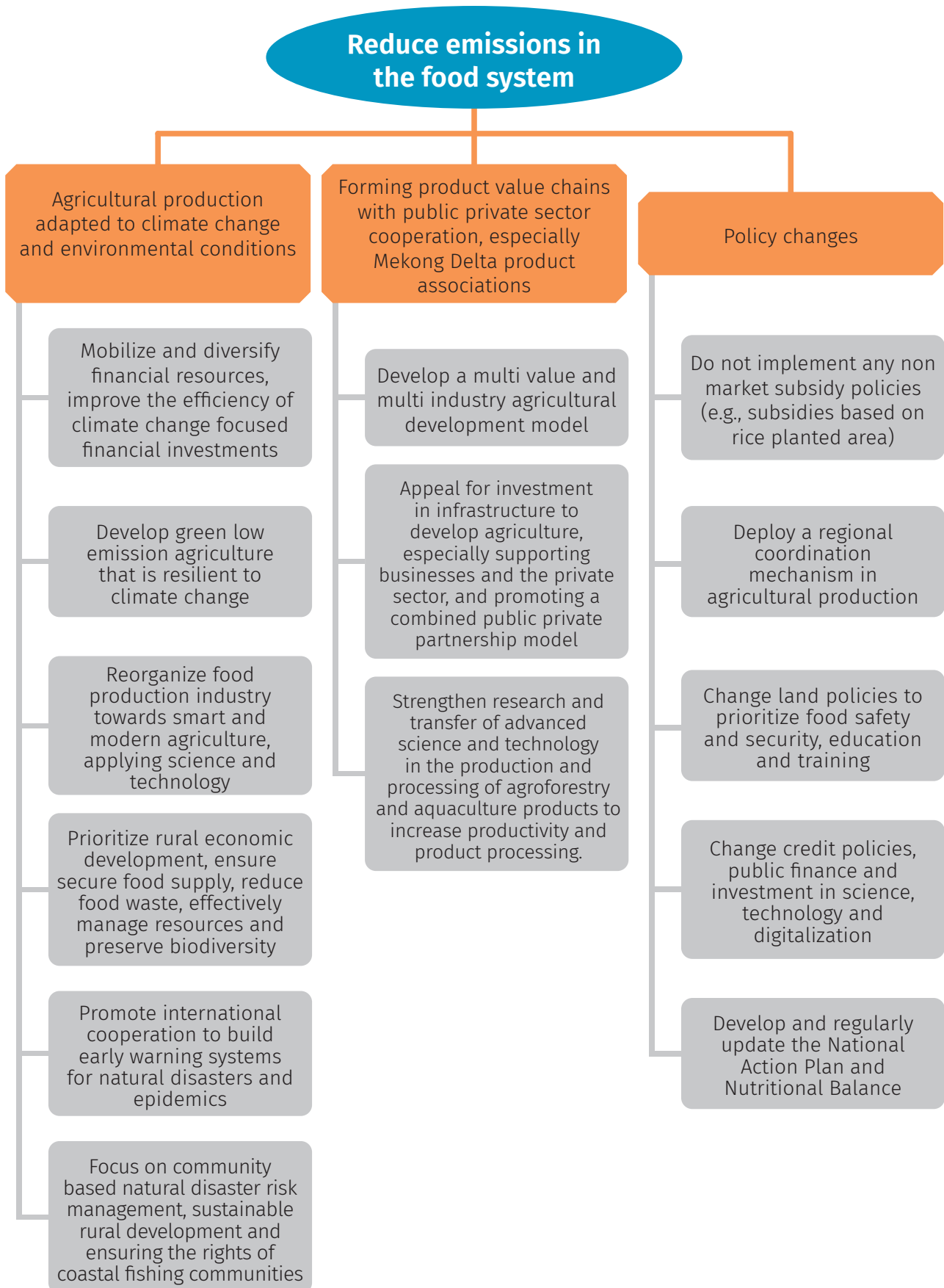


Figure 6. Solutions for a low-emission food system in Vietnam

Sources: Compiled by the author based on secondary document review

Table 3. Province-level policies for socioeconomic development, environment and food security in the Mekong Delta

Provinces	Strategic visions
Ca Mau	<ul style="list-style-type: none"> • Applying science and technology to further improve rice productivity; the province is changing varieties in areas with suitable conditions to improve rice quality, focusing on ecological rice production to produce organic rice that meets international standards, and enhancing the value chain in these areas. • Over the last two years, Ca Mau has scoped for areas with suitable conditions for the expansion of specialized shrimp–rice production areas, to increase the sources of export food. As a result, shrimp–rice production area has increased from around 35,000 hectares to around 37,000 hectares. In areas where it is not possible to increase production area, Ca Mau is promoting scientific and technological advances to help farmers increase productivity by about 0.3 tons/ha/crop. If successful, this venture will continue in future. So far, this has resulted in an additional rice output of around 20,000 tons. • Ca Mau has deployed shrimp–rice production since October 2009, for the purposes of sustainable production and climate change adaptation. Thanks to the application of scientific and technical advances in production, this model has contributed to improving productivity, rice output and aquaculture. This is an example of a fairly sustainable livelihood model for rice-growing areas previously affected by salinity (Tuyet Minh 2021). • Starting with a review of the area of land affected by salinity and ineffective production of two rice crops, Ca Mau switched to producing one shrimp crop and one rice crop simultaneously. At the same time, the province has focused on investing in irrigation infrastructure to create conditions for this shrimp–rice production model to be deployed and replicated in places with favourable conditions. Since 2012, this has successfully produced large rice–shrimp rotation fields. Implementation of this model has gradually increased people’s awareness and shifted individual and small-scale production practices, resulted in community links and created a stable and favourable environment for more sustainable and environmentally-friendly production practices. Prior to implementation, Ca Mau undertook capacity building and implemented activities to improve production related facilities and technology (Tuyet Minh 2021). • Until now, the shrimp–rice model has been implemented over an area of nearly 40,000 hectares across the province (mainly in the districts of Thoi Binh, U Minh, Tran Van Thoi, Cai Nuoc and Ca Mau City). This has seen positive results, with positive impacts in farmers’ awareness and production practices; and improvements in the management capacity of specialized and government agencies at all levels. Average rice yield has increased from 3.65 tons/ha to 4.33 tons/ha, an increase of 19%, while average shrimp yield has increased from 356 kg/ha to 531 kg/ha, an increase of 48.91%. The shrimp–rice model is considered sustainable for areas affected by saltwater intrusion (Tuyet Minh 2021). • In addition to the shrimp–rice model, Ca Mau is also implementing numerous other models, like integrated pest management (IPM), large-scale and value chain-wide cooperation models for rice production. • To ensure food security, Ca Mau is implementing rice land planning. By 2020, it had stabilized the land area for specialized freshwater rice production to around 51,000 hectares, as well as formed two high-tech agricultural production zones, each with an area of about 200 to 500 hectares. Alongside this the province has implemented irrigation and intensive farming measures to increase crops and increase productivity; these areas grow two rice crops or one rice crop in rotation with one cash crop; some low-lying areas have also developed the fish–rice model. For shrimp-farming areas, especially in northern Ca Mau, the province has encouraged continuous production of one rice crop on shrimp-farming land in places with favourable conditions; land area being used like this increased from 43,000 to 45,000 hectares between the periods of 2010–2015 and 2016–2020, with a stable area of about 45,000 hectares now being maintained. • The province has developed a context-specific policy to ensure food security, and taken advantage of globalization opportunities to implement breakthrough policies that specifically support production-related businesses, cooperatives and farmers.

continued to next page

Table 3. continued

Provinces	Strategic visions
	<ul style="list-style-type: none"> • The province is strengthening links between farmers, cooperatives and businesses to ensure food security and organize production processes along the entire value chain, from seeding to harvesting, processing and consumption. Businesses play an important role, contributing to increased competitive advantage, added value and sustainable agricultural development. • The province aims to appropriately resolve issues arising during the process of ensuring food safety. It aims to promote the application of scientific and technological advances in production to reduce costs and prices, improve the quality of agricultural products, protect the agricultural environment and public health. Pilot projects are considered key in the transfer of scientific knowledge and technological advances in production so as to implement and replicate effective agricultural production models. • The aims of restructuring the agricultural sector are to provide practical benefits for farmers, increase the added value per unit of agricultural product, protect the ecological environment, and modernize agriculture in a safe, sustainable and efficient way. • To ensure food safety through this restructuring of the agricultural sector and the building of new rural areas, Ca Mau Province plans to implement the following solutions: <ul style="list-style-type: none"> ◦ have policies to maintain and effectively use land designed for rice cultivation ◦ promote agricultural production and improve productivity through structural transformations ◦ strengthen food storage capacity and improve agricultural supply chain efficiency ◦ promote implementation of a 'green revolution' in agriculture ◦ proactively prevent and overcome the effects of climate change and epidemics, as well as pressures from population growth and urbanization. ◦ develop rural infrastructure and reduce obstacles to investment in agriculture ◦ build a food security information system ◦ improve access to food for all people, developing resources to serve food security goals ◦ strengthen international cooperation on food safety and continue to integrate more into the international agricultural and food markets ◦ raise public and farmers' awareness around food security.
Bac Lieu	<ul style="list-style-type: none"> • Stabilize the area of land dedicated to wet rice cultivation to 58,600 hectares in the freshwater subregion north of National Highway 1A. • Expand rice production on shrimp–rice land with an area of 45,000–60,000 hectares in the subregion north of National Highway 1A. At the same time, invest in completing infrastructure, especially the irrigation system that separates salt and fresh water, and the dredging of canal systems that are silted up. Develop high-quality commodity rice production areas, with both specialty rice and salt-resistant rice coming under the Bac Lieu brand. • Focus on building large-scale rice approaches, striving to improve the value-added chain and develop sustainably; building links between businesses and farmers; producing high-quality rice products under the Bac Lieu brand; and ensuring high-quality, disease-free rice seed production areas to meet the demand for production rice seed. • Recommend farmers apply intensive yet sustainable farming methods and comply with environmental regulations in the use of materials and agricultural waste treatment; apply economical irrigation technology and use new high quality, high-yielding rice varieties that are pest resistant and adaptable to climate change, being drought and salt tolerant. • Effectively implement credit policies to serve agriculture and rural areas; these policies should encourage the development of cooperations and associations associated with the production and consumption of agricultural products. Create favourable conditions for farmers to access credit policies to invest in agricultural development and expand production scale business. • Take advantage of central government support to invest in development, particularly investing in infrastructure to serve production. • Promote investment by building high-tech agricultural zones linked with processing, consumption and eco-tourism.

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Table 3. continued

Provinces	Strategic visions
	<ul style="list-style-type: none"> • Promote research, application and transfer of new scientific and technological advances in production, aligned with each subregion’s advantages. Strengthen relationships with domestic and foreign organizations and universities around scientific and technological research cooperation and the transfer of scientific and technological advances so that new technologies are applied to real production. • Encourage the participation of businesses, especially non-state enterprises in research and the transfer of scientific and technological advances. • Promote the development of links associated with agricultural product consumption, build large-scale farming approaches, and create conditions for household economic development by linking in and collaborating with businesses and cooperatives around the production and consumption of farming households’ products. Invest in building a warning forecasting natural disasters, hydrometeorology, closely monitoring the processes of climate change, sea-level rise, saltwater intrusion and crop diseases, developing timely response plans to each threat.
Soc Trang	<ul style="list-style-type: none"> • Develop specialty rice production across the province during 2022–2025, contribute to the creation of concentrated production areas, and apply scientific and technical advances for high quality, uniform production with low production costs. • Mechanize harvesting and create large raw material areas, promoting links between the production and consumption of products through contracts. Resolve challenges with seed, maintaining seed quality without degeneration to ensure rice quality.
Dong Thap	<ul style="list-style-type: none"> • The province has implemented solutions to develop the rice industry into a key export industry in a sustainable manner, focusing on the following: encouraging farmers to improve rice quality, increasing the area used for certified, high quality and specialty varieties of rice; strictly manage areas that produce for export; improve the capacity to monitor, predict and effectively prevent harmful organisms. • Advise farmers to focus on improving production efficiency through reducing the cost of fertilizers, pesticides and seeds, widely applying advanced, sustainable rice production processes (IPM, 3G3T, 1P5G, SRP) and good agricultural practices, efficient rice cultivation adapted to climate change, organic rice production combined with traceability, and harvesting at the right time. • Operate the Emission Reduction Initiative Alliance. Dong Thap Provincial People’s Committee and key industry associations have also committed to strengthen public-private cooperation, coordinate resources and step up efforts, particularly through innovative solutions and creative startups, to reduce emissions in the region from 2023. • Pilot at least one innovative ‘emission reduction/low emission generation’ solution in a key agricultural field (fruit, rice, seafood) within the province and evaluate the pilot in 2024 to see if it can be replicated. During 2023–2025, encourage an ecosystem of innovation and creative startups associated with ‘low emission agriculture’. Dong Thap Province Emission Reduction Initiative Alliance aims to effectively promote the efforts of all stakeholders; contributing to forming an ecosystem of innovation and creative startups associated with the theme and goal of reducing agricultural emissions for the province and the region.

Sources: Tuyet Minh 2021, Minh Dat 2020, Tuyet Nghia and Tung Duy Phong 2023, Khanh Anh 2022

Asia-Pacific region with a free trade agreement with the European Union. After the European Union–Vietnam Free Trade Agreement (EVFTA) came into effect, tariffs on many types of Vietnamese fruits and vegetables were reduced from 10–20% to 0%, thus creating favourable conditions for Mekong Delta products to enter the EU market (VNA 2021c).

4.4 Inter-level and inter-sectoral organizational structures

The issue of food production and security in Vietnam and the Mekong Delta requires multi-level and multi-sectoral mechanisms and linkages. Establishing multi-sectoral and central-to-local tools to form and implement a socioeconomic and environmental development plan for the Mekong Delta will create the enabling conditions required for Mekong Delta provinces to develop. For example, Resolution 78/NQ-CP on the Government’s Action Programme to implement Resolution No. 13-NQ/TW of the Politburo dated 2 April 2022, assigned relevant agencies to organize policy making and implementation in the Mekong Delta, including administrative agencies at all levels, central and local ministries and sectors, government and Party agencies, Chairmen of People’s Committees of Mekong Delta provinces and cities, the National Assembly, the Vietnam Fatherland Front, the Central Propaganda Department,

news agencies, newspapers, and sociopolitical organizations. The resolution aims for these stakeholders to work closely to strengthen all policies related to food security.

Decision 287/QĐ-TTg, approving the Mekong Delta region plan for 2021–2030, with a vision to 2050 (Prime Minister’s Office 2022a) and Decision No. 52/QĐ-HDDPDBSCL on Promulgating the operating regulations of the Mekong Delta Regional Coordination Council (Mekong Delta Regional Coordination Council 2023) also assigned specific tasks to ministries, sectors and localities (Table 4).

In addition to policies, ministries and local governments have developed initiatives like the Mekong Forum, organized by the Ministry of Agriculture and Rural Development in collaboration with the People’s Committee of Dong Thap Province with the theme ‘Modern, circular, low-carbon agriculture’ held in Dong Thap Province in the Mekong Delta on 20 December 2022, to identify the challenges and opportunities for promoting value chains and the entire agricultural sector in the Mekong Delta region (Thuy An 2022). Meanwhile, another forum, Mekong Connect 2022, aimed to find solutions for economic development, connectivity and integration of resources for sustainable development in the Mekong Delta region (VNS 2022b).

Table 4. Main functions and tasks of relevant stakeholders in the formulation, implementation and monitoring of economic, social and environmental policies in the Mekong Delta

Agency	Main functions and tasks
Ministry of Planning and Investment	<ul style="list-style-type: none"> • Organize publication and sharing of the Mekong Delta region plan for 2021–2030, with a vision to 2050. • Lead, and coordinate with ministries, sectors and localities in the region, to review, formulate and submit to the Prime Minister for approval, plans, policies, solutions and resource allocation for plan implementation. • Lead, and coordinate with ministries, sectors and localities in the region, to evaluate plan implementation; monitor, supervise and inspect the implementation of provincial, urban, rural, technical and specialized plans in the region; and supervise the implementation of key investment programmes and projects with regional scale and characteristics. • Research and propose mechanisms to increase links and coordination between localities in the region; lead and coordinate with relevant ministries and agencies to promote investment and solicitation activities for key projects in the region; promote and advertise to attract domestic and foreign investors and economic sectors, so that they participate in plan implementation.

continued to next page

Table 4. continued

Agency	Main functions and tasks
Relevant ministries and agencies	<ul style="list-style-type: none"> • Organize the implementation of planning within their field of management, in accordance with authority. • Coordinate with the Ministry of Planning and Investment to review, formulate, and submit to the Prime Minister for approval, plans, policies, solutions and resource allocation for the implementation of plans; review and submit proposals to competent state agencies on mechanisms and policies that effectively implement the objectives and development goals set out in planning. • Coordinate with the Ministry of Planning and Investment in implementing, monitoring and evaluating plan implementation, monitoring key investment programmes and projects at regional scale in priority order (in their respective field of management) to promote socioeconomic development in the region.
People's Committees of provinces and cities in the Mekong Delta region	<ul style="list-style-type: none"> • Organize the preparation of provincial plans that ensure linkages and consistency with the Mekong Delta region plan (2021–2030, vision to 2050). • Coordinate with the Ministry of Planning and Investment and relevant ministries and agencies to develop and submit to the Prime Minister for approval plans, policies, solutions and state budget allocation for plan implementation; review and propose to competent state agencies specific mechanisms and policies to effectively implement the objectives and development goals set out in the plan. • Coordinate with relevant ministries and agencies to ensure investment promotion and solicitation activities are coordinated interprovincially to improve investment efficiency; promote and advertise so as to attract domestic and foreign investors and economic sectors to participate in implementing the plan. • Review, evaluate, adjust or prepare new plans, programmes and investment projects in accordance with the Mekong Delta region plan (2021–2030, vision to 2050). • Organize supervision and inspection of development project implementation in the locality, according to the assigned functions, and report to the Prime Minister.
Mekong Delta Region Coordinating Council	<ul style="list-style-type: none"> • The Mekong Delta Region Coordinating Council is an intersectoral organization established to assist the Prime Minister in reviewing, directing, coordinating and resolving important intersectoral issues related to regional connectivity and sustainable development in the Mekong Delta region. • Deputy Prime Minister Le Minh Khai is Chairman of the Coordinating Council. Vice Chairs include: Minister of Planning and Investment (Permanent Vice Chairman); Minister of Natural Resources and Environment; Minister of Agriculture and Rural Development; Minister of Transport. • Members of the Coordinating Council include: <ul style="list-style-type: none"> ◦ Deputy Ministers and equivalent in the following ministries and agencies: Planning and Investment, Finance, Industry and Trade, Construction, Science and Technology, Information and Communications, Health, Education and Training, Public Security, Defence, and the Government Office. ◦ Chairs of the People's Committees of centrally-affiliated provinces and cities, including: Can Tho, Long An, Tien Giang, Ben Tre, Tra Vinh, Vinh Long, Soc Trang, Hau Giang, An Giang, Dong Thap, Kien Giang, Bac Lieu, and Ca Mau. • The Coordinating Council may establish subcommittees to coordinate by industry, sector or subregion. Subcommittees are organized and operate on a concurrent basis as prescribed by the Chairman of the Coordinating Council. • The advisory and support mechanism for the Coordinating Council, ministries and provincial People's Committees consists of: the Coordinating Council Office, the Ministerial Coordination Team, the Provincial Coordination Team, and the Expert Advisory Team. • The Ministry of Planning and Investment is the permanent secretariat of the Coordinating Council. The Ministry of Planning and Investment establishes the Coordinating Council Office. Civil servant positions within the Coordinating Council Office are under the Ministry of Planning and Investment and operate on a concurrent basis.

4.5 Cooperatives investing in closed-loop value chains, from production to branding

In addition to central and local government policies, there have been many cases of farmers and local communities in the Mekong Delta taking the initiative to cooperate with businesses for more streamlined production along the chain.

In the Mekong Delta, Kien Giang offers several collective economic models with linkages and chain production happening across 468 cooperatives in the fields of agriculture, forestry, fishery, and animal husbandry with a total charter capital of VND 199,147,637,000; a total of 36,195 members and 66,807.55 hectares of cultivated land, creating jobs for 4,570 seasonal workers. The three main forms of linkages are product sales through purchase and sale contracts between businesses, cooperatives and households; linkages with investment and product sales support, between businesses and cooperatives; and linkages in a closed value chain. In the closed value chain, the business invests in farmers through cooperatives, as well as buys, processes and sells products (Thuy Trang 2023; Tran 2023).

In An Giang, cooperatives participate in linkages in two forms. First, the cooperative signs a contract with businesses to produce and sell products for cooperative members and households. From 2011 to 2018, each year there were 10–14 cooperatives linked with 15–21 businesses. In 2021, 30 businesses implemented production linkages through 46 cooperatives, with an area of 87,698 hectares of rice (sticky rice), 3,981 hectares of vegetables, and 1,356 hectares of fruit trees (Trong Tin 2022). Second, value chains between leading enterprises, cooperatives, input suppliers, collectors, processors, wholesalers and retailers are implemented to produce and supply products to consumers. The enterprises have cooperated with the provinces' departments, agencies and commune People's Committees to create 24 new agricultural cooperatives in the group's raw material area. This enterprise sent personnel to join the boards of directors of cooperatives and sent a team of 'three together' (eating together, living together, and working together) to guide the cooperative members on modern and scientific farming techniques and procedures.

Implementation of the 'One Commune One Product' (OCOP) programme in many provinces and cities in the Mekong Delta (Mekong Delta) has helped many cooperatives to elevate unique and strong products in localities, create added value, increase product value, create a stable source of income for cooperative members, and contribute to the development of rural economy. The OCOP products of the region are gradually forming a sustainable chain of linkages between farmers and cooperatives, between cooperatives and supermarkets and businesses, improving product quality, and meeting the needs of domestic and export consumers. For example, An Giang Province has focused on developing strong products from village craft products like sarongs made by the Khmer Van Giao cooperative (Tinh Bien); Mango juice made by the cooperatives in Cho Moi (Cho Moi); brocades made by the Chau Giang weaving and embroidery cooperative; silk made by the Tan Chau weaving village cooperative in Tan Chau; logan fruit produced by the Khanh Hoa cooperative (Chau Phu District); sundried frogs from the cooperatives in Khanh Hoa (Chau Phu District); Keo mango produced by the agricultural cooperatives of Long Binh (An Phu); and jaggery (traditional cane sugar) made by the Nhon Hung palm sugar cooperative (Phuong Nghi 2023).

In Soc Trang Province, businesses or production companies participate in most stages of the rice value chain, which uses high-quality ST20 rice, bringing high value and profit. Farmers participating in the chain also benefit from high prices. Comparatively, with other groups of rice farmers production is not streamlined across the value chain; there are many actors involved, bringing lower value and income (Vu 2018).

4.6 Local low-emission agricultural production models that can be scaled up

While policies are being formulated to shape the development of a low-emission food system in the Mekong Delta, many studies have pointed to the low-emission production models that already exist in the Mekong Delta (e.g., Le et al. (2020) for livestock, Le and Umestu (2022) and Tran et al. (2019) for rice cultivation, and Tra et al. (2021) for catfish farming).

Table 5 lists examples of specific guidelines for emissions reduction in some sectors.

Table 5. Guidelines and recommendations for a low-emission food system in the Mekong Delta

Industries	Guidelines	Source
Rice	Determine the carbon footprint of the rice value chain	IRRI 2023a
	Investment guidelines for low-emission rice in the Mekong Delta	Nelson et al. 2023
	Cost-benefit analysis for emission reduction projects	IRRI 2023b
	Mapping of suitable areas for alternate wetting and drying practices in rice production	IRRI 2023c
	Geographic reference system for rice monitoring and MRV for GHG (RiceMoRe)	IRRI 2023d
	Tool for calculating greenhouse gas emissions from cultivated land adjusted for source	IRRI 2023e
	Proposal for a monitoring, evaluation and assessment system for the rice sector	IRRI 2023f
	Improvement of straw management for farmers in the Mekong Delta	IRRI 2023g
	Investment plan for low-emission rice production in the Mekong Delta in support of Vietnam’s implementation of the Paris Agreement	Tran et al. 2019
Livestock	Integrated, zero-emission farming systems and sustainable livelihoods for small-scale livestock farms: A case study in the Mekong Delta	Le et al. 2020
Forestry	The carbon market in Vietnam: Potential and challenges for future development	Vũ et al.2023
	The potential for forest restoration in the Mekong Delta	Pham et al. 2022
Fisheries	Water pollution from catfish production in the Mekong Delta, Vietnam: Causes and control measures	Pham et al. 2010
Multi-product agricultural production systems	Cost assessment of greenhouse gas emissions from multi-product agricultural systems in the Mekong Delta	Yamamoto et al. 2022
	Economic-environmental-energy efficiency analysis to optimize the management of organic waste from integrated livestock-crop systems: A case study in the Mekong Delta, Vietnam	Nguyen et al. 2022
	Sustainability of shrimp-rice farming systems in the Mekong Delta, Vietnam: A climate-resilient model	Dang 2020

Delegates from 13 Mekong Delta provinces attending the workshop also shared their experiences on the progress and implementation of green growth and low-emissions initiatives at the provincial level. These experiences can provide lessons for other provinces to follow. For example, Long An Province has had a special programme and policy since 2016 called the ‘High-tech Agricultural Development Programme for Agricultural Restructuring’. To

implement this programme, Long An Province has developed models to reduce farmers’ use of inorganic fertilizers and replace them with organic fertilizers. The province has also applied mechanization to help farmers increase their profits and protect the environment. These activities have been fully funded by the government, which demonstrates the positive role of government support programmes for the Mekong Delta.

5 Challenges for developing a low-emission food system in the Mekong Delta

Development of a low-emission food system in the Mekong Delta is not only affected by direct factors related to individual industries, but is also greatly influenced by political, cultural, economic and environmental factors at the macro level. Figures 7 and 8 provide an overview of the challenges that the Mekong Delta is facing. If these challenges are not addressed, it will be difficult to achieve emissions reduction in food production in the Mekong Delta.

A review of annual reports from 13 provinces in the Mekong Delta on the norms and challenges of food production, ensuring social security, and environmental protection also point to common challenges that these provinces are facing (Figure 8).

The following sections provide more in-depth analysis of the challenges faced by the Mekong Delta.

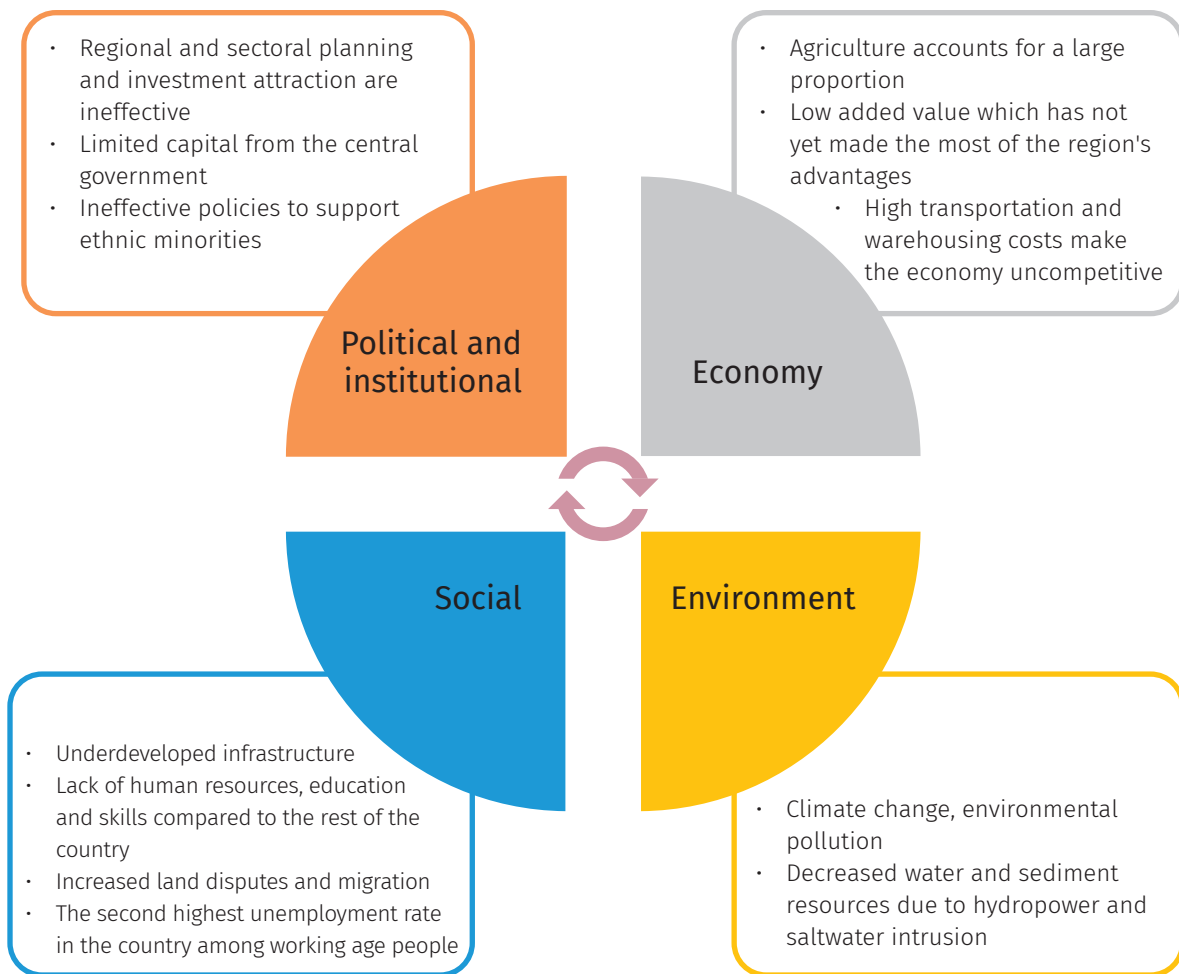


Figure 7. Institutional, environmental, economic and social challenges to sustainable development in the Mekong Delta

Source: Central Committee of the Communist Party of Vietnam (2012); VCCI and Fulbright (2020, 2022).

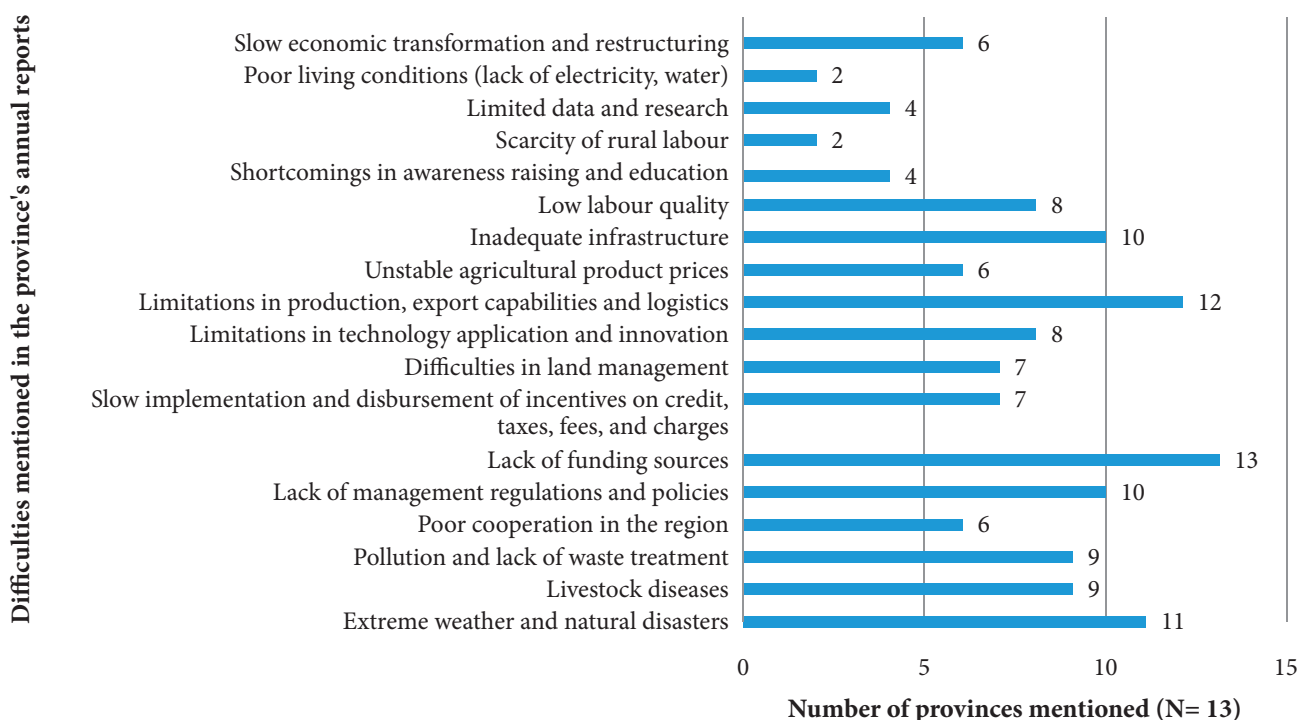


Figure 8. Challenges implementing food system emission reduction policies in the Mekong Delta, according to reports from 13 Mekong Delta provinces (2018–2023)

5.1 Environmental challenges

Impacts of climate change, resource degradation and saltwater intrusion

Agriculture has always been a mainstay during economic difficulties; however, the agricultural sector has been, is and will be facing three ‘changes’: climate change, market fluctuations and changes in global consumption trends towards green and sustainable (BB 2023).

Located at the end of the Mekong River, Vietnam – and the Mekong Delta region in particular – are feeling the most severe impacts of climate change. The flow of the Mekong River, both upstream to downstream and around the delta, has been severely reduced. The delta now often faces severe droughts, and saltwater intrusion tends to appear 1–1.5 months earlier with a wider range and intensity than before. In 2020, the amount of sediment deposited in the Mekong Delta was reduced to just a third of what it was 15 years ago. This directly affects the livelihoods of over 20 million people in the Mekong Delta region, as well as efforts to ensure water security and food security for all countries in the basin (VGP 2023).

Climate change causes sea levels to rise and rainfall patterns to change, which has led to

saltwater intrusion in rice fields and water scarcity across the Mekong Delta. As a result, 70% of rice-growing areas are contaminated with salt, and rice production has decreased by up to 30%, causing thousands of farmers to lose their income (Thu Phuong 2023a). In 2020, water levels in the Mekong River fell to a record low, prompting Vietnam to declare a state of emergency for five provinces in the region (Kim Long 2020). Droughts and saltwater intrusion also lead to reduced crop yields and increased production costs; people have had to migrate to cities to find work as a result of reduced income.

Flow changes – due to the impacts of climate change, coastal erosion, development of hydropower plants in the upper reaches and infrastructure – have reduced the water available for irrigation, leading to overexploitation of groundwater in the Mekong Delta region (Pham 2020; Thuy An 2022; World Bank 2022).

5.2 Political, policy and institutional challenges

5.2.1 Unclear vision and definitions for agricultural, food and food system emissions

With current food security and emissions policies, Vietnam and the Mekong Delta

have not comprehensively and systematically addressed the various components of the food system. In particular, the issue of waste and food loss has not been taken into account and researched thoroughly. The absence of a system to monitor, track and report emissions – as well as political, economic, social and environmental impacts on the entire food system – also makes it challenging to implement policy effectively. The lack of specific instructions for different sectors also makes it difficult for Mekong Delta localities to implement policies set at central government level.

The central goal for the Mekong Delta is to shift the agricultural structure from a predominant focus on rice, followed by aquatic products then fruits, to a predominant focus on aquatic products, followed by fruits and then rice; however this goal comes without a clear approach for taking into account emissions reduction mechanisms within the relevant industries in the food system.

The majority of relevant actors believe food security in Vietnam is inherently synonymous with food production, of which the key product is rice; as a result, it is considered necessary to resolutely maintain rice land area (Thu Phuong 2023b). Changing perspectives on food security is a key premise for changing the vision of the Mekong Delta. Adopting a new ‘food security’ perspective – focused on access, quality, safety, resilience and adaptation to economic and environmental shocks – will allow localities to keep an area of rice land sufficient for domestic consumption and storage/export at a certain level, but also flexibly switch to more productive and higher value activities. Reducing intensive rice farming also helps reduce environmental pollution, restore soil quality, reduce CO₂ emissions, and create conditions for the Mekong Delta to build large-scale specialized agricultural areas and form dynamic urban areas with modern infrastructure (VCCI and Fullbright 2022). Agricultural products like rice are considered by government to be economically, environmentally and socially sustainable. However, up to now, economic sustainability has always been the focus (Thu Phuong 2023b) while other issues have been considered complementary. This has caused many difficulties in achieving the goal of reducing emissions.

Development goals for the Mekong Delta prioritize improving the quality of forests and increasing the forest coverage rate to 7.5% by 2030, protecting coral reef ecosystems, mangrove forests, seagrass beds and lagoon ecosystems; this is to ensure the provision of important ecosystem services for socioeconomic development, as well as proactively prevent, avoid and minimize the risks of natural disasters, climate change and sea level rise. Development goals also prioritize reducing the pollution that stems from agricultural, industrial and urban development through the modernization of wastewater and solid waste treatment technology, and increasing the collection, treatment and recycling of waste. However, current policy documents on the food system do not fully focus on the potential of meeting these goals in the agriculture and forestry sectors.

5.2.2 Streamlining policies and building a food system emissions tracking, monitoring and assessment system

The food industry in Vietnam is predominantly focused on rice, with little attention being paid to other food industries and the ecosystem as a whole. Vietnamese policies ensure both domestic food security as well as exports to the international market, but streamlining these policies to ensure these two goals remain feasible requires accurate determination of land area. Until now, diverse ministries and localities have been using different monitoring data and collection methods as well as different ways of classifying land types, leading to implementation challenges (CDKN 2014). One of the current policy focuses is therefore to complete and operate a regional information system and database, to better inform decisions on natural resources, the environment, climate change, and response activities in the region’s localities.

Although Vietnam is gradually shifting from a focus on rice production to a more comprehensive and sustainable food system that is climate adaptive, accomplishing this goal requires streamlining with other policies, especially in the context of natural disaster management and prevention strategies. In particular, the policy of encouraging farming households to flood their rice fields every three years has made many households hesitate because their livelihoods are unstable (Tran et al. 2021).

Another major challenge is to streamline policies and objectives that could negatively impact environmental protection, climate change mitigation and adaptation, and food system emissions reduction (Table 6). The fact that the Mekong Delta is considered the agricultural centre of Vietnam has led to most of the region's provinces focusing on long-term intensive rice farming. Localities are therefore mostly focusing on boosting productivity and rice yield to achieve rapid GDP growth and other economic goals,

as well as to guarantee national food security. They are not able to combine these food security, economic development and social security goals with emissions reduction goals; particularly since low-carbon rice production is still expensive, making farmers reluctant to adopt this method (VNA 2021b).

Land policy is also a prominent issue. Owning fragmented parcels of land has an impact on rice production and food security for many

Table 6. The potential risks of implementing socioeconomic development policies for coastal ecosystems and food system emissions reduction in the Mekong Delta

Objectives		Potential risks
Decision approving planning in the Mekong Delta region for 2021–2023, with a vision to 2050	<ul style="list-style-type: none"> The economy grows at an average of around 6.5%/year. The scale of the economy (GRDP) in 2030 will be 2–2.5 times larger than in 2021. Economic structure: In 2030, agriculture, forestry and fishery will account for around 20% of GRDP; industry and construction will account for around 32%; services around 46%; taxes and subsidies around 2%. Effectively promote natural resources, as well as rich and diverse cultural identities, for sustainable socioeconomic development. Concentrate on infrastructure development, with a particular focus on transport, energy, clean water supply, irrigation and social infrastructure. 	<ul style="list-style-type: none"> Currently, assessment and evaluation of efficiency is based only on income and short-term financial indicators. The lack of studies to fully calculate the value of coastal ecosystems in the region has led to prioritization of economic development models, at the expense of sustainability and marine biodiversity. While infrastructure development is a condition to develop agriculture, this is also the cause of deforestation as well as degradation of forests and coastal mangrove ecosystems.
	Economic restructuring towards industrialization and modernization; gradually shift from a labour-intensive to capital-intensive industry structure, moving from low to medium and high technology and efficiency. By 2030, the proportion of labour-intensive industries, rough processing, and low-tech industries will decrease to less than 50%.	Economic restructuring towards large-scale modernization will be a massive change for the Mekong Delta economy. This will have a significant impact on small-scale households (e.g., loss of jobs, loss of land, migration).
Resolution No. 13-NQ/TW of the direction of socioeconomic development as well as ensuring national defence and security in the Mekong Delta until 2030, with a vision to 2045	<ul style="list-style-type: none"> Average growth during 2021–2030 will reach about 6.5–7%/year. The scale of the economy by 2030 will be 2–2.5 times higher than in 2021. The proportion of agriculture, forestry and fishery in total regional income (GRDP) will be around 20%; industry and construction will be around 32%; services around 46%; taxes and subsidies are around 2%. GRDP per capita will reach around VND 146 million/year. The urbanization rate will be 42–48%; 80% of communes will meet new rural standards, of which 30% of communes meet advanced standards. The forest coverage rate will reach 7.5%. 	Prioritizing economic development to achieve annual growth, reducing the proportion of agriculture, forestry and fishery, and promoting urbanization, all put significant pressure on existing forest areas.

households. If the land fragmentation index increases by 1%, the likelihood of all households being exposed to food insecurity increases by 4.79% (Nguyen et al. 2022). Meanwhile, although the Vietnamese government focuses on maintaining the area of food production, conflicting urban expansion goals cause challenges for implementation (Pulliat 2015).

Another challenge is the monitoring of emissions related to food systems. According to representatives at the workshop, national-level inventory of greenhouse gas emissions is being conducted in the sectors of energy, industry and agriculture; however as each sector uses different calculations for greenhouse gas emissions, the method and calculations used for the energy sector cannot be easily compared with those of agriculture or land-use change. While agricultural emissions calculations cover land-based farming, accounting of greenhouse gases or reduction in food system emissions needs to cover a wide range of interrelated sectors, ranging from energy, farming and waste. The challenge with calculating and approaching the inventory of greenhouse gas emissions is collecting sufficient data, for example relating to processes like transportation during construction, procurement, post-harvesting transportation to the cooperatives and warehouses, as well as the consumption of energy during transportation. It is necessary to find appropriate solutions that separate out different emissions so they can be calculated. The Ministry of Natural Resources and Environment has issued various documents related to greenhouse gas emissions, including categories for reducing emissions and inventorying these reductions.

Regarding the database system, there is a currently a national-level website, but there is not yet a value chain-level approach to food system emissions reduction monitoring. Only a few studies have been conducted on the carbon footprint of rice that have used global methodologies; and from the perspective of workshop delegates, the degree of certainty among these studies is not high. Combining multiple sectors into a unified whole to calculate Vietnam's food system emissions requires discussion between experts in each sector to enable a unified methodology. At present, numerous data collection agencies exist at commune and district level; while these can still

function, the national system requires specific research and detailed surveys in each individual region to properly assess the current situation.

While central agencies focus on making new policies and perfecting the legal system, representatives from the 13 Mekong Delta provinces participating in the workshop shared that there are too many policies, and the challenge at provincial level is that limited resources mean they have to prioritize certain policies over others; when policies overlap or conflict, they also need to work out how to resolve this.

5.2.3 Food production prioritizes quantity over quality, hygiene and safety

Development policies currently focus only on increasing production, while a major risk for Vietnam's food chain is the issue of food hygiene and safety (Ha and Ha 2023); agricultural production in Vietnam uses a lot of chemicals, pesticides and chemical fertilizers, and inputs have unclear origins (World Bank 2016; Le and Umetsu 2022; Nguyen and Minh 2023). Although food and agricultural businesses play an important role in influencing agricultural production in the Mekong Delta, their long-term sustainability in the production chain is not guaranteed (Hutton et al. 2021).

5.3 Social challenges

5.3.1 Human resources and capacity

One of the challenges faced by Mekong Delta provinces in implementing food system emissions reduction is the capacity of local officials and farmers to manage emissions reduction effectively in the context of climate change (Thu Phuong 2023a). Likewise, businesses and cooperatives are currently more focused on investing in the production, preservation, processing and branding of products.

Workshop participants also highlighted the challenges arising from lack of field-based research to verify the results of large-scale scientific research. Recent research has found that emissions reduction measures are not yet being applied in practice, but it is also unclear in which areas and with what land area such measures can be appropriately applied. This makes the local-level process of planning actions to reduce emissions difficult, since it is not known which mechanism is most appropriate to apply.

Additionally, although there have been many sector-specific studies, there are very few studies that look at the entire food system and determine which links are important for it to change across the whole chain.

Participants of the consultation workshop highlighted the lack of research sufficiently evaluating emission issues around processing and packaging. Even more importantly, it was felt necessary to work out what policies are required to change the behaviours, lifestyles and diets of Vietnamese people, so policymakers can ensure appropriate interventions and solutions.

Participants also pointed out that awareness of sustainable production among Vietnamese small and medium-sized enterprises remains low. They were unaware of concepts like climate change adaptation and mitigation, for example. These enterprises' willingness to participate in reducing emissions is also very limited. Businesses were concerned about the cost implications of changing production models to reduce emissions, and are therefore only likely to take steps towards environmental sustainability if this was a government requirement. Current policy also remains too complex for them to understand; they are unaware what specific actions they need to take to reduce emissions. Equally lacking is a clear policy explanation of new concepts like carbon markets and taxes that small and medium enterprises can easily make sense of. Delegates from 13 Mekong Delta provinces shared their difficulties conveying technical terms and international concepts related to emissions systems to local people, because these concepts are often vague and lack practical economic implications for local people.

5.3.2 Food access

Vietnam's guiding documents supporting food access have so far only looked at helping people improve their livelihoods and increase their income, thereby enabling them to buy more and better food. However, food access in Vietnam and the Mekong Delta hinges upon many other socioeconomic aspects that also require consideration.

Access to food differs between rural and urban areas. In urban areas within the Mekong Delta,

working class immigrants often experience more difficulty accessing nutritious food due to unstable income (Nguyen et al. 2022). Even when these groups access social food assistance programmes, the food they receive is not balanced and nutritionally adequate (Nguyen et al. 2022). Immigrants also tend to receive food from family members, and in turn send money for family members to buy food. However, the high cost of food has affected food access for both those remaining in the hometown, and migrating family members who have left to work in the city (Hoang et al. 2013). Ministry of Agriculture and Rural Development representatives also flagged that when those of working age gradually move to urban areas, it becomes difficult to ensure the necessary human resources in rural areas (Vietnam News 2023).

Food security differs between ethnic groups in the Mekong Delta. Vuong et al. (2023) highlight how Khmer households in the Mekong Delta face food insecurity more often than Kinh households; this is because of differences in access to natural resources, land, finance and social support, limiting Khmer households' capacity to cope with shocks like natural disasters and epidemics. Many ethnic minorities and vulnerable groups – including coastal communities, women and children – are at equally high risk of food insecurity due to language barriers and limited financial, social and technical capacity (Care Climate Change 2021; Nguyen et al. 2021; Vu et al. 2022). A specific focus on ethnic minority communities in policies aiming to eliminate malnutrition and food shortages is particularly needed for the Mekong Delta (Nguyen and Minh 2023).

5.3.3 Gender equality

Current policies and solutions implemented in the Mekong Delta focus on supporting the poor, with national goals aiming at hunger eradication and poverty reduction. However, addressing gender equality and providing specific support for vulnerable groups – including women and ethnic minorities – requires further efforts and consideration.

Although the Mekong Delta has impressive poverty reduction and economic growth rates, the issue of gender equality still needs to be

emphasized in this region; wages paid to men and women for the same labour activities are not equal, and men often have higher income (GTZ and AusAID 2010). In some livelihood activities, like industrial shrimp farming, participants are mainly men. Mechanized rice farming, which provides technical jobs for men, also limits employment opportunities for women (GTZ and AusAID 2010).

The poor, especially poor and landless women, depend on natural resources for their livelihoods, but policies like forest contracting and natural forest protection create many obstacles for them to continue to generate income from these resources. Traditional gender roles and limited education levels among women in the Mekong Delta also make it difficult for them to escape the vicious cycle of vulnerability and uncertainty (VNS 2023).

Although the Vietnamese government has many policies addressing gender equality in climate change adaptation and mitigation, the integration of these policies into local policy and practice has not been effectively implemented (USAID 2023). Gender integration into climate change and natural resource protection policies is overlooked, and often remains on paper rather than realized in the provinces (Pham and Brockhaus 2016; Pham et al. 2016).

5.3.4 Food security differs across regions and localities

The Red River Delta region of Vietnam generates a surplus of around 3 million tons of rice each year; the Northern midland and mountainous region generates a surplus of 1.2 million tons; the North Central region has a surplus of 2.2 million tons; the South-Central Coast region 1.75 million tons; and the Central Highlands generates a surplus of 0.3 million tons. Meanwhile, the Southeast region alone requires an additional 0.56 million tons from other regions (Thuy An 2023). The Ministry of Agriculture and Rural Development has calculated high levels of rice supply and demand so as to be proactive in ensuring national food security. As such, the forecast of 15 million tons of rice for export may increase to 17 million tons, equivalent to over 7.5 million tons of rice available for export (Thuy An 2023).

5.4 Economic challenges

5.4.1 Limited financial resources and market instability

There is significant potential to reduce emissions in the agricultural sector in Vietnam. However, investing in scientific and technical solutions requires quite substantial funding (Thu Phuong 2023c). While the Vietnamese government has made efforts to increase financial resources to support climate change adaptation and emissions reduction, supplied resources currently fall short of meeting actual demand. Household income in the Mekong Delta is also limited, so speedy transition towards a more climate change adapted emissions reduction model is unlikely. Many studies suggest that instead of wide disbursement of funding, investment in climate change mitigation and adaptation should be prioritized, and food security policy should focus on high-risk areas (Vu et al. 2022).

The types of agricultural products that the Mekong Delta produces and trades are significantly impacted from market fluctuations (Government News 2023). Even when product prices of some key commodities such as rice for the international market increased sharply, the domestic price of rice also increased; therefore, many businesses having to sell at a loss to maintain their reputation in trading, causing market turmoil when supply exceeded demand at the same time (Nguyen 2023a).

Vietnam ranks fourth in Southeast Asia and 54th in the world according to the Food Security Index developed by the Economist Intelligence Unit (EIU). With a score of over 75, Vietnam rates highly on the index regarding the presence and quality of food safety net programmes, access to finance for farmers, average food costs, the proportion of population below the global poverty line, food safety, agricultural production fluctuations, urban absorption capacity and food loss. However, Vietnam still needs to make further efforts; regarding the index of public spending on agricultural research and development and the index of food affordability, Vietnam ranks lower than the world average of 5.0 and 17.8 points respectively (VNA 2019).

5.4.2 Finance focused on climate adaptation over mitigation

The Vietnamese government prioritizes resources for climate change adaptation rather than mitigation. More than 70% of ministries' and 90% of provincial climate change budgets are for adaptation. Meanwhile, reducing emissions is mainly considered to be the responsibility of businesses and foreign organizations (Vietnam News 2022). According to a report by VCCI and Fulbright (2022), the Mekong Delta is facing three spirals relating to budget, labour and economic structure. The 'budget spiral' reflects a serious lack of investment in the Mekong Delta. Due to lack of government investment, the region's infrastructure – especially transportation – is lacking, weak and degraded, leading to the region's inability to attract effective investment projects. Here begins the second spiral of labour, which stems from a lack of job opportunities,

meaning young workers migrate from the Mekong Delta to urban and industrial areas in the Southeast, reducing both the quantity and quality workforce of the region. This exacerbates the downward spiral in investment, because there is no longer abundant labour to fuel cheaper prices.

5.4.3 Limited factors promoting investment in the Mekong Delta

The Mekong Delta lacks resources, with a workforce that continues to migrate away due to low living standards and lack of job opportunities. Weak transport infrastructure is the biggest bottleneck here, particularly since the region does not have a deep-water seaport, reducing the opportunity for exports, competitive advantage, the attraction of investments, and human resource development in the region (VNA 2023b).

5.5 Challenges for specific food types

Table 7. Challenges for specific types of food

Industry	Challenges
Rice	<ul style="list-style-type: none"> • Shifting the model of rice production is not easy; implementing such changes is even more difficult. • Planning around planted area is not streamlined. Farmers' income remains low as does the export value of rice, and the rate of sustainable production. Meanwhile post-harvest loss rates and logistics costs remain high. There are not many brands, and rice trade support services develop slowly. • Rice production has negative impacts on the environment and climate change, and a system to control and reduce greenhouse gas emissions is lacking. • One of the difficulties in implementing an action plan to reduce emissions is the lack of data. Data collection is also a challenge due to lack of human and financial resources.
Seafood	<ul style="list-style-type: none"> • Lack of knowledge and awareness of food loss in the catfish value chain in the Mekong River basin. • Ineffective process of seafood exploitation, protection and development and illegal fishing leading to an EU "yellow card", restricting the export of seafood to the European Union, one of Vietnam's largest exported seafood markets. • Particular challenges for the Vietnamese shrimp industry include: environmental degradation and disease; difficulty controlling the quality of inputs (seeds, feed, chemicals); limited organization and technical capacity in production; low application levels of science and technology; fluctuations in water environmental indicators and poor environmental quality; and potential pollution from agricultural production (chemicals and pesticides).
Vegetables	<p>Due to lack of market information, farmers pursue large-scale cultivation of high-priced agricultural products. This leads many farmers to quickly increase land area used for 'trendy' agricultural products, with the consequence that upon harvesting, the market is oversupplied and prices fall dramatically. Many agricultural product types are falling in price, resulting in further challenges for farmers; as well as shrinking export markets, the shutdown of wholesale markets in Ho Chi Minh City – the largest consumer of agricultural products in the Mekong Delta – has caused a backlog of agricultural products. Obstacles in transporting goods out of quarantined areas also make it difficult for agricultural products to be consumed.</p>
Livestock	<p>Small-scale livestock farming still accounts for a high proportion of agriculture in the region. However, public awareness of biosafe farming techniques, as well as proactive disease prevention and control for livestock and poultry, remains limited. The price of animal feed and raw materials has increased due to dependence on imports from other countries (billions of dollars each year), causing production costs to increase as feed costs account for 60% to 75% of the cost of livestock products. Livestock farming still exhibits many limitations, shortcomings and slow transformation. Prices have dropped, especially following disease spread in pig herds, forcing many herds to be destroyed.</p>
Agroforestry	<p>Agroforestry models remain fragmentary, with no agency or management unit streamlining a systematic database on agroforestry. There also lacks a specific policy mechanism for this issue. This is because all guidelines and strategic policies on agricultural development are oriented toward specialized farming, creating concentrated large-scale production areas associated with processing, while forestry policies are separately more focused on protecting forests and limiting access to forest resources.</p> <p>Although Vietnam has a policy of paying for forest environmental services, some provinces like Long An are still unable to pay for forest owners because they do not know how to pay, and the norms have not been clarified.</p>

Source: Huong Ly (2019); Hung Tan (2019); Chuong (2021); Anh Quang and Ngoc Son (2023); Van (2023); Chu Khoi (2023); Phung (2023); (BB 2023); summary of discussions at the national consultation workshop.

6 Conclusion

As well as playing a critical role in ensuring food security for the entire country, the Mekong Delta can also support Vietnam to reduce emissions by implementing a low-emission food system. As policy gradually improves at both central and local levels, along with private and public financial resources for climate change and adaptation in the region's provinces, local changes will be seen in households and businesses linking into large-scale production and applying scientific models to reduce emissions. This means Mekong Delta provinces can promote the competitive advantages of their agricultural products, and take advantage of trade agreements with other nations to develop more sustainable agricultural production systems.

However, Vietnam must also overcome numerous challenges in developing a low-emission food system. These include increasing population pressure, market insecurity, environmental degradation and climate change, insufficient institutional and policy arrangements, limited human and financial resources, and restricted

food access particularly in rural areas and among vulnerable groups like women and ethnic minorities. The lack of an emissions tracking, monitoring and reporting system that encompasses the entire food system, policy overlaps and inconsistencies, and ineffective coordination between sectors all contribute to the challenge of implementing green growth policies locally.

To achieve a low-emission food system in the Mekong Delta, macro-level policy changes are required; both to ensure integrated multi-sectoral management, and to promote economic, social and environmental goals, as well as shifts towards environmentally-friendly behaviours. It is also necessary to increase capacity and research support so it becomes possible to create a comprehensive and transparent information system on the food system. The participation of relevant stakeholders – particularly women and disadvantaged groups – in all future decisions and policy making relating to sustainable food systems is also critical.

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DOI: 10.17528/cifor-icraf/009050

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This report provides an overall picture of the policy-oriented and practical stakeholders involved in implementing policies and programs related to low-emission food systems in the Mekong Delta - the center Vietnam's largest food producer and supplier. The report is based on a review of the legal and policy framework, decisions of the Government of Vietnam, secondary documents and opinions shared by experts in the national consultation workshop. The report also identifies opportunities and challenges for building and implementing low-emission food systems in this region.

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