SUSTAINABLE DEVELOPMENT OF THE MEKONG DELTA'S RICE SECTOR: One year of transformation and the first milestones of the 'One Million Hectares' Project

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In the context of Vietnam's agricultural sector facing multiple challenges - including climate change, land degradation, environmental pollution, and market fluctuations - developing a high-quality, low-emission, and sustainable rice production model based on science and technology has become an urgent priority. The project "Sustainable development of one million hectares of high-quality, low-emission specialized rice production in the Mekong Delta by 2030" officially entered its pilot and implementation phase in 2024. Its goal is to chart a new course for Vietnam's rice industry, enhancing the national brand and contributing to the protection of the planet for future generations. This article analyzes the outcomes of the project's first year - from policy direction and pilot models to results in productivity, quality, and environmental performance while identifying challenges and limitations that need to be addressed. Based on these findings, it offers recommendations for the sustainable development of the Mekong Delta's rice sector in the coming period.

1. EFFORTS IN DIRECTION AND IMPLEMENTATION OF PILOT MODELS

Since the project's launch in mid-2024, the Ministry of Agriculture and Environment has closely collaborated with local authorities in the Mekong Delta, as well as with international organizations such as the International Rice Research Institute (IRRI), the World Bank (WB), the Netherlands Development Organization (SNV), various associations, enterprises, and domestic and international partners to jointly implement activities related to high-quality, low-emission rice production models.

Initial activities included meetings, field surveys, implementation planning, and the development of new cultivation protocols in line with the project's objectives. From the Summer - Autumn 2024 crop to August 2025, a total of 11 pilot models have been deployed - including Hung Loi Agricultural Cooperative, Phuoc Hao Agricultural Cooperative, Phat Tai Agricultural Cooperative, Thang Loi Agricultural Service Cooperative, Phu Hoa Youth Agricultural Service Cooperative, Tien Thuan Agricultural and Service Cooperative, My Thanh Bac Cooperative, Hiep Xuan Phu Cooperative, Hong Phat Agricultural Service Cooperative, Cuu Long Organic Medicinal Plant Cooperative, and Kinh Don Agricultural Service Cooperative - covering a total area of approximately 2,162 hectares across five key provinces including Dong Thap, Can Tho, Vinh Long, An Giang, and Ca Mau. These initiatives clearly signal a promising new direction for the Mekong Delta's agricultural sector.

The Department of Crop Production and Plant Protection (Ministry of Agriculture and Environment) has worked with IRRI, the Institute of Agricultural Environment, and local partners to coordinate detailed implementation plans. Each province assigned one to two technical officers to provide on-site technical guidance, working directly with the cooperatives to collect data on crop indicators and parameters for greenhouse gas (GHG) emission calculations, which were analyzed by the Institute of Agricultural Environment. In addition, the Department continued the Summer–Autumn 2025 crop on six pilot models initiated in 2024 - in Can Tho (2 models – former Soc Trang and Can Tho sites), Vinh Long (2 models - former Tra Vinh sites), Dong Thap (1 model - former Dong Thap site), and An Giang (1 model - former Kien Giang site). The Department also partnered with IRRI to support three new pilot models in Dong Thap (former Tien Giang site), Ca Mau (former Bac Lieu site), and An Giang (former An Giang site). Furthermore, with support from the World Bank (WB) through the Institute of Agricultural Environment, two additional models were established in Can Tho (1 model - former Hau Giang site) and Ca Mau (1 model - former Ca Mau site). Some of these models also received assistance from provincial governments and private suppliers of agricultural inputs (seeds, fertilizers, pesticides) and mechanization equipment (land preparation, seeding, spraying).

During the construction and implementation process, the models were selected based on criteria such as reducing the amount of seeds sown, nitrogen

Table 1. Results of area, yield and rice output of Summer-Autumn crop models in 2025

No.	Location	Model			In-model /out-of -model comparison	
		Area (ha)	Productivity (tons/ha)	Quantity (tons)	Productivity (tons/ha)	Quantity (tons)
I	**The model has been deployed since 2024**					
1	Hung Loi Agricultural Cooperative	50	60.0	300	0	0
2	Phuoc Hao Agricultural Cooperative	48.75	68.1	332	3.1	15.1
3	Phat Tai Agricultural Cooperative	44.48	64.1	285	3.1	13.7
4	Thang Loi Agricultural Service Cooperative	50.0	71.2	356	3.0	46.0
5	Phu Hoa Youth Agricultural Service Cooperative	48.53	63.0	306	2.0	9.7
6	Tien Thuan Agricultural and Service Cooperative	53.4	78.8	469	15.9	84.9
II	**New open model (IRRI supported)**					
7	My Thanh Bac Cooperative	42.8	55.3	237	1.4	6.0
8	Hiep Xuan Phu Cooperative	45.3	63.6	288	7.6	34.3
9	Hong Phat Agricultural Service Cooperative	50	67.3	337	0.31	1.6
III	**New open model for self-made provinces (WB)**					
10	Cuu Long Organic Medicinal Agricultural Cooperative	50.2	44.54	224	5.1	26.0
11	Kinh Don Agricultural Service Cooperative	60	65.0	390	5.0	30.0
	Total	**543.5**	**64.8**	**3,524**	**5.12**	**267.3**

(Source: Department of Crop Production and Plant Protection)

fertilizer, and pesticide use, as well as minimizing irrigation water. Models also incorporated technological innovations such as mechanized row seeding with fertilizer incorporation, cluster seeding, drone seeding, and drone-based pesticide spraying. Notably, the pilots tested and evaluated MRV (Measurement, Reporting, and Verification) procedures for GHG emissions to ensure transparency and accuracy in measuring environmental impacts.

Alongside these efforts, technical officers, farmers, and cooperatives received training on new production processes, baseline data establishment, and water level monitoring point identification, while gradually adopting digital and technological solutions aimed at optimizing productivity and reducing greenhouse gas emissions effectively.

2. INITIAL SUCCESSES AND PROBLEMS THAT NEED TO BE OVERCOME

In the first year of implementing the Project "Sustainable development of one million hectares of high-quality, low-emission specialized rice production in the Mekong Delta by 2030", the pilot models have clearly demonstrated initial successes, while also posing many challenges that need to be overcome to achieve long-term goals.

Reducing Production Costs and Input Materials

The pilot models have demonstrated significant effectiveness in reducing the use of seeds, fertilizers, and pesticides in accordance with sustainable cultivation standards. Specifically, the amount of seed usage decreased by 50 -65%, saving approximately 70 - 130 kg per hectare. In addition, the average nitrogen

fertilizer input was reduced by 31.3%, thereby lowering production costs, mitigating soil and water pollution, and reducing greenhouse gas emissions.

Improved rice yield and productivity

Results from nearly 11 pilot models indicated that the average yield reached 6.48 tons per hectare, an increase of 0.512 tons per hectare compared with traditional farmer practices. Notably, 10 out of the 11 models recorded yield increases ranging from 0.14 to 1.59 tons per hectare, equivalent to 3.2 -22.1% improvement.

Pest management and efficient water use

Several models achieved the standard of draining at least 2-3 times, even some successful models drain water 4 times. This practice not only reduced irrigation water use but also contributes to decreased CO_2 emissions through lower evaporation rates and reduced methane generation during flooding periods.

Straw collection and agricultural waste recycling

During the winter-spring crop, most models collected straw from the fields, limiting greenhouse gases generated from traditional straw burning. Some cooperatives sold straw to traders, while the rest was used as fertilizer or composted into organic fertilizer, contributing to promoting a circular and sustainable agricultural model.

Production organization through value chain linkages

Most participating farmers operated under cooperative-based production, supported by technical guidance from management agencies. This approach established sustainable value chain linkages, enhancing income and livelihood resilience for local farmers.

Application of new technologies and international standards

The pilot models integrated mechanized equipment, including seeders and drones for spraying, which improved productivity and minimized environmental impacts. Several cultivation areas obtained VietGAP or organic certification, meeting food safety standards for domestic and export markets.

Branding and export of low-emission "Green" rice

A total of 19,200 tons of low-emission rice certified under the "Vietnam Green Rice" label has entered international markets. Remarkably, 500 tons were exported to Japan for the first time, opening new trade channels and strengthening the global reputation of Vietnamese rice brands.

Thus, the results of implementing 11 Summer-Autumn crop models in 2025 show that the fresh rice yield of the models ranges from 4.45 tons/ha to 8.78 tons/ha, the average yield of 11 models reaches 6.48 tons/ha, an increase of 0.512 ton/ha compared to the other models. In which, the Agricultural and Service Cooperative Tien Thuan has the highest yield of 8.78 tons/ha; Agricultural Cooperative Cuu Long

Many models apply mechanization and achieve VietGAP and organic certifications, meeting the requirements of the domestic and export markets

Table 2. Results on model area and model replication area in the provinces of the Mekong Delta region from 2024 to present

No.	Province	2024			September 2025			Cumulative		Com-pared to the 2025 plan (%)
		Plan (ha)	Model (ha)	Repli-cation (ha)	Plan (ha)	Model (ha)	Repli-cation (ha)	Model (ha)	Repli-cation (ha)	
1	Tay Ninh	0.0	0.0	0	60,000	268	69,390	268.0	69,390	115.7
2	Dong Thap	50.0	43.1	3,542	97,103	50	55,516	93.1	55,516	60.9
3	Vinh Long	50.0	98.4	110	13,703	884	8,114	982.1	8,224	60.0
4	An Giang	60.4	60.8	108,685	371,297	318	33,372	378.8	142,057	99.9
5	Can Tho	100.0	100.0	7,330	104,000	230	68,670	330.0	76,000	73.1
6	Ca Mau	0.0	0.0	0	170	110	110	110.0	110	64.7
Total		260.4	302.3	119,667	417,181	1,860	235,172	2,162.3	354,839	85.1

(Source: Department of Crop Production and Plant Protection)

ogranic medicinal herbs has the lowest yield of 4.45 ton/ha (the reason for the low yield is that the time of rice flowering is due to prolonged rain, affecting the ability to pollinate, reducing rice yield). Compared to outside the model, except for the model at Hung Loi Agricultural Cooperative, which has the same yield as outside the model; the remaining 10 models all have a yield higher than outside the model from 0.14 - 1.59 tons/ha, equivalent to an increase of 2.6 - 22.1%. The total fresh rice output of 11 models is estimated at 3,524 tons, an increase of 267.3 thousand tons compared to outside the model. However, in practice, the units still face many difficulties in the implementation process:

Technical and knowledge difficulties of farmers

Despite the positive results, many new localities and cooperatives still lack knowledge and experience in applying emission reduction farming processes. They are also concerned about the impact of unusual weather, especially in determining the amount of seeds to sow and water withdrawal in the Summer-Autumn crop.

Difficulties in measuring, monitoring and evaluating emissions

The implementation of the MRV process - measuring, reporting, and verifying greenhouse gas emissions has just begun to be tested on a number of models and needs to be expanded and completed.

3. RESULTS OF REPLICATING THE PROJECT MODEL FROM SUMMER-FALL CROP 2024 TO SEPTEMBER 2025

3.1. Results of project area expansion

Provinces in the Project area have actively built and expanded farming models using local budgets. In particular, many applied areas have achieved from 1, 2, 3, 4 to all 5 criteria of the Technical Process for producing high-quality, low-emission rice as stipulated in Decision No. 145/QD-TT-CLT. Up to now, the applied area has reached more than 235 thousand hectares, nearly double that of the end of 2024 (119.7 thousand hectares). This shows that the Project has completed its scale target, with the cultivated area of high-quality and low-emission rice reaching 180,000 hectares by 2025. However, compared to the planned area registered to participate in the project at the time of issuance, this figure only reached 85.1% (417,181 hectares).

3.2. Evaluation of the implementation of the Project's objectives

In terms of scale: The achieved area is 354,839 hectares compared to the target of 180,000 hectares, reaching 197% of the set target.

For sustainable farming: On an area of 354,839 hectares, technical advances have been applied, including: Reducing the amount of seeds sown by 70 - 100 kg/ha; Reducing 20% of nitrogen fertilizer and pesticides; Reducing 20% of irrigation water compared to traditional farming; 100% of the area applies at least one criterion in the sustainable farming process; The area certified for good agricultural practices (VietGAP) is 7,493 hectares, organic certification is

Table 3. Implementation plan for the Winter-Spring crop model 2025 - 2026

No.	Province	Winter-Spring crop model plan 2025 - 2026 (ha)	Consolidate the area of replication and new opening by 2025 to achieve the goals of the Project
1	Tay Ninh	50	69,390
2	Dong Thap	544	97,053
3	Vinh Long	1,800	13,703
4	An Giang	1,780	142,255
5	Can Tho City	500	76,000
6	Ca Mau	520	630
Total		**5,194.3**	**399,031**

246 hectares, and meeting food safety conditions is 5,659 hectares.

Regarding production reorganization: 100% of farmers in pilot models are organized into cooperative production, ensuring linkage from agricultural material supply to product consumption.

Regarding environmental protection and green growth: The Winter-Spring crop achieved 70% of straw collection and reuse. According to the MRV measurement report, on average, the emission reduction of 10 models that harvested rice was 3.7 tons of CO_2/ha/crop.

Regarding rice farmers' income: According to model reports, farmers' income increased by an average of 13.4% compared to traditional farming.

For branding and export: The Rice Industry Association has started to build the "Low Emission Green Vietnamese Rice" brand. The amount of 19,200 tons of rice equivalent to 5,629 hectares of rice in the Project are certified to use this brand, of which 500 tons of rice are exported to Japan for the first time.

3.3. Implementation plan for the Winter-Spring crop project 2025 - 2026

According to the Plan, the total planned area of the Winter-Spring crop model for 2025 - 2026 is 5,194.3 hectares, distributed in 6 provinces. Of which, Vinh Long with 1,800 hectares and An Giang with 1,780 hectares have the largest scale, accounting for most of the area of the whole region. Dong Thap deployed 544 hectares, while Can Tho City has 500 hectares and Ca Mau has 520 hectares. Tay Ninh is the locality with the smallest scale with 50 hectares. Data shows that most of the model area is concentrated in the two provinces of Vinh Long and An Giang, while other localities deploy at a medium or small level. In addition, the provinces will consolidate the replication area and open a new Winter-Spring crop of 2025 - 2026 of 399,031 hectares according to the criteria of the high-quality and low-emission rice production process.

4. CONCLUSION

The project "Sustainable development of one million hectares of high-quality, low-emission specialized rice production in the Mekong Delta by 2030" has achieved many positive results in the first year of implementation. However, to continue towards the goal of sustainable development, it is necessary to overcome current challenges and promote support and training activities to improve the capacity of farmers and cooperatives. This will not only contribute to improving productivity and product quality but also help protect the environment and develop a sustainable economy for the Mekong Delta. In the coming time, the Ministry of Agriculture and Environment will continue to closely follow the reality, direct the application of emission reduction processes on a large scale and guide pest control, successfully protecting the 2025-2026 Winter-Spring crop according to the production plan in the Project's objectives. At the same time, the Ministry will quickly complete the draft to seek expert opinions, broad opinions of scientists and international organizations on the MRV process to soon promulgate this process to serve the goal of participating in the ERPA program within the framework of the 1 million hectare Project; Complete the draft and procedures to soon submit for promulgation the High-quality, low-emission rice cultivation process in the Project; Direct localities to expand sustainable production models and initially implement emission measurement according to the issued MRV process. Along with that, support businesses and cooperatives to promote high-quality rice products, low-emission rice to domestic and foreign consumers...■