Analysis of Agroecological Transition at the National Level
The Emergence and Institutionalization of Agroecology in Viet Nam

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TAFS Project
Transitions to Agroecological Food Systems: a case for policy support

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Project outline

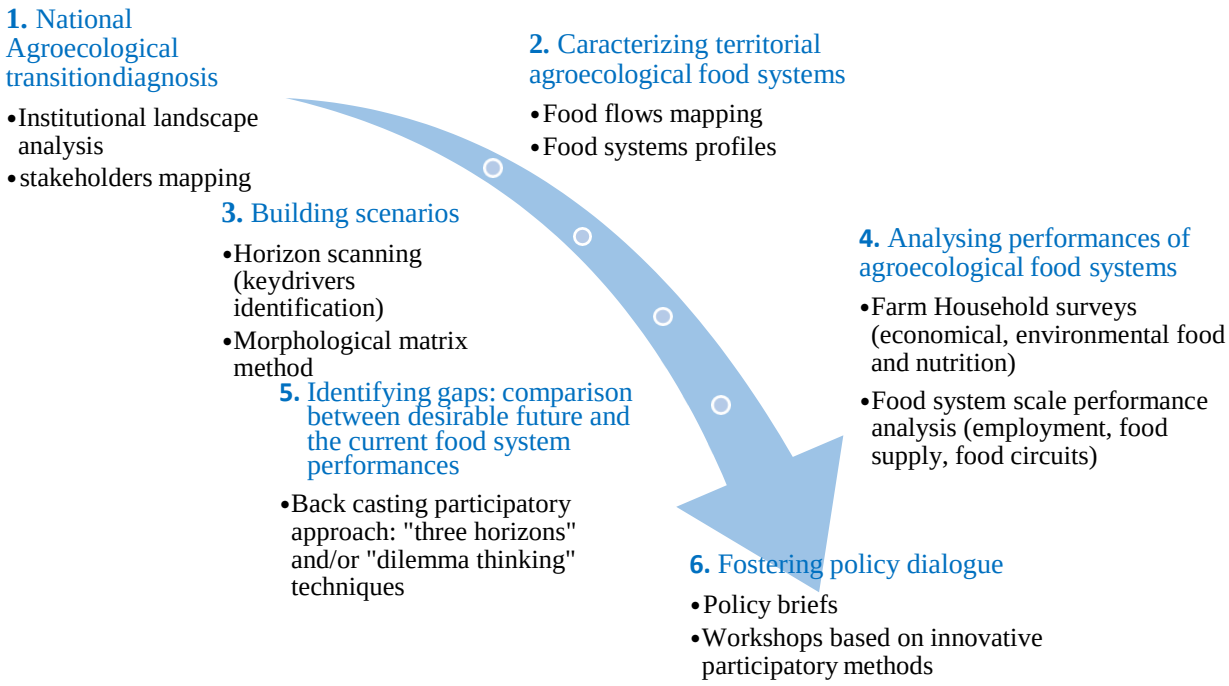
Across contrasting farming and sustainability context worldwide, social actors are mobilizing to promote agroecology in order to meet the major challenges of sustainable development, such as food security, halting biodiversity loss, employment and climate change adaptation. Whether on a national or territorial scale, public action initiatives are experimenting the development of food systems based on agroecological practices.

Nevertheless, these initiatives are quite diverse (oriented towards production or consumption, trade promotion, environmental protection, value chain dynamics at national or territorial levels) and do not provide a systemic agroecological centred response to the challenges of production, employment, environment and public health. Moreover, these initiatives remain limited, often on a much localized spatial and temporal scales. At present, multiple discourses support agroecology, however, it has not reached a level of credibility that would allow the development of policies that form the basis for transforming food systems towards greater sustainability and resilience at the speed required. In many countries, the decision to move towards an agroecological transition is a major break with the policy directions taken for several decades, based on the green revolution.

While public policies are key drivers to support and enable the transition to agroecological food systems, little is known about how these policies should be constructed to be effective. Most research projects focus on assessing agroecological practices at the farm level, and there is no generic framework for analysing how public policies might facilitate or hinder the agroecological transition. The main objective of the TAFS project is to engage with policy makers and provide them with convincing arguments grounded on scientific evidence, field data and concrete experiences, on the appropriate ways to promote agroecological transitions through public policies at different levels.

Through different case studies in eleven countries on three continents (Madagascar, Mali, Senegal, South Africa, Lao PDR, Vietnam, India, Argentina, Brazil and Colombia), TAFS will analyse a diversity of socio-ecological and productive contexts with regard to agroecological practices and trajectories. The research design includes six interconnected stages with a diversity of research instruments (see figure). The wide range of countries and contexts will facilitate the co-construction of a comprehensive understanding and knowledge about the diversity of agroecological transition processes and how related adapted policy frames may support sustainable food systems in the short and long term.

TAFS - Step by step analytical process



ABSTRACT

Many countries are accelerating the transition of agricultural production from conventional farming to sustainable agroecological farming. Agroecology transition not only requires farmers and consumers to be more proactive, but also needs appropriate and effectives public policies. Therefore, this study will clarify the concept of agroecology in Vietnam and describes how this concept has been incorporated into public policy.

The results show first the main issues that have led to the emergence of agroecology as a topic of public action. Overuse of chemical fertilizers, pesticides and herbicides exceeds the permissible limits of the ecological environment, leading not only to soil degradation and water pollution, but also to a declining productivity of agriculture. Some consumers, fearing for their health, increasingly pay attention to the quality and safety of the food products they purchase. In addition, negative impacts of climate change require for policies to promote sustainable agricultural practices to more adapt to climate change. Agroecological practices, such as agroforestry, organic agriculture, climate-smart agriculture, good agricultural practices (GAP), conservation agriculture, integrated pest and crop management have been implemented in order to face these challenges.

These practices were implemented from the 2000s onwards and have been reinforced in the 2010s through a series of public policies, including the development of standards for GAP and organic farming. Although these policies do not directly mention agroecology, they cover various issues, in particular related to food safety and ecological issues that indirectly impact the agroecology transition.

The transition to policies from food security to food safety and sustainable development has been supported by the Ministry of Agriculture and Rural Development **(**MARD), which is responsible for agricultural products quality, food hygiene and safety management. The Ministry of Natural Resources and Environment (MONRE) also play an important role in promoting agroecology transition in Vietnam. Various research institutes develop research project on agroecology, such as Vietnam Academy of Agricultural Sciences (VAAS), and new research institutes have been recently created like the Center for Agricultural Research and Ecological Studies (CARES) and the Institute of Circular Economy Development established in 2020. The private sector is engaged in the organic sector with companies directly involved in farming organic products for export and an increasing number of stakeholders are members of the recent Vietnam Organic Association (VOA). Agroecological initiatives in the Mekong region countries has been pushed by national and international NGOs for as part of a global movement that spread across the region since the mid-2000s.

In conclusion, the study determines some requirements of agroecology development to ensure ecological balance and that exploitation of resources for agricultural production does not negatively affect the natural environment and ensures sustainable development. It identifies difficulties, challenges and barriers of agroecology transition in order to propose overall solutions to promote agroecological transformation in Vietnam.

CONTENTS

I. INTRODUCTION

1. Objective of the study

The main objective of this study is to document what agroecology means in Vietnam and its degree of institutionalization in the existing policy framework. The study analyses the processes related to the emergence of agroecology in Vietnam, and the role played by different stakeholders in the public debate, which refers to the first step of the TAFS project (see figure p. 2). The review focuses on the last 10-15 years, when agroecology has emerged internationally in the policy debate within the preparation of the Sustainable Development Goals (SDGs). This investigation will make possible to draw out the issues (challenges, themes, methods) surrounding the conceptualisation and implementation of agroecological policies in the country.

2. Concepts of agroecology

Ecological agriculture is considered as the way for sustainable agriculture development. Ecological agriculture applies methods that allow the regeneration and preservation of ecosystems. Several agroecological techniques are widely applied in agricultural production, such as afforestation, minimum tillage, multi-cultivation, and natural based cultivation. These techniques contribute to enriching nutrients in soil and renewable ecosystems. Without chemical fertilizer use, farmers can live harmony with the ecosystem and utilize natural resources in the most sustainable way. Recently, sustainable eco-oriented agriculture was targeted, created and maintained by producers on the basis of the rules of the natural ecosystem, balancing agricultural production and artificial ecosystems. An agricultural ecosystem is a subject of agricultural activity aimed at creating a sustainable food system. Basically, an agricultural ecosystem is a relatively simple ecosystem in composition and homogeneous in structure and agroecology is maintained under constant human interactions.

The agroecology consists of four main attributes: productivity; stabilization; sustainability; and fairness. Productivity is the amount of biomass generated per a unit of area and time, and stability is the degree at which production is maintained under conditions of minor disturbances caused by environmental factors. This may be enabled for sustainable development; sustainability is the attribute that governs the productivity of the system in terms of greater disturbances. Agroecology attributes also include fairness through the distribution of the finished product to the individuals in the ecological systems. Recently, FAO (2020) has proposed 10 characteristics of agroecology, including diversity, synergies, co-creation and sharing knowledge, resilience, culture and food traditions, human and social values, efficiency, recycling and responsible governance. When an agroecological system can integrate these elements, it can maintain the sustainable development.

Agroecology approach is convincible and that is evidence-based alternative to the current chemical-based agri-food system promoted by new agricultural technologies and demands for more agricultural commercialization. This approach clearly aims at strengthening innovation capacity of family farms as well as the recognition of their contribution to sustainable food systems. It covers technical, economic, social, policy and institutional dimensions of the agri-food system.

3. Determinants and social forces of agroecology transition in Vietnam

3.1. Achievements of agriculture sectors in Vietnam

After the 30 years of innovation (1986 - 2016), agriculture sector has achieved a fast and stable growth for a long time, the agricultural restructure shifted in a positive direction. The value of agricultural production of Vietnam grew at an average rate of 4.06% per year in the period (1986 - 2015). Vietnam's agriculture has recorded to have made great progress and becomes a leading exporter of agricultural products and foodstuff and is among the top 5 exporting countries. Vietnam has 10 items with a turnover of over 1 billion USD, including: rice, coffee, rubber, cashew, pepper, cassava, vegetables, shrimp, phantasies, and forest products. While other economic sectors are still affected by the economic recession, the agricultural sector has

overcome difficulties and achieved quite comprehensive results, and the agriculture growth has reached a relatively high rate of about 3% per year. However, the agriculture growth and development in Vietnam have also revealed several challenges that requires for governments and relevant actors to have strategic plan to responds timely to challenges to achieve a sustainable agriculture.

3.2. Challenges and requirements for promoting agroecological transition

i) Increasing use of chemical fertilizer to maintain agricultural productivity

Agriculture is using too much fertilizer, especially nitrogenous fertilizers in crops, leads to excess nitrate contents in land and harms the health of consumers. According to the report of Department of Crops, a State agency under Ministry of Agriculture and Rural Development (MARD), there are 26 million hectares of agricultural land with the average annual fertilizer demand of about 10 million tons, of which there is nearly 20% of nitrogenous fertilizers. To improve crop yields, farmers have to increase the use of fertilizer 2-3 times or even 5-7 times more than actual needs of crop, resulting in exceeding nitrates in fruits and vegetables and causing harm for consumers. According to FAO, crops absorb only about 40-50% of the fertilizer, the rest is washed away or persisted on plant parts. Currently, the efficiency of using nitrogen fertilizer is only 30-45%, phosphorus 40-45% and potassium 40-50%, depending on the soil condition, plant variety, season, fertilization method, and type of fertilizer. Thus, 60 - 65% of nitrogen is equivalent to 1.77 million tons of urea, 55-60% of phosphorus is equivalent to 2.07 million tons of superphosphate, and 55-60% of potassium is equivalent to 344 thousand tons of Potassium Chloride (KCl) is applied to the soil but not yet used by plants (Truong Hop Tac, 2019).

The wasteful and indecent practices in the use of chemical proteins make vegetables unsafe, associated with heavy metals, pesticides and microorganisms, adversely affecting the health of consumers. Le Thi Hien Thao (2003) identified the level of NO3- in drinking water has increased significantly which is caused by increased use of inorganic nitrogen fertilizers, causing NO3- leakage into groundwater. Increased levels of NO3- in drinking water pose a health risk to the public. Organic contaminants are degraded by microbial activity, which causes a decrease in downstream oxygen. Excess nitrogen is converted to nitrate (NO3-) or nitrite (NO2-) forms, which are toxic to aquatic animals directly, and indirectly to terrestrial animals due to water use (Tabuchi and Hasegawa, 1995). Especially harmful to human health through the use of water sources or crop products, especially fresh fruits and vegetables with excess nitrate content. If the content of nitrogen and phosphorus in water and food, especially nitrogen in the form of nitrite and nitrate salts, is too high, it will cause some dangerous diseases for people, especially children.

ii) Climate change and pollution in agricultural production

Viet Nam is ranked by the United Nations Development Organization as one of the countries most affected and most vulnerable to climate change. Climate change may cause GDP in the period 2046-2050 to decrease from 0%–2.5% (Lan, 2019). The degree of climate change in recent years has happened rapidly, and saline intrusion in the Mekong Delta is becoming more and more complicated. The hot weather in the North is not favourable for the development of rice. In particular, disease outbreaks in livestock and poultry can infect humans. The protection and prevention are increasingly difficult due to the emergence of new types. The use of chemical fertilizers, pesticides, herbicides and growth stimulants has shown signs of exceeding the permissible limits of the ecological environment, leading to soil degradation and water pollution. IPCC (2007) indicated the main impacts of climate change on agricultural production in ecological regions of the world are reflected in the aspects, such as the increase in temperature will affect the ability to generate and develop crops and animals leading to productivity and

output change. Increasing temperature will reduce water resources, many areas will have no water and will not be able to continue farming, leading to a decrease in cultivated area. An increase in temperature will cause the ice to melt, leading to more invasive, flooded and mangrove lands. Changing climate conditions will reduce biodiversity, cause ecological imbalance, especially natural disasters, natural enemies and affect plant growth and disease development. Extreme, irregular weather phenomena such as early, late, or unseasonal rains will make it difficult to arrange planting seasons and crop structure, causing significant damage to the agricultural production. These negative impacts of climate change require for policies to promote agroecological practices to more adapt to climate change in in Vietnam so as to maintain to growth rate in agriculture sector. The Vietnamese authorities recognize the challenges posed by climate change and a more sustainable, greener growth model is at the core of their development agenda. Vietnam ratified the 2016 Paris Agreement on Climate and committed to reducing greenhouse gas emissions by at least 8 percent by 2030 and to achieving the United Nations Sustainable Development Goals (SDGs) by 2030. One of the policies is to develop green economy, using clean energy and providing stronger incentives for households, firms, and government to pursue green growth: taxation of fossil fuels that fully prices environmental and health externalities would nudge energy demand toward renewables and generate revenue to finance adaptation and mitigation plans (IMF, 2018).

The Government has endeavoured to implement a coordinated policy and organizational system to respond to climate change. The most important orientation documents are the Party Central Committee's Resolution 24-NQ/TW on active response to climate change, the National Strategy on Climate Change and the National Strategy on Green Growth, and the Government's Resolution 120/NQ-CP on sustainable development of the Mekong Delta in adaptation to climate change. These policies are supported by key climate change programs such as the NTP to Respond to Climate Change and Green Growth in 2016-2020, the Plan for the Implementation of the Paris Agreement on Climate Change, and the scheme for managing GHG emissions and carbon credit trading.

iii) Agricultural growth mainly based on natural resource exploitation

Agriculture in Vietnam still much depends on the natural resources rather than on advanced sciences and technologies. Vietnam's agricultural growth in recent years has mainly based on the intensity use of natural resources. Although Vietnam has achieved high rates of growth in agricultural output over the past decades, this accomplishment has been at a heavy cost to the environment. The sector's increasing use of land and synthetic inputs has accelerated deforestation, biodiversity loss, land degradation, water pollution, and greenhouse gas emissions (WB, 2016). Today, this pattern is not only gaining attention but may be reaching its limits as natural resource degradation is starting to have an observable effect on farmers' bottom lines. The government has recently turned its attention to environmental challenges, Vietnam's Green Growth Strategy — which touches upon agriculture-related themes — being emblematic of the attention being paid to the matter at the highest levels of government. However, Vietnam's agricultural policies and public expenditures are still primarily driven by production output objectives (Khoi et al. 2015). Several agricultural promotion policies moreover appear to conflict with environmental protection goals. Primary attention has been given to putting in place effective regulatory solutions to environmental problems in agriculture production. Yet, regulatory enforcement is often challenging, especially in circumstances like that in Vietnamese agriculture where primary production is highly fragmented.

Scherr et al. (2015) highlight a wider range of policy instruments that governments may use, often in combination, to provide the incentives and controls needed to prevent environmentally destructive agricultural activities and otherwise induce sustainable farming and natural resource management practices. These instruments set and allow enforcement of the rules, raise awareness and provide needed information, and enable, through various means, better behaviour and technologies. Multi-stakeholder initiatives. Despite their growth in recent years, meanwhile,

market-based approaches are not the only ones to have proven effective. In fact, one key lesson that is emerging from transactional approaches to environmental protection is the importance of the institutional, social, and cultural fabric in which these are imbricated. A range of approaches that can be grouped under the umbrella of multi-stakeholder initiatives have also been used with success. While these range in nature, these tend to leverage non-monetary currencies, such as social recognition, belonging, status, favours, or community acceptance, to provoke behaviour change (WB, 2016).

In addition, rural environment is not well managed. Pollution of wastewater and exhaust gas in industrial zones and craft villages is directly degrading the environment, endangering people's sustainable livelihoods and depleting aquatic resources. Vietnam's agricultural products have participated in the global value chain, but only stop at the supply of raw agricultural products, while the added value of agricultural products is mainly due to the processing, packaging and operating stages (de Brau et al, 2018). While there is increasing demand for agri-food products with high quality, this needs to change agricultural practices transforming from intensive practices into more agroecology practices such as organic production to invest in upgrading safer and more sustainable agricultural value chains such as building standard production areas, investing in post-harvest or processing technologies and applying IoT technology, blockchain, traceability of product origin (Das Nair, R. and Landani, N., 2020). Therefore, the combination of agroecological practices associated with applying high technology to create eco-projects can create favour condition for agri-food products in Vietnam to effectively involve in the global value chains.

iv) Smart and sustainable consumption and production promote AE transition

Consumers' income increases with the trend of smart and sustainable consumption. Consumers prioritize the selection of safe, organic and ecological agricultural products, so these products tend to be more consumed. Sustainable consumption is the consumption of products and services that effectively meet needs, while minimizing negative environmental, social and economic impacts. Consumers increasingly pay attention to quality, tend to choose safe organic goods and products. According to Le Anh Tuan and Nguyen- To T (2020), top 3 organic food images among Vietnamese people are: safe for health, eco-friendliness and freshness (no conservatives). 39% consume organic food more than once/week. 51% don't consume organic food. Most frequent users are mid to high income levels and those who live in Ho Chi Minh City, Vietnam. Consumers who are interested in organic foods is also interested in agroecological products (Chable et al, 2019). This research also indicates that awareness of organic food, information on organic food, food safety concern and perceived value of organic food have positive impacts on attitude towards organic food and perceived value influence purchase intention significantly. Consumers' top choice will be healthy products, so organic and clean produce will be the first choice.

However, the cost of organic products is still high and people and institutions still do not understand much about the role and benefits of organic agriculture. Evaluation standards are still in the process of being finalized until 2018, when the Ministry of agriculture and rural development issued the National Organic Agriculture Standards in Vietnam. This is the first standards system for production, cultivation, animal husbandry, processing and labelling of organic products, putting an end to any argument related to actual criteria of organic agriculture, as well as responding to expectations of farmers and enterprises in this field. The declared Standards in Organic Agriculture is set up for following areas: general requirements in production, processing, labelling of organic agricultural products; organic farming; organic husbandry; and requirements for eligible agencies for assessment, certification of organic production and processing system. However, organic products in Vietnam are still quite new to the majority of consumers. Most consumers cannot distinguish the concept of "organic products". Sometimes they confuse “safe” and “organic” products because labels and signals d not differentiate clearly “normal products” and “organic products”.

v) National Strategy on Green Growth in 2011-2020 and Vision to 2050, and Strategy on Cleaner Industrial Production until 2020.

The foundation for these policies was the issuance of the Law on Economical and Efficient Use of Energy. Particularly, the Government of Vietnam issued the National Action Plan on Sustainable Production and Consumption until 2020 and Vision to 2030. This is the most comprehensive and direct document which explicitly mentions sustainable goal, number 12 and is oriented towards sustainable production and consumption for Viet Nam, until 2030. This policy specifies sustainable goal 12 targets to be achieved by 2020, 2025 and even 2030. Especially, the National Action Plan on Sustainable Production and Consumption is ambitious in that it states Viet Nam will have basically transformed its production and consumption models towards sustainability by 2030. This confirms the determination and commitment of the Vietnamese Government to transform the nation's production and consumption models towards sustainability. This plays important role to enable transition agricultural production into agroecological production.

vi) Covid-19 and challenges for agricultural supply chains.

Covid-19 pandemic has adversely affected economic growth, markets, employment, income, and social security in rural areas, especially agricultural exports. Supply chains of agricultural and foodstuffs from rural areas are disrupted, especially export chains. Vietnam's agriculture has overcome these difficulties thanks to the experience in combating drought and salinity from previous years, the rice yield in our country still increased, the husbandry initially recovered, fisheries and forestry increased significantly, helping the agricultural industry to recover in the future. Vietnamese agriculture has ensured food security and has become the backbone of the economy, this is an important factor in stabilizing Vietnam during the Covid-19 pandemic. According to the Report of Ministry of Agriculture and Rural Development, despite the complicated developments of the Covid-19 pandemic, the nation's farm produce exports still exceeded the plan. In 2021, Vietnam exported $24.23 billion worth of farm produce, an increase of 28.2 percent over the same period in 2020. Of this, the export of major produce brought turnover of $10.4 billion, up by 13.3 percent, seafood exports $4.05 billion, forestry products $8.7 billion, up by 61.5 percent (MARD, 2020).

However, Covid-19 pandemic also influence food preferences of consumers, who are more concerned about their health to protect them from potential threats from Covid-19 infection. A study of attitudes and eating habits in Spain during the lockdown indicates that lowering the frequency of shopping has reduced consumption of the most perishable food products, like fish and seafood that would otherwise be heavily consumed. However, sales of non-perishable, ready meals also dropped. This was most likely attributed to people's perception of the latter being unhealthy and the more time consumers had for cooking during the lockdown (Laguna et al, 2020). This consumption tendency implies that safe food and organic will be more consumed than conventional foods and that essential policies for promoting safe food production and agroecological transition to create number of organic foods based on agroecological practices. Therefore, Viet Nam's response to the emerging coronavirus pandemic was launched on January 15, 2020 with the convening of the National Steering Committee (NSC) chaired by Deputy Prime Minister Vu Duc Dam. The National COVID-19 Response Plan was issued on 20 January 2020 and further updated on 31 January. This plan emphasises measures to "Ensure Citizens Health, Social Security and Assist Enterprises in Production and Business" and carried out comprehensive assessments of pandemic impacts on local socio-economic development and proposed relevant measures for economic recovery and social security, including measures to ensure providing safe foods for people (United Nation in Vietnam, 2020).

vi) Challenges for sustainable development in agricultural sectors

The sustainability of agricultural growth and development are still limited due to several factors. Although the growth rate of the agricultural sector has recovered significantly, it has not been

firmly established yet, and it has exposed many shortcomings and weaknesses of a fragmented, uncoordinated, low productivity and low-quality agriculture in the context of increasingly fierce competition of global markets. The labour force in agriculture now accounts for more than 42% of the whole country labour force, but only accounts for more than 16% of GDP (GSO, 2019). Vietnam's agricultural productivity is at the bottom of the ranking in Southeast Asia, the small size of production coupled with the high operating costs is the reason that the productivity of Vietnamese agriculture is always ranked at the bottom and poses a serious threat to the competitiveness of the whole industry (Newman et al., 2016). In addition, the relationship between production and consumption or between enterprises and farmers is not highly linked, ineffective and unsustainable supply chains, while Vietnam's agriculture is facing fierce competition in the world agricultural market. The market is not stable, undiversified and depends on some traditional markets with many risks. Countries tend to protect trade, especially Vietnam agricultural products traditional markets such as EU, USA and some other countries. The scale and openness of the market and its increasing diversity will create challenges to the competitiveness of the agricultural sector (Kee et al., 2013).

In couple with low growth rate in agriculture, and underemployment is widespread in rural areas; quality of agricultural products, food safety and hygiene and nutritional supplement value are not high, the average growth in this sector is only about 3% per year (Nguyen et al., 2017). Particularly, the level of technological and institutional innovation remains limited. In many localities, agricultural growth also depends on increasing agricultural land, natural resource intensity, abuse of chemical fertilizers and toxic pesticides, making input costs higher and higher and increase the cost of environmental protection. In order to respond promptly to natural disasters, leadership is essential so that projections of the effects of climate change are fully integrated into the policy-making process, giving priorities to Green and smart investment solutions in improving the efficiency of natural resource use and maximizing the strengths of a particular ecosystem. In order to effectively implement its commitments in multilateral environmental agreements, Viet Nam has promulgated many policies, advocacies and measures for conserve and sustainable use of natural resources. They include the Law on Biodiversity, Law on Environment Protection, Law on Forest Protection and Development, Law on Forestry, Resolution 24- NQ/TW dated 3 June 2013 of the 11th Party Central Committee on active responses to climate change, improved natural resource management and environmental protection along with such strategies such as the Strategy of Environmental Protection, Strategy of Viet Nam Forestry Development 2006-2020, Strategy of Special-use Forests Management and National Strategy on Biodiversity up to 2020 with a vision to 2030. These legal documents outline plenty of specific objectives related to sustainable forest conservation, development and biodiversity conservation.

III. THE AGROECOLOGICAL TRANSITION POLICIES IN VIET NAM

1. The transition of agricultural policies associated with agroecology transition

Before 1986: agricultural production was organized in cooperatives following annual plans made by the state. There was equal output distribution regardless of worker productivities. Domestic and international trade was highly restricted. As a result, agricultural output stagnated and starvation occurred in several areas. Vietnam had to import 170 thousand tons of rice and 1.1 million tons of food crops annually during the 1976-1980 period. Even after the "Contract 10 system", the farmers were allowed land use rights only no more than 03 hectare sizes and hinder the development of production on a large scale (Nguyen & Grote, 2004). Significant resource for agricultural production has been wasted due to land reallocation for industrialization. The imbalance between rural and urban public investment makes the income gap more expanded. Limitation in the land redistribution right of farmers is among the reasons for lower agricultural growth and potential. In this stage, there is less pressure on environmental ecosystems, so there are less policies to protect environment in agricultural productions. Moreover, all agricultural materials were managed by the central government, farmers do not have chance to use much or more fertilizer or pesticide in their cultivation. As a result,

agroecology policies are not mentioned in this period.

From 1986 to 1992: agricultural policy has changed from a centrally planning and autarkic system to an open and market-oriented one. In the reform package, the most important components are land reform, trade reform, and the development of policy instruments to assist agricultural production in general. Among policies, the land reform was initiated in 1981. The Directive No. 100 issued on January 13, 1981 allowed cooperatives to assign parcels of land to farm households based on an annual production contract. While the farmers were responsible for planting, weeding, and harvesting, the cooperative was in charge of harrowing, ploughing, irrigation and drainage, and pest control. Most of the harvest had to be delivered to the cooperatives. While cooperatives still acted as a planning agency for households' farming activities, they no longer strictly controlled the sale of products. Farmers were allowed to sell their products in free markets provided that they fulfilled their production contracts with the cooperatives. This encouraged farmers to increase investments in their land resulting in a rise in agricultural output. In 1988, Resolution 10 was launched giving farmers the right to use their land for 10-15 years, to fully control the production process and to hold about 40% of their contracted output.

Intensive farming has become the mainstream in agriculture with the application of new scientific and technological achievements in varieties, farming processes and product processing. This started causing land degradation in many localities and the government started pay much attention to protect environment in agricultural production and rural area. In addition, the concept of sustainable agricultural and rural development took shape at the Food and Agriculture Organization's (FAO) Conference on Agriculture and the Environment in Hertogenbosch in 1991, and the issue of sustainable development in agriculture sectors was widely mentioned, recognized and affirmed at the 1992 Earth Summit in Rio de Janeiro through Agenda 21, this have impact to the Vietnamese Government to transit partly from intensive cultivation by exploiting natural resources into more sustainable way or agroecological practices.

From 1993 to 2008: The turning point was marked in 1993 by the Land Law which granted long-term land use rights to farming households as well as the five rights to exchange, transfer, lease, inherit, and mortgage. This is also the critical moments in the development of agroecology transition because the long-term land use rights of farmers referred to 20 years for annual crops, and 50 years in the case of perennial crops. Therefore, farmers have full right to cultivate whatever they have capacity to invest in agricultural production. The Land Law also put a ceiling on the amount of land that can be allocated to households: for annual crops, the limit is two hectares in the central and Northern provinces and three hectares in the southern provinces, and for perennials the limit on land holdings is ten hectares. Therefore, this period created a footprint in agricultural production in Vietnam based on significant increase in agricultural yield and accessing the regional and international markets. This period started the increase in intensive cultivation to increase the yield in agricultural sector by using massive chemical fertilizers and requires for policies to ensure more sustainable production. However, intensive agricultural production also raises a big question related to sustainable development because it may cause problems for environmental ecosystem as a result of overexploiting natural resources and external inputs for agricultural production.

From 2008 to present: This period experienced the transition to policies from food security to food safety and sustainable development. The main policy document for rural development was issued on 5 August 2008, when the Communist Party of Vietnam adopted Resolution 26 on "Agriculture, Farmer and Rural Area" – Tam Nong. The document states that the development of agriculture and rural areas as well as improving living conditions of farmers is based on the market economy with socialist orientation. The resolution lays out both general and specific objectives to be attained by 2020. Based on these objectives, tasks and solutions are specified,

which involves all actors related to the three targets and also includes sensitive matters like land administration and state-owned enterprises. This is the most important strategic policy that shape majority of agricultural policies in Vietnam since 2008.

The National Target Program on New Rural Development in Vietnam is implemented in accordance with Decision 800 / QD-TTg dated 04 June 2010 by the Prime Minister (after calling it Decision 800). The National Assembly has built a common goal of "Building a new rural structure. Socio-economic infrastructure with good infrastructure, reasonable structure and reasonable model of social services, linking agriculture with rapid development of industry and services, linking rural and urban development according to planning, rural democracy, stability, and rich national cultural identity, environment protected ecology, natural preservation, and the quality of people's life and well-being are enhanced, socially-oriented "

Policies for restructuring agricultural sectors: The Prime Minister of Vietnam issued the Decision No. 899/QD-TTg on June 10, 2013, approving the plan of restructuring the agricultural sector towards improving value added and sustainable development. This policy aims to make national standard compliance with international standards. Accordingly, the restructuring program aims to develop the household livestock and animal husbandry sector by reorganizing the slaughter system to ensure food safety, tightening the monitoring of the use of veterinary drugs and additives in the field, and increasing efficiency in disease control. To improve quality and production, the plan focuses on increasing the use of science and technology in producing high-quality varieties, developing organic farming, reducing the use of pesticides, and growing crops which are more adaptive to climate change.

This plan also encourage investment in in these products according to local advantages and market demand as if national key products in a local scale; introduce policies and find solutions for increase the production scale and competitiveness in order to include them in national key products; invest in these products according to local advantages and market demand as if national key products in a local scale; introduce policies and find solutions for increase the production scale and competitiveness in order to include them in national key products; Keep reviewing and revising the plan for plant and product restructuring according to advantages, market demands and regional climate. Develop large-scale concentrated agricultural production areas; organize production chains for national key products; encourage clean and organic agriculture. Keep reviewing and revising the plan for plant and product restructuring according to advantages, market demands and regional climate. Develop large-scale concentrated agricultural production areas; organize production chains for national key products; encourage clean and organic agriculture. Overall, the plan is aimed at maintaining growth, raising efficiency and competitive capacity through productivity, quality and value addition; meeting better the requirement and preferences of domestic consumers and promote export on international market.

2. Agroecological policies in Viet Nam

In the event of the 13th Party Congress, the orientation for socio-economic development in the period of 2021 - 2025, determined the goal of building a "agroecology, modern countryside, and smart farmers". This is perhaps a goal to concretize one more step to implement the policy of the Resolution 26/NQ-TU of the 7th meeting of the 10th Party Central Committee on "agriculture, rural and farmers". The notice clearly states the views and orientations for the development of the agricultural sector: The three main pillars of the industry are agriculture, rural areas and farmers, in which the farmer must be the center. The countryside is the foundation, the basis, and agriculture the driving force. Agricultural development activities must revolve around farmers in order to improve the material, spiritual and quality of life for farmers; harmoniously resolve the relationship between the State, society and the market. Agriculture-rural-farmers must continue to contribute to political and social stability, promote the development of industrialization and modernization of the country.

In Vietnam, agroecology policies, reflected by encouraging specific agroecological practices, include: 1) agroforestry; 2) integrated pest/crop management; 3) crop-livestock system management; 4) standardized agricultural production; 5) organic production; 6) system rice intensification; and 7) food safety control policies.

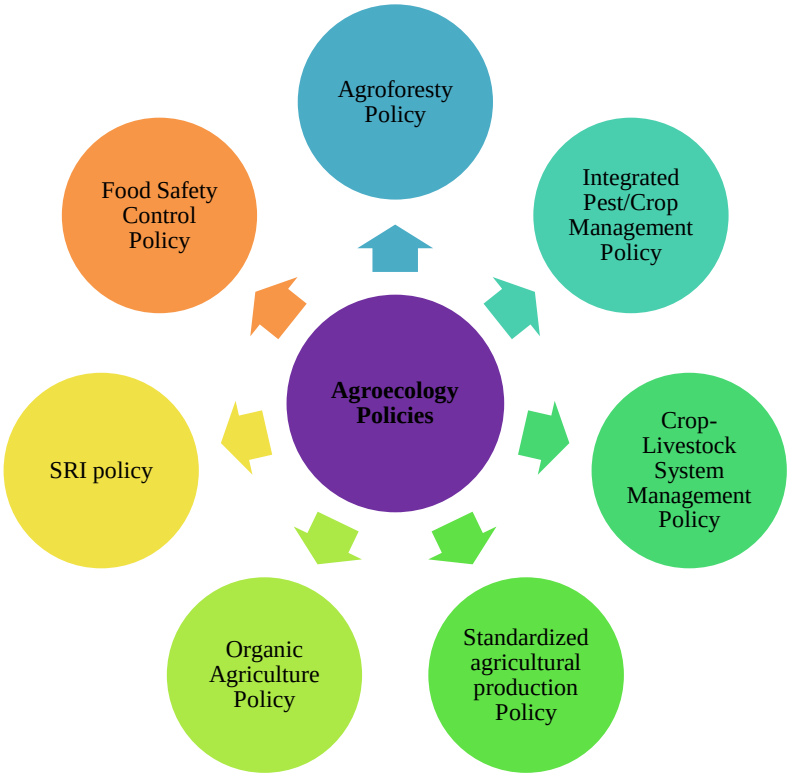


Figure 1: Key Agroecological practices in Vietnam

2.1. Agroforestry policies

Agroforestry is a land-use system in which perennial trees are grown calculated on the same unit of land as trees. Short-term agriculture and / or animal husbandry, which can be coordinated in time and space. An agroforestry system must have five characteristics: (i) usually consists of two or more crops (or plants and animals), of which at least one perennial tree species is required; (ii) usually produces two or more products; (iii) production cycle is longer than one year; (iv) more ecologically and economically diverse than monoculture systems; (v) there is reciprocal interaction between elements constituting the system (possibly positive and / or inverse interaction).

Agroforestry farming practices was first time institutionalized and promoted by the government in the Land Law 1987 which set agroforestry practices as responsibility of farmers who are allocated with agroforestry land. However, even in the Law on Forest Protection and Development 2004, agroforestry was set as principles of forest protection and development. Following revised version of Land Law (1993, 2003, 2013), agroforestry practices have been no longer considered responsibility of farmers, instead, they are only encouraged to apply in their production. In corresponding with soften policies on responsibility of farmers to do agroforestry, at the end of 2000s, there were some policies at ministry level which provided financial supports to motivate farmers practicing agroforestry. There has been a shift in agroforestry policies, from more mandatory to more flexible and selective regarding agroforestry practices at farm level. Considering positive aspects of agroforestry practices in a long-run wellbeing of farmers as well as environment, this shift reflects a failure of government to pressure of market and local demands, in regulating/directing farming practices towards more sustainable. Therefore, there may be a conflict in public policies pursuing the sustainability. Alternatively, agroforestry policies should pay much attention to sustainable aspects of agroforestry practices and ensure that majority of practices should contribute to the sustainable development.

2.2. Policies for Integrated Crop Management and Integrated Pesticide Management

Integrated Pests Management (IPM) is "a pest management system based on the environment and specific ecological conditions and population fluctuations, uses appropriate technical means and measures to control the pest populations are always below the level of economic harm". Vietnam's national IPM program has been in place since 1992, with the support of FAO the International Program to deal with pest outbreaks such as aphids and small leaf-roll worms on rice plants and due to the abuse of plant protection drugs. After that, a number of programs were followed, such as: Community program, IPM on vegetables; program for conservation and application of biodiversity in Asian communities as well as the IPM component of the agricultural sector support framework since 2000. At the central level, the Plant Protection Department is the responsible agency that coordinate and manage the National Program. At the provincial level the program is implemented through the Plant Protection Sub-Departments. The effectiveness of the National Program has been recognized by the community during the aforementioned period. According to the report of Vinh Phuc Department of Agriculture and Rural Development (2020), when applying the IPM process, farmers can reduce the number of varieties by 40%, reduce one pesticide spray, reduce chemical fertilizers, increase yield 7.5 quintals/ha (about 12%) and increase economic efficiency by nearly 13.5 million VND/ha compared to production according to local practices.

The goal of the IPM Program is to adopt integrated pest management based on an ecological approach, to help farmers understand the field ecosystem, use appropriate farming practices, make effective decisions in the management of the production system, aiming to grow healthy crops and reduce the use of pesticides in the field. From there, building a sustainable production. Therefore, IPM is emerging requirement for good agricultural practices particularly in the current context of climate change and accelerating demands of international exporters for safe of agricultural products. This practice contributes to increase food security, food safety, protection of public health and agricultural development. In the sustainable industry, the Ministry of Agriculture and Rural Development issued Decision No. 2027/QD-BNN-BVTV dated June 2, 2015 on approving the project: "Promote integrated pest management on crops in 2015 -2020". This is the first time that the Vietnamese national IPM program was institutionalized and implemented by the Department of Plant Protection under Ministry of Agriculture and Rural Development (MARD).

Before that practical policy, IPM program in Vietnam has been supported by FAO since 1992 when the first legal document on plant protection issued by the Ministry of Agriculture and Rural Development, although the Law on Plant Protection is issued at this period, but no specific regulations related to IPM was found. Even though there had been lots of activities promoted related to IPM in 1990s and 2000s such as Farmers Field Schools (FFSs), The Department of Plant Protection also recommended several measures to enable agricultural practices that can follows agroecology-oriented practices. One of measures that has been widely applied in Vietnam, namely *"3 reductions, 3 increases" ("3 reductions"* is reductions of varieties, fertilizers and pesticides; "*3 increases*" is increase in yield, quality and efficiency). After that, this measure changes in to the "1 Must; 5 reductions" ("1 must" means that farmers MUST use certified varieties; "*5 reductions*" is reductions of massive varieties, fertilizer, pesticide, water and post-harvest loss).

In early 2000s, the Integrated Crop Management (ICM) program is widely applied in agricultural production, and it has been officially implemented in Vietnam since 2001. ICM is the combination of the Integrated Pest Management and the Integrated Nutrition Management (INM) (hear by ICM = IPM+INM). While IPM focuses on using appropriate pesticide to manage the growth of plants, INM focuses on a management form in which nutrients will be provided to

plants based on the characteristics of the ecological environment (soil, water, weather, climate...), growth and development of the plant (depending on the growth stage of each plant) in the pest situation. Therefore, ICM is based on the multifaceted correlation of factors in the ecosystem, the type of crop is living and ICM is a harmony combination of practices that can be enable of sustainable crop management.

The purpose of the ICM program is to improve the capacity and awareness of agricultural staff and farmers about the relationship between fertilizers, pests and the ability to grow and develop crops. Therefore, farmers can use reasonable numbers of seeds in their production, reducing the exceed use of nitrogen, reducing the use of pesticides, creating conditions for plants to grow and develop well, increase productivity, product quality and economic efficiency. ICP is also more practical and it can be adopted to specific ecosystem and region. If the ICM program can be implemented well, plants can grow well with few pests, high yield, clean products, and good quality. In Vietnam, the ICM program also continues with some measures that were widely applied in earlier period but it can be customized to appropriate to each region such as *"3 decreases, 3 increases"* measures in the South or *"2 decreases, 3 increases"* measures in the North. In which, there are 3 reductions: reduction of seed or amount of water for irrigation, reduction of excess nitrogenous fertilization, reduction of pesticides; 3 increases are: increase crop yield, increase the quality of agricultural products, increase economic efficiency per unit area. ICM proves clear efficiency in agricultural production, the results showed that the yield increase in the models applying ICM was about 10% higher than that in the control gardens while the increase in economic efficiency was 20- 30% (Nguyen Dang Nghia, 2021).

2.3. Policies for crop-livestock system management

The crop-livestock system management is also called as the Integrated Farming Management (the system of "pig-garden-pond", in short Vietnamese: VAC). This practice has been a traditional farming practices of Vietnamese people to cope with their poor access to external farming inputs as well as food market before the country was further open to international market in the mid-1980s. Recognising the importance of this model, Vietnamese Government has issued several policies to encourage this model nationwide.

Directive 36/CT-TW dated June 25, 1998 of the Politburo on strengthening environmental protection in the period of industrialization and modernization of the country has "issued tax and credit policies to support the use of clean technologies"; Resolution No. 41-NQ/TW dated November 15, 2004 of the Politburo on environmental protection in the period of promoting industrialization and modernization of the country also clearly states that "encourage recycling and use of recycled products" and the socio-economic development strategy 2011-2020 issued for the XI Congress (2011) of the Party; Resolution 24/NQ-TW dated June 3, 2013 of the Central Committee on proactively responding to climate change, strengthening natural resource management and protecting the environment has also continued to emphasize and detail this policy. On the basis of the Party's policy, the State has issued policies such as the Strategy for Environmental Protection to 2020, with a Vision to 2030; Green Growth Strategy, Decree 38/2015/ND-CP; Decision 16/2015/QD-TTg; National Strategy on Integrated Solid Waste Management 2018. These policies represent the shift towards circular economy of Vietnam in the agricultural sector.

Thanks to support policies of Vietnamese government, several models have been established and proved the economic effectiveness in agricultural productions and integrated farming management. Some remarkable models are "duck-rice" integration this model is very common, especially in North and Central Vietnam in collectivization period. According to this model, farmers release ducks into rice paddies fields, this does not only help to fatten ducks, but also to make uses of ducks for controlling weeding, pests and enhancing rice yield through adding more manure and soil/water disturbance that facilitates oxygen exchange and release toxics from soil such as metal. Another model is the system of "(floating) rice and fishes" in the Mekong delta. Integrated farming practices have long been proved for their benefit-cost efficiency. However,

these types of system have been much reduced recently caused by market-oriented agricultural development and rural population expansion from which fishponds have been converted to housing land or garden for fruits and vegetable. In addition, the 4F biosafety breeding model in livestock is highly appreciated by both farmers and policy makers, this model aims to optimize for main input for livestock raising, including Farm, Foods, Feeds and Fertilizer. This model is a closed production cycle, including: organic pig raising, production of biological products, production of organic animal feed and production of microbial fertilizers. In this model, the waste on the farm is collected and treated to produce microbial organic fertilizers for cultivation, forming a closed agricultural production process from livestock to cultivation, from plants to plant soil. Implementing the 4F biosafety breeding model not only increases economic efficiency, prevents diseases, but also contributes to protecting the ecological environment and reducing greenhouse gas emissions. This can be considered as the first true circular economy model in agriculture (Nguyen Thi Mien, 2021).

2.4. Policies for standardized agricultural production

Viet Nam has made a change in agricultural production by issuing standards to ensure food safety for consumers. One of the standards in production is good agricultural practices (VietGAP). VietGAP is the abbreviation of the Vietnamese Good Agricultural Practices, which means that good agricultural practices. It is the application of production methods to produce clean and safe products, especially fresh fruit and vegetable. Before VietGAP, there had been a lot of agricultural production safety program for vegetables, fruits, and used as a beverage. In many regions, the regulations were built into the common process for farmers to implement. However, because the government did not setup any unit to be responsible for testing and certifying or incentive to encourage producers, the trend of producing clean agricultural produce has not been widely developed, and in some places, it appeared for a while then faded and forgotten.

VietGAP is food safety inspection program through from A to Z of the production line. It starts from the farm preparation, cultivation to harvesting, post-harvest storage, including related factors such as: the environment, chemicals, crop protection products, packaging and even the working conditions and welfare of workers in the farm. The aim of VietGAP is to prevent risks of food safety, produce quality and workers in production, harvesting and postharvest handling of fresh fruit and vegetables. This practice serves to protect the environment and use for product identification and traceability, contributes to enhancing the responsibility in production and management of food safety of individual and/or organization, creates the approval feasibility of food safety for individual and/or organization, ensuring the transparency, traceability and recall of produce, and enhancing the product quality and economic efficiency of fruit and vegetable production in Vietnam.

VietGAP was developed based on a combination AseanGAP and GlobalGAP with slightly lower criteria for compliance in aspects of protection applied for farm workers and environment but not in aspects that directly affect food safety, including compliance with pesticide and fertilizer uses or microbiological contamination (MARD, 2008). This practice has been strongly supported by the Vietnam Government. This is clearly shown via issuing the Law on Food Safety later on 2010 and effected on the 1st July 2011 requesting establish the legal regulatory guidelines and perform the roadmap for the implementation in Vietnam, this is a big progress in food safety control in Vietnam. When farmers follow VietGap, quality of product ensures and the consumer is benefit because they have chance to buy safe product. This also a critical turning point of Vietnamese agriculture aiming at agroecology ecosystems because agricultural production can protect both producers and consumers by following certain standards. This was clearly determined in the Decision No 01/2012/QD-TTg dated 09th January 2012 of the Prime Minister on the policy supports the application of Good Agricultural Production Practices in agriculture, forestry and fisheries. The State budget invests 100% of the fund for basic surveys, identifying concentrated production areas applying VietGAP approved by the competent authorities. State budget support: No more than 50% of total investment capital for construction and renovation of infrastructure of concentrated production areas; Support one-time funding for hiring

evaluation organizations to be granted safety product certificates; Support training for widely applying in production and preliminary processing of safe products.

2.5. Policies for organic production

There is increasing demands for organic products by consumers in both domestic and international markets. This is also a leading reason for encourage the development of organic agriculture in Vietnam in the future. In addition, pressure of environment protection also causes the transition of conventional production into organic production. Organic agriculture is a production system that allows the optimal exploitation of resources such as soil, energy, nutrients, biological processes to take place in nature with the most appropriate management method (Bach Tan Sinh, 2019). By this definition, organic agriculture can also be understood as ecological agriculture. Thus, the term "organic" not only refers to the type of nutrition provided to plants but is expanded as a perspective, in which sustainability is the key (Nguyen Van Bo and Ngo Doan Dam 2017).

Vietnamese organic products have international promising markets, but organic farming system in Vietnam has not received considerable attention from the government, and it has grown in "an unplanned manner". However, there is increase in organic agriculture production area in Vietnam rom 53,350 ha in 2016 to 237,693 ha last year and they are grown in 46 out of 63 provinces and cities (MARD, 2020).

In December 2007 the Ministry of Agriculture and Rural Development issued national basic standards for organic production, which can now be used as a reference for producers, processors and others interested in organic products for the local market. MARD is planning to set up a certification system for the local market but a timeframe for this activity has not yet been developed. Some private service providers, such as Qualiservice, recently developed competencies to support farmers in obtaining certification (organic and GAP-Good Agricultural Practice) for agricultural and fishery products. A recent good move was that in late 2011, Vietnam Organic Agriculture (VOA) was officially established and in May 2012 the First Congress of Vietnam Organic Association was held (Ngo Doan Dam et al, 2012).

There is no consistent policy to encourage organic production from local to central level. In other words, there are no official programs or regulations for supporting organic system since the government still obsessed to meet national food security and the international food demand. This impedes the promotion of organic farming within the country. No legal framework for organic farming eventually causes further effects, such as no training for organic expert in the field, no aid for organic farmers to create organic offices, or no extra costs in production system. Therefore, it is clear that the growth of organic farming needs the legal framework to result a planned growth of organic agriculture. Actually, the Government of Vietnam through the Ministry of Agriculture and Rural Development has collaborated with the Vietnam Farmers.

The draft of the National Basic Standards for Organic Products has been conceptualized and enacted by the MARD in December 2006 through the Decision No. 4094/BNN-KHCN on the issue of TCVN 602:2006 Organic. This standard follows the IFOAM guideline and ISO 65, which are issued by Codex on organic. However, this standard has not further issued yet into regulations or policies or specific programs. Thus, it does not bring a better condition for organic development in Vietnam. Vietnam still needs real organic policy, such as the infrastructure, the certification and accreditation, the research and development, the training and education, and also the financial support. The situation has not much change until the official standard of organic farming was issued in 2017, namely TCVN11014:2017/2018. These policies appear to conflict with environmental goals. Protecting natural resources and environment has not been a pillar of agricultural policy, the use of danger synthetic inputs still continues to be practiced, and the practices at provincial level maintains high productivity. The policy and administrative failure make organic farming is still underdeveloped in Vietnam.

2.6. Policies for System Rice Intensification

The basic principles of system rice intensification (SRI) applied on rice transplanting and direct seeding, farmers approach methods (NT Dung and HX Phu, 2017). 1) For rice transplanting, SRI principle applied on transplanted rice includes 5 basic principles: plant healthy rice seedlings, (2 to 2.5 leaves); plant only 1 seedling for one clump, sparse transplanting, in squared shaped; Irrigate so that the field is alternately flooded and non-flooded; aerate soil; and 5) intensify the use of organic fertilizer, bio-fertilizer to improve soil fertility. 2) For direct seeding, SRI principle applied in direct seeding consists of 4 basic principles; sow sparsely: disperse (without machine) less than 2 kg seeds/500m2 and less than 1.5 kg /500m2 (with machine); irrigate so that the field is alternately flooded and non-flooded: 4-5 times after seeding until growing stand; Ensuring to adequate soil moisture; maintaining water level 3-5 cm from initial formation until finishing the milky stage. From the dough stage until harvesting, keep the field dried; aerate soil the first time soon after implantation. The second time should be conducted in 10 days later than the previous time. Together with soil, the water surface also needs to be aerated. Remove grass within the first 30 days; Ecological land conservation: use organic and microbiological fertilizers, compost post-harvest crop residues and reduce the use of chemicals, including fertilizers, plant protection products. 3) For farmers approach methods, farmer field schools (FFS) organised to help farmer in practicing the SRI principles so that they can apply them in the specific conditions of their land (seeds, soil, and cultivation conditions). FFS is also the environment for farmers to practice cooperation skills in the process of SRI implementation as well as in manufacture.

System rice intensification (SRI) was firstly introduced in Vietnam in 2002, this idea is much supported by the Conversation and Biodiversity Applications Asia. In the first trials, this technique was applied in four provinces in Vietnam: Hanoi, Hoa Binh, Quang Nam and Thua Thien – Hue province. It was proved that farmers can completely apply SRI and overcome the basic current drawbacks of wet rice cultivation practices in sowing seed, cultivating, and abusing chemical pesticide. In 2004, the Plant Protection Department built the SRI technical process applied in rice with different farming conditions, and disseminated SRI application in the other provinces. The results presented that applying the SRI in a large field with active aspersing process and close cooperation with the community will be more favourable, compared to applying SRI in the individual production condition of each household. After that data collected from model research were summarized under the form of reports and proposal documents by Plant Protection Department, and sent to the Ministry of Agriculture and Rural Development to propose the recognition of SRI as a technical progress. Accordingly, the Ministry of Agriculture and Rural Development issued Decision No. 3062/QD-BNN-KHCN on recognizing SRI as a technical progress and assigns Plant Protection Department to organize the application of SRI in the Northern provinces on September 15th 2007. After this event, there in an increasing number of farmers apply SRI in their cultivation with total one million farmers adopting SRI and this significantly contributed to improving rice production efficiency.

SRI Vietnam network namely "SRI-Vietnam" was formed with the participation of state agencies, provincial authorities, research and development organizations, international and domestic non-governmental organizations, farmers and individuals interested in SRI. This forum is an opportunity to share information and develop cooperation in both SRI Vietnam and SRI Global. There were 35 provinces in Vietnam applying SRI in 2015, including 23 provinces from Red River delta, Northern mountainous and midland, 5 from North Central Coast, 3 from South Central and 4 from Mekong River Delta. SRI is extended to develop in some integrated cultivation model such as applications SRI in the "system of rice cultivation – fish". SRI application makes the field a spacious place for fish habitation. In addition, farmers no longer have to use much chemicals in their production practices. The rate of using chemical fertilizer reduced more than 50%, which make SRI fish farming more efficient than the conventional practices. This model not only conserve biodiversity but also improve the income from conservation activities. In 2015, there were 60 farmers applying this model (Truong et al., 2017).

To keep promoting SRI, the Minister of Ministry of Agriculture and Rural Development promulgated Decision No. 3119/QĐ-BNN- KHCN on December 16th, 2011 related to approving the Scheme of reducing greenhouse gas emissions in agriculture and rural by 2020. In which, it set a target to reach 3.2 million hectares of rice applying SRI principles by 2020.

2.7. Policies for food safety control

Typical food safety control policy if the Law of Food Safety. This law was passed by the 12th National Assembly of the Socialist Republic of Vietnam at its 7 sessions on June 17, 2010 and comes into effect from July 1, 2011. The Law provides on food safety assurance conditions, food production and trading and food import and export; advertising and labelling of food; food testing; risk analysis for food safety; preventing, preventing and overcoming food safety incidents; information, education and communication on food safety. Recently, the Prime Minister issued Directive 17/CT-TTg dated April 13, 2020, strengthening responsibility for state management of food safety in the new situation. The Directive clearly specifies the responsibilities and tasks for each management agency, sectors and levels in the locality, and at the same time demonstrates the Government's determination in ensuring food safety to all people in the world.

Food safety scheme continued to be the government's concern. One famous program launched by the government of Vietnam was the campaign of "no early spray" in 1994. The aim of the campaign was to reduce the excessive use of chemical pesticides, especially during the first 40 days of planting rice seeds. In 1998, the initiative regulation on the scheme had been temporary issued. The Integrated Pest Management and Safe Vegetable Growing Practices are two examples of training courses that had to be followed by provincial and district authorities. Later in 2003, the government issued the Ordinance of Food Safety and Hygiene with the aim of minimizing the residue impact on human health. The ordinance determines that the safety and hygiene of food is under the responsibility of food business operators. The operators also have an obligation to meet standardization in producing safe food. Simultaneously, the government also regulates the use of pesticides in agriculture. Using less pesticide means less toxic to human body and also contribute to environmental protection. This is an approach that is promoted by the government to three key agents (producers, operators, and consumers).

To promote resource and environmental protection, Vietnamese governments have issued many policies targeted on agroecology promotion with pursuing that this model can generate safe products from agricultural production. These have been directly or indirectly targeting on: i) promotion of agroforestry through more diversification of the system; intercropping, rotation and agroforestry; ii) promotion of more sustainable practices such as: reduction of chemical pesticide/fertilizer dependence and increasing uses of local available inputs such as pest-control bio- ingredients (lime, garlic, or pheromone, even manuals) manure/composts or bio-wastes, and integrated farming system; iii) promotion of other resource conservation such as minimum soil tillage, water saving techniques, forest protection. Agroecology promoted policies have not achieved expected results because there is lack of market incentives for products generated by the agriculture systems. Although there are some policies that were issued later to build and develop models of safe agricultural chains

Decision No. 3073/QD- BNN-QLCL dated December 27th, 2013 of the MARD regulating the development and development of safe models of food supply chains for safe agricultural, forestry and fishery products nationwide and the safe food supply chain (National strategy for food safety during 2011- 2020, Decision No. 20/QD-TTg dated January 4th, 2012). These policies indicated process and mechanism for supervising food safety throughout the product chain and has been inspected by competent authorities to ensure food safety requirements at all stages of production and business in the food supply chain. The initial production facilities of the chain do not require VietGAP certification, equivalent certificates or food safety eligibility. Accordingly, products sold at business establishments to individuals or organizations directly subject to supervision by functional agencies, which have been sampled and tested at laboratories designated by the

MARD, and meet the current regulations and technical regulations on food safety; The certifying body is Quality Management Agency for agricultural, forest and aquaculture products of provinces, cities or agencies assigned by the Department of Agriculture and Rural Development to manage the quality of food safety in agriculture, forestry and forestry (Back Tan Sin, 2019).

3. Institutions and Actors involving agroecology policies

At the central level, two ministries have much roles in issuing policies and regulations related to agroecology but those policies do not directly mention the agroecology policies, it covers policies that indirectly impact the agroecology transition in Vietnam only.

3.1. State agencies

The Ministry of Agriculture and Rural Development (MARD) is one of the most important state agencies that play an important role in promoting agroecology transition in Vietnam. MARD is a governmental agency performing state management functions in the fields of agriculture, forestry, salt production, fishery, irrigation/water services and rural development nationwide, including state management functions with regard to delivery of public service in accordance with legal documents. Vietnam set the goal of developing ecological and sustainable agriculture, and changed mindset from agricultural production to agricultural economy, thus creating multiple values. MARD could receive support and advice from the lender and other experts during the process of building agriculture ecological system to spread to other regions, thus improving farmers' lives and mechanism renovation so as to fully tap the strength of both public and private sectors, farming enterprises, as well as farmers and cooperatives.

Agroecology policy is still new in Vietnam, so in the regulations about function and tasks of MARD, there is not any mention about ecology, but this state agency is responsible for quality and food hygiene and safety management of agro-forestry, fishery and salt products with specific functions regulated in the Decree No 15/2017/ND-CP of Vietnamese Government. These functions and tasks are as follows: Guide application of food hygiene and safety system: Good manufacturing practices (GMP), Good aquaculture practices (GAP), code of conduct (CoC), Good hygiene practices (GHP) and hazard analysis critical control point/rick management – HACCP/RM in production, processing and transportation; Govern monitoring, inspect antibiotic, harmful and poisonous chemicals and pathogen factors for animals and plants before harvest in raw – processing, preserving, processing, transporting; control animal slaughter and conduct hygienic veterinary activities; Issue regulations, technical standards of food quality and safety, disease – resistance, safe environment in production, preservation, processing and before entrance to market; Govern inspection, approval, termination of approval of sufficient conditions for food safety in plants, aquaculture areas, harvest, purchase, transportation, preservation, raw – processing, processing agroforestry, fishery and salt products; Govern approval of food quality and hygiene safety for imported agroforestry, fishery and salt products, domestically – produced products for export before market distribution; Govern, inspect issuance of quarantine certificate for imported and exported alive animal or flora and fauna products could bear pathogens; inspect import or domestic production of food, veterinary medicine, fertilizers, chemicals used in animal breeding, cultivation, agroforestry activities, fishery and salt production based on decentralization (MARD, 2021).

In addition to the Ministry of Agriculture and Rural Development, the Ministry of Natural Resources and Environment (MONRE) also play an important role in promoting agroecology transition in Vietnam. MONRE is an agency of the Government, performing the state management function in the following fields: Land; resource water; production resources, geology; Environment; hydrometeorology; climate change; metrology and cartography; general management of natural resources and protected marine environment and islands; explore. The functions, tasks and organizational structure of MONRE is regulated by the Degree No. 36/2017/ND-CP of the Vietnamese Government. Accordingly, MONRE is responsible for developing and implementing programs of education on legislations on land, to raise awareness of policies and legislations on land among agencies, organizations, households, individuals and

communities, with special attention paid to ethnic minorities. Besides, the MONRE is also responsible for developing and implementing programs on education of legislations on land, to raise awareness of policies and laws on land among agencies, organizations, households, individuals and resident communities; with special attention paid to ethnic minorities.

MONRE formulates and organizes the implementation of a national biodiversity conservation master plan; guide and inspect the formulation and appraisal of biodiversity conservation planning of provinces and centrally run cities; evaluate the compatibility between the biodiversity conservation planning of ministries and ministerial-level agencies with the national master plan on biodiversity conservation; guide the integration of biodiversity in socio-economic development planning and strategies, branches and territories; Proposing and institutionalizing international mechanisms, policies and initiatives on climate change for socio-economic development, ensuring national defense and security in accordance with conditions and ensuring national interests. family; propose and recommend the adjustment, amendment and supplementation of Vietnam's mechanisms, policies and technological standards related to climate change in accordance with the international situation;

MONRE also guide and organize the implementation of measures to manage carbon credit business activities in accordance with the provisions of law and international treaties to which Vietnam is a signatory, issue certifications for investment projects in accordance with the provisions of law. clean development mechanism and other international mechanisms on reducing greenhouse gas emissions of all economic sectors; Act as the national focal point for the implementation of the United Nations Framework Convention on Climate Change, the Kyoto Protocol, the Paris Agreement on Climate Change, the Vienna Convention on the Protection of the Ozone Layer, and the Protocol. Montreal on substances that deplete the ozone layer and other international treaties related to climate change, protecting the ozone layer; national authority on clean development mechanism (CDM); national agency of the Climate Technology Network and Center (CTCN); national focal point for actions to reduce greenhouse gas emissions in accordance with national conditions (NAMA); the national focal point for the Adaptation Fund.

3.2. Research Institutions, Education and Training Organizations

Based on the development trends and strategic orientations of state agencies, research units and educational and training organizations under relevant ministries are also actively implementing projects and implementing research models related to ecological agriculture. In Vietnam, some large prestigious units in this field can be mentioned such as the Vietnam Academy of Agricultural Sciences with 19 member units, conducting research in various fields but also carrying out many projects. While research supports the development and assurance of biodiversity and ecology, projects are also beginning to make an impact on policymakers. In addition, many research units under other ministries and agencies such as the Ministry of Science and Technology and the Ministry of Natural Resources and Environment have also started to develop and implement projects related to ecological agriculture. State agencies involved in the field of organic agriculture include: MARD, MOST, MONRE. Most institutes and research organizations interested in organic agriculture are directly under MARD, with functions and tasks related to crops, livestock and fisheries, including the Vietnam Academy of Agricultural Sciences (VAAS) and other research institutes/centers, Animal Husbandry Institute, Research Institutes for Aquaculture and agricultural universities in different ecological regions throughout Vietnam.

In Vietnam, there is a Center for Agricultural Research and Ecological Studies (CARES) under Vietnam National University of Agriculture, which is a public, non-profit educational and research institution. This center was established by the Ministry of Education and Training in 2000, the CARES mandate is to help farmers enhance their knowledge and increase agricultural productivity, environmental protection and sustainable development in rural and peri-urban areas. CARES conducts studies in the areas of agricultural ecology, rural sociology, natural resources management, farming system R&D, economics, marketing, and policy analysis.

CARES is a scientific-technological organization that applies an interdisciplinary and multidisciplinary approaches to research, training, education, and technological transfer, based on innovative and initiative concepts, ideas of its own staff, the local people to whom they work with, and other scholars and scientists from Vietnamese and international organizations.

Recently, the Institute of Circular Economy Development was established in 2020. This is a public science and technology research unit under Vietnam National University of Ho Chi Minh City (VNU-HCM). It is established under the Decision No. 108/QD-DHQG dated February 27th, 2020 of VNU-HCM and officially came into operation from August 2020 with the registration certificate of science and technology activities by the Ministry of Science and Technology on June, 16th, 2020. The Institute for Circular Economy (ICED), VNU-HCM has affirmed its position with visions to become Leading institute for circular economy in Vietnam and the Globe South, providing knowledge, solutions about technologies, innovation, policies on circular economy related and linked platform of Government – Industry – University with relevant actors for circular economy and the common goals of sustainable development.

3.3. Private sectors

There are many challenges in Vietnam's agroecology, including challenges for food in the context of increasing urbanization, leading to demand for both food quantity and quality. Food producers must also provide enough for the population. More importantly, the quality of food must meet the requirements of safety and cleanliness to meet the requirements of demanding consumers. Currently, consumers are very interested in safe agricultural products, thereby posing challenges to human health since micronutrients and nutrients in the diet must bring high nutritional content to human health. This lead private sectors change their approach in producing foods to satisfy the consumer's needs and demand. Producers are also consumers, and they may well become future researchers. The younger generation needs to be more exposed to agriculture to turn them into people who are passionate about agriculture. It is possible to bring the approach to ecological agriculture to the young generation through events such as: Earth Day, Earth Hour, Environment Day... so that they can better understand Vietnam's agroecology, turn farming into a professional activity and generate high income as well as improve the life of farmers.

Vietnam has no system of national standards and legal framework for production, certification and monitoring of quality of organic agricultural products. In early 2007, MARD issued Sector Standard No. 10 TCN602-2006 for organic products in Vietnam, but this standard is still very general and has not been specifically instructed for organic certification, to serve as a basis for production, processing, and other interested entities. Currently, there are 13 organizations in the country which are farmer groups and enterprises certified by international organizations meeting standards to export organic products to European and American countries (MARD, 2007).

Certification bodies play a role in certifying organic products and they contribute to the increase in organic production and markets in Vietnam. Third-party methods use independent organizations to ensure a particular certificate's guidelines are met and maintained by producers. Compliance is a time-consuming and complex process of documentation, inspection, and record-keeping; however, this does ensure conformity and high transparency. There are currently two registered third-party certifiers in Vietnam: Control Union and NHO QScert. Control Union is an international certification council and is the most active and visible organic certifier in Vietnam. NHO QScert, a Vietnamese organization, is a relative new-comer but poised to have a much larger presence over the coming years.

Participatory Guarantee Systems (PGS) are not officially recognized by the Vietnamese government. They are commonly accepted by retailers and consumers and continue to actively educate and work towards ensuring smallholders benefit from adopting organic principles. PGS initiatives are what IFOAM Organics International refers to as "locally focused quality assurance systems" and is the only real alternative to third-party certification. Often initiated by NGOs and cooperatives, PGS stresses active participation, trust, and cooperative knowledge networking, which ensures they remain much more suitable for smaller markets and supply chains. These

grass-roots programs are built and maintained by their members meaning they're much more affordable for and can easily account for a range of different environmental conditions, producers, and solutions.

Mekong Organics, an Australian-based organization, has identified a knowledge gap between producers, certifiers, and markets and has developed a solution they believe will give organic farmers in Vietnam, in particular individual smallholders, a better chance to succeed. Most small organic farmers are without proper support and many unfortunately fail to cope with unforeseen problems, including the initial loss in profit – an inherent feature of organic farming. The confusion and misunderstandings about organics aren't reserved for consumers, in fact, primary producers in Vietnam have arguably larger and more complex challenges. However, with a proliferation of certifiers and organizations willing to share knowledge and develop strong and cooperative networks, Vietnam's organic smallholders and producers will have much better chances of success and longevity. The private sector is also engaged in the organic sector with companies directly involved in farming organic products for export (e.g. Hiep Thanh - Ecolink). The increasing number of stakeholders involved in organic agriculture are now organised in a Vietnam Organic Association (VOA).

3.4. Civil society

A very important factor is the increased interest of the Government and the people in organic agriculture. As proof, on May 22nd, 2013, Vietnam Organic Agriculture Association was officially established. The Ministry of Agriculture and Rural Development (MARD) issued Sector Standard 10 TCN 602-2006: Organic - Standard for Organic Agriculture Production and Processing on December 29th, 2006 as an important legal basis. Many businesses have boldly invested in the production, processing and export of organic agricultural products.

However, Vietnam Consortium of Agriculture Organic Association needs to be through successful model businesses, helping them to advertise and introduce products, thereby improving understanding and interest of society as a whole, especially the government agencies to the products of organic agriculture. The Association needs to build a network of domestic and foreign collaborators, NGOs to update information, support businesses in approaching the trend of developing organic agriculture of countries, new technologies and especially the procedures and standards set by each importing country.

On 31st October 2011, the Ministry of Internal Affairs issued the decision on the establishment of Vietnam Organic Association (VOA). It is specified as a social vocational organization with participation of individuals, organization, enterprises, scientific units, cooperatives, groups who have concerns and hearted enthusiasm to organic agriculture, who directly produce, process, do business, providing services, export and use organic products in many provinces and cities. Representing Vietnam Academy of Agricultural Sciences (VAAS), the Principal Investigator and his FCRI team have taken part in the progress of preparation and organization of the First Congress of Vietnam Organic Association. On May 22nd 2012, the Vietnam Farmer Union led and organized the First Congress of Vietnam Organic Agriculture Association took place in Hanoi with the participation of 158 representatives as scientists, organizations, business, consumers and farmers concerning about organic production.

3.5. International development agencies

There are very few international agencies and organizations supporting the development of organic agriculture in Vietnam, except Agricultural Development Denmark Asia (ADDA), GTZ of Germany and more recently the Rural Development Agency of Korea. In Vietnam, organic agriculture is also a new concept as consumers' awareness about food safety is still limited. In 2005, ADDA was funded by Denmark's development cooperation DANIDA to start the largest initiative in organic farming in collaboration with a national mass-organisation, the Vietnamese Farmers Union (VNFU). The project aimed at increasing awareness and knowledge of farmers on organic agriculture, and assisting them to produce, certify and market organic products. The

ADDA-VNFU project established 25 farmer groups producing organic products in nine provinces. On an area of 70 ha they produced organic vegetables, rice, orange, litchi, grape- fruit, tea and fresh water fish. They also trained 120 farmers on organic production.

The ADDA-VNFU organic project collaborates with MARD to support development of national organic standards and certification. In 2006 the government set up a national standard to guide organic productions. ADDA-VNFU also developed a Participatory Guarantee System (PGS) to promote organic vegetables for the domestic market. Since 2008, other international NGOs such as IUCN/SNV (shrimp farming), VECO (vegetables), and research institutions such as CIRAD (tea) are engaged with national partner institutions in clean agricultural practices, value chain development through different certification mechanisms: PGS, Geographical Indication, social certification and trademark registration. In the 2000s, "modern agroecology" initiatives in the Mekong countries were largely pushed by national and international NGOs as part of a global movement that spread across the region. This countermovement to the global trend of agricultural intensification promotes more sustainable land uses, production of healthier food, and conservation of traditional knowledge and practices.

More recently, these practices have been valorized as part of "climate smart" agricultural strategies. A non-exhaustive review of agroecology experiences in the Mekong Region, including Vietnam, which is reported here, was conducted as part of the feasibility study for a new project funded by the French Agency for Development (AFD) to support the Agroecology Transition in the Mekong Region. Another component of the study, which is reported elsewhere, aimed at analysing existing regional networks related to the man- agreement of natural resources and drawing lessons for the governance of a future agroecology learning alliance (Castella and Kibler, 2015).

III. SOLUTIONS TO FACILITATE SUSTAINABLE AGROECOLOGY TRANSITION IN VIET NAM

The modern agriculture of the 21st century is an intelligent eco-agriculture based on innovative applications of eco-agriculture, combining intelligent and precise management methods using digital technology, are intended to produce more products in more resource-efficient terms. Therefore, potential solutions to agroecology transition in Vietnam are as follows:

1. Identify and scale up successful agroecology-oriented production models

Agroecology production models (such as conservation agriculture, agroforestry, landscape agriculture, sustainable rice intensification, integrated systems of livestock and farming, organic farming ...) are the main solutions for long-term agricultural intensification, limiting conversion of forests to cultivated land, limiting the use of materials (fertilizers, pesticides), reducing greenhouse gas emissions from agriculture and contributing to increase carbon storage. The model of the transition to agroecology will contribute to crop diversification, improve farmers' capacity to ensure food security, provide food safety products and enhance agricultural biodiversity, improving the resilience of the production system to climate change. This type of successful model should be replicated and contributed to helping Vietnam fulfil its international commitments on climate change adaptation and mitigation.

2. Integration of agroecology with appropriate technologies

Developing agroecology model (agroforestry, organic, climate-smart agriculture, conservation agriculture ...) to produce modern, environmentally friendly goods need to apply suitable technologies in all stages of the value chain by combination with modern governance methods applying digital technology, promoting potential advantages of regions to ensure competitiveness and food safety. Agroecological practices must be resilient to climate change with smart adaptation and mitigation strategies.

3. Close linkage between agriculture with preservation, processing and consumption

It should have linkage between producers and market actors along the value chain and promote

branding of agricultural products and foodstuffs, combining with rural tourism and protecting the rural environment. Develop synchronous infrastructure for the value chain of agricultural products, rural-urban connectivity, modern rural governance through digital technology application, and promote the construction of a new and sustainable countryside. The program of building a new countryside should be completed in the direction of "**agroecology; modern rural; smart farmers**".

4. Promote transition from conventional agriculture production to agroecological production

The development of Vietnam's agriculture is entering a high level of intensive farming with the increasing use of chemical fertilizers, chemical plant protection drugs and a series of cultivation measures such as three-crop rice cultivation, deforestation, coffee, pepper, cashew cultivation... for the purpose of productivity and output. With the above mentioned cultivation practices, the land is increasingly degraded, nutrition is unbalanced, the macrobiotic in the soil is destroyed, the residue of toxic substances in the soil is higher and higher, the more disease sources accumulated in the soil, leading to the generation of some unpredictable pests. Therefore, there is an urgent needs for promote solutions to transform conventional production into agroecological production.

5. Establishing a sustainable agricultural ecosystem

The essence of a sustainable agricultural ecosystem is a system of plant and animal components that have a causal interaction with each other. If there is a change in one element, it will lead to another change. When studying the agricultural ecosystem, it is necessary to put it in accordance with the systematic principle as well as the law of the ecosystem. Therefore, ecological environment should be carefully invested and protected.

6. Promoting local advantages in agroecology transition policies

The solution directions should focus on developing and upgrading domestic value chains and processing efficiently to promote agroecological practices of local products. Businesses need to change the mindset that the domestic market is of low quality, while, in terms of strategy, after the pandemic is an opportunity for Vietnam to assert its position in global value chains, upgrade value chains of agricultural products and foodstuffs, and ensure food safety according to the standards of importing countries. For high-end markets with FTA, the strategy of diversifying local and indigenous products such as Geographical Indications by the One Commune One Product (OCOP) national program. In addition, organic product and added value product should be a brand for Vietnamese agricultural products. Therefore, supportive policies should focus on linking, developing cooperatives, investing in safe production protocol and post-harvest technologies.

7. Sustainable agricultural development policies must be based on attributes of ecological agriculture

The Vietnamese government and farmers have mostly focused much on productivity for a long time. The role of ecological services that the system provides is often neglected, overlooked, or ignored in national economic development strategies as well as in everyday agricultural activities of the people. Ecological harms caused by unsustainable chemicals and other farming practices are often offset by increased chemical or mechanical investment. In the long run, the productivity of agricultural ecosystems and the quality of agricultural products are governed and determined by supporting ecosystem services such as soil, water, and biodiversity quality, rather than high-tech equipment (net houses, synthetic fertilizers, pesticides, expensive irrigation systems ...). Therefore, in the context of climate change with widespread resource degradation, the protection of agricultural resources must be considered as a top priority in the national development goals.

8. Policies should focus on restoring the quality of ecological services

The ecological systems have been severely damaged and degraded in decades by the abuse of chemical investments, mechanization, and agricultural development plans are unscientific and lack interest in protecting and maintaining ecological services. Therefore, agroecologial practices must be seen as an alternative to chemically intensive agriculture. This will help to increase creative capacity of farmers and stakeholders in the value chains. This also the way to establish effective adaptation strategies to achieve the highest efficiency of agricultural production systems for ensuring the quality of agricultural products, and the health of producers and consumers.

ANNEX: AGROECOLOGICAL POLICIES IN VIET NAM

AE relevant policies	Legal documents	Descriptions of AE relevant contents
Agroforestry policies	Land law 1987, expire 10/1993	- Farmers allocated with agroforestry land were responsible for farming practices targeted on land protection including agroforestry adoption. - Farmers allocated with agroforestry land were responsible for greening barren lands, adopting soil protection measures, and agroforestry farming practices
	Law on Forest Protection and Development 1991, expire in 2005	- Farmers were encouraged to do reforestation, forest protection, and agroforestry production - Production forestlands were allocated to farmers for agroforestry production.
	Land law in 2003, Expired in 2014	- Farmers were encouraged to invest in improving the agricultural productivity for allocated agricultural and forestlands.
	Law on Forest Protection and Development 2004	- This Law provides for the management, protection, development and use of forests and rights and obligations of forest owners. - Agroforestry practices were considered as principles of forest protection and development.
	Decree 01/CP 1995: regulations for land allocation for agricultural, forestry and fishery activities, expired in 2005	- This Decree enables full right for farmers to transform their productions from conventional production into organic or agroecological practices. - Farmers were allotted land for perennial and annual crop production and rights to harvests.
	Decree 163/1999/NĐ-CP on forestland allocation and rent for organizations/individuals for forestry purposes, expired in 2004	Farmers with forestlands allotted, were encouraged to adopt agroforestry practices in reforestation and agricultural production in forest land and rights to harvests non-timber forest products in the forest.
	Decision 178/2001/QĐ-TTg stipulated the rights and responsibilities of organizations/individuals allocated with forests and forestlands	Farmers are allowed to integrate agricultural crops or animals into production forests, this policy includes specific guideline for farmers use forest land for production purpose

	Decision 08/2001/QĐ-TTg: regulations for special, protection, and production forests remained under natural forests, expired in 2006	20% of special, protection, and production forestlands without forest is allowed for allocated farmers to do agroforestry production
	Circular 38/2014/TT-BNNPTNT: Guidelines for sustainable forest management, Expired in 2014	Farmers allocated with forestlands were allowed to make decisions on agroforestry production.
	Decision 17/2015/QĐ-TTg: Mechanisms for protection-forest management	Organizations and individuals allocated with protection forestlands are allowed to do agroforestry production, and have full rights to agricultural/fishery harvests.
	Decree 13/CP 1993: Extension, expired in 2005	- Establishment of extension system from central to district level by permanent basic and communal level by contract. - Extensionists are monthly paid from state budget, and from possible service contracts made with private sectors or farmers.
	Decree 56/2005/NĐ- CP: Extension organization and policy, expired in 2010	Updated version of Decree 13/CP 1993. Principles of extension are counted on local demands.
	Circular 30/2006/TTLT/BTC-BNN&PTNT-BTS: Guidelines for management of state budget for extension, expired in 2010	Financial supports (80% for varieties and 60% for other farm inputs) for the poor to do agroforestry in the uplands.
	Decision 186/2006/QĐTTg: Regulations for forest management	Farmers/farm communities are allowed to do agriculture on not more than 40% of allocated mangrove forestlands without forests, and not more than 30% of (terrestrial) forestlands without forests
	Decision 166/2007/QĐ-TTg: support policy for organizations and farmers engaged into the project "forestry development for local livelihood improvement in the central Highlands"	Organization/farmer are supported $300/ha for agroforestry development, and having full rights to agricultural harvests
	Decision 279/QĐ-BNN-HTQT: approving the project: "agroforestry trials in Son La, Dien Bien, and Yen Bai"	Improving effectiveness of small-scale farming system in the Northwest of Vietnam through agroforestry production.
	Law on Environmental Protection 2014	- State offices are encouraged to purchase and use environmentally friendly products (such as eco-label ones).

		- Ministry of Natural resource and Environment is requested for policies related to sustainable production and consumption in all aspects from production to consumption
Integrated Pesticide and Crop management	Ordinance 8-L/CTN 1993: Plant protection and quarantine, expired in 2002	- This Ordinance includes measures to prevent and control organisms harmful to plant resources, plant quarantine and management of plant protection drugs. - The prevention and control of organisms harmful to plant resources must be carried out regularly, according to each season, every year or many years in the production, development and exploitation of plant resources and ecosystems
	Ordinance 36/2001/PL-UBTVQH10: Plant 1/2002 protection and quarantine, expired in 2015	The prevention and control of organisms harmful to plant resources must be carried out regularly, synchronously and promptly in research, experiment, production, exploitation, processing, preservation, trading and use activities. use, export, import, temporary import for re-export, temporary export for re-import, transit and other activities related to plant resources.
	Law on Plant Protection and Quarantine 2013	This Law is enshrined by the regulations on the plant protection against harmful pests, pathogens and diseases, plant Phyto-sanitation and pesticide management. Considered IPM and pesticide application of "4 Rights" as a principle of pest management.
	Program "3 Reductions, 3 Increases" in 2005, expired in 2006	- Reductions: seed quantity, nitrogen inputs and pesticides - Gains: rice yield, rice quality, and economic return.
	Program "1 Must, 5 Reductions" in 2006	1 Must: use of certified varieties 5 Reductions: seed quantity, nitrogen inputs, pesticides, irrigation water, and post-harvest lost.

	Decision 986/QĐ-BNN- KHCN 2014: plan for research and application for restructuring agricultural sector to achieve higher added value and sustainability	Promotion of integrated farming intensification & IPM
	Decision No 2027/QĐ- BNN-BVTV 2015: approval for promotion of IPM application in 2015-2020	Widely promotion of IPM application in agricultural sector in Vietnam. Ecological approach for pest management.
Good Agriculture Practices	Decision No. 67/1998/QD-BNN-KHCN: Temporary regulations on safe vegetable production, expired in 2007	Temporary definition of safe vegetables: fresh vegetables which have low chemical residues, harmful diseases, nitrate level, metal concentration level (under standard level) and be safe for consumers, friendly for environment.
	Standard TCVN 2014: organic agricultural production and processing	Regulations on conditions for organic agricultural production (such as water, soil and farming inputs) and marketing (such as labelling).
	Decision No. 379/QĐ-BNN-KHCN: VietGAP for vegetable and fruit crops in 2008	Regulations on conditions for VietGAP application (such as water, soil and farming inputs). IPM/ICM is suggested
	Decision No. 2998/QĐ- BNN-TT: guidelines for application of basic VietGAP for vegetables in 2010	Regulations on conditions for VietGAP application (such as water, soil and farming inputs). IPM/ICM is required
	Decision No. 2999/QĐ- BNN-TT: VietGAP for coffee	Regulations on conditions for VietGAP application (such as water, soil and farming inputs). IPM/ICM is required
	Decision No. 107/2008/QĐ-TTg 2008: Supports for safe vegetable, fruit and tea production towards 2015. Expired in 2012	Financial support for identifying and zoning areas suitable for VietGAP application Priority for organizations/individuals in accessing land, and land-use tax for VietGAP application
	Law on Food Safety 2010	To establish a legal framework and to realize a roadmap for compulsory application of good manufacturing practices (GMP), good agricultural practices (GAP), good hygiene practices (GHP) and hazard analysis and critical control points (HACCP) and other advanced food safety management systems in food production and trading
	Decision No. 1820/QĐ-BNV 2011: Establishment of Organic Agriculture Union Vietnam	Further institutionalizing organic agricultural production in Vietnam

	Decision No. 01/2012/QĐ- TTg: Supporting GAP application in agriculture, silviculture, and aquaculture	Financial support for identifying and zoning areas suitable for VietGAP application financial support for IMP/ICM application
	Circular No. 42/2013/TTLT-BNNPTNT-BTC-BKHĐT: Guidelines for implementation of Decision 01/2012/QĐ-TTg	More concrete details for state support for organic agricultural production Applicators for VietGAP in agricultural production and marketing
	Decision No. 43/2007/QĐ-BNN: Regulations for safe tea production, processing and certification. Expired in 2008	Clarifying conditions for safe tea production, processing and certification
	Decision No. 106/ 2007/QD-BNN: Regulations for safe vegetable production and marketing. Expired in 2008	Clarifying conditions for safe vegetable production, processing, certification, and marketing
	Decision No. 84/2008/QĐ-BNN: Regulations for certification of VietGAP for safe vegetable and tea production, expired in 2012	Clarifying regulations, procedures and roles of relevant stakeholders in certifying VietGAP for safe vegetable and tea production
	Decision No. 99/2008/QĐ-BNN (2008): Regulations on management of safe vegetable, fruit and tea production and trading. Expired in 2012	Conditions for safe vegetable, fruit and tea production, certification, and trading. Punishment of violators in safe vegetable, fruit and tea production and trading.
	Circular 48/2012/TT-BNNPTNT: Regulations for certification practices cropping production and processing	Procedures and assigned stakeholder for certifying GAP agricultural products & processing
	Circular No. 59/2012/TT-BNNPTN: Regulation for safe vegetables, fruits and tea production. Expired in 2015	Conditions and certification for food safety in vegetables, fruits, and tea production and processing
	Circular No. 54 /2014/TT-BNNPTNT: Regulations for certification of GAP application for receiving state supports for agricultural, forestry, and fishery sector	Conditions and procedures for the recognition of other good agricultural practice (hereinafter referred to as other GAP) that may be applied to agriculture, forestry and aquaculture to enjoy the incentives prescribed in Decision No. 01/2012/QĐ-TTg dated 09/01/2012 by the Prime Minister on policies supporting the application of good agricultural production procedure in agriculture, forestry and aquaculture (hereinafter referred to as Decision No. 01/2012/QĐ-TTg).

Policies for Systems of Rice Intensification	Decision 3062/QĐ-BNN- KHCN: Approval of SRI in some Northern provinces as a technological improvement	Technical guidelines and principles of SRI
	Decision 1310/QĐ-UBND: Approval of zoning agriculture, forestry and fishery areas which apply advanced technology from 2012-2020 in Ha Tinh province	Orientation of applying SRI into larger production area
	Decision 2745/QĐ-UBND: Approval of project: agricultural development applying advanced technology in Thanh Hoa province until 2020	Orientation of applying SRI into larger production areaand reaching 30,000 ha of high quality rice production.
	Decision 1006/QĐ-BNN-TT:Plan for restructuring the cropping sector for the periods 2014-2015 and 2016-2020	Encouragement of applying advanced and sustainable production agriculture production techniques in includingrice
	Decision 1406/QĐ-UBND: Approval of restructuring plan in agriculture sector in Lai Chau province until 2020and the vision until 2030	Orientation of applying SRI into larger production area
Policies on integrated farming	Decision 31-BT: Establishment of Vietnam 2/1986 Gardening Association	Promoting VAC practices for household income andnutrition improvement, poverty reduction which contribute to sustainable agriculture development.
	Decision No. 1475/QD- BNV: Approving the regulations (amended, supplemented) of VietnamGardening Association	Vietnam Gardening Association is a social-occupationalorganization working based on the voluntary, solidarity and cooperation of members. It focuses on helping members to develop VAC models to improve income, nutritional status and poverty reduction for households.
Policies for production and marketing/ trading	Decision 490/QD-TTg of the Prime Minister, dated 7 May 2018 on National Program on One-commune-one-product (OCOP)	- This Decision is effective until end of 2020 but New Rural Area Program is preparing new decision for OCOPProgram to continue after 2020. - This policy encourages the development of local products using indigenous knowledge to improve production, processing techniques to promote brand andexpand market resulting in promoting agroecological practices in agricultural production.

Policies for sustainable forest management	Decision 297/QĐ-TTg of the Prime Minister dated 18 March 2019 on approval of project on forest protection, restoration and sustainable development in the Central Highlands for the period of 2016-2030	This decision aims to prevent and reverse deforestation, gradually restore and develop forests. By 2030, the forestarea will reach about 2.72 million ha, increasing the forest coverage rate to 49.2%; Manage, protect and develop forests sustainably, protectthe ecological environment, conserve biodiversity, provide forest environment services, contribute to socio-economic development, maintain security, national defense, social order and safety of the Central Highlandsregion
Policies for restructuring of agricultural sector	Decision 899/QĐ-TTg of the Prime Minister dated 10/6/2013 on restructuring ofagricultural sector toward enhanced value addition and sustainable development	- Approving the Project "Agricultural restructuringtowards raising added values and sustainable development" - Enhancing natural resource management, reduce greenhouse gas emission and negative impacts on the environment, utilize environmental benefits, raise capacity for risk management, enhance disaster preparedness, increase forest coverage to 42% - 43% by2015, and 45% by 2020; - Restructuring policy also focuses on the sustainabledevelopment that must be pursued throughout the restructuring in terms of economy, society, and environment.
Policies for Climate change mitigation and adaptation	Decision 158/2008/QĐ-TTg dated 2008 proving the national target program on response to climate change.	This Decision aims at approving the national target program on response to climate change to ensure national sustainable development and seize opportunitiesto develop a low carbon economy and join international efforts in mitigating climate change and protecting the global climate system.
	Decision 1183/QĐ-TTg dated 2012 for the period 2012– 2015 on National target program to respond to climatechange	- Identify climate change features of Vietnam due to global climate change; Assess climate change impacts (including climate variability, sea level rise and climaticextremes) on every sector, area and locality; - Develop action plan of all ministries/sectors and localities to respond to climate change; to implementpilot projects to respond to climate change.

	Decision 2139/QĐ-TTg dated 2011 on approving National climate change strategy	- Ensure food security, energy security, water security, poverty alleviation, gender equality, social security, public health; enhance living standards, conserve natural resources in the context of climate change - Consider low carbon economy and green growth as principles in achieving sustain-able development; GHG emission reduction and removal to become a mandatory index in social and economic development. - Take advantage of climate change opportunities for social and economic development; promote climate-friendly behaviours
	Decision 1393/QĐ-TTg dated 2012 on Vietnam green growth strategy and national action plan on climate change	- Green growth is an important part of sustainable development and ensures rapid, effective, sustainable economic development and significantly contributes to the implementation of the national strategy on climate change. - Green growth, towards the low-carbon economy, natural capital enrichment has become a decisive tendency in sustainable economic development; reduction in emissions and increase in the possibility to absorb greenhouse gases is becoming mandatory and important targets in socio-economic development.
Policies for gender and social inclusion	Law No. 73/2006/QH11 dated 2006 on Gender equality. Decision No. 2351/QD-TTg dated 2010 approving the National Action Program on Gender Equality for 2011-2020 Decision 449/QĐ-TTg dated 2012 on National ethnic strategy to 2020	Provides for principles of gender equality in all fields of social and family life, measures ensuringgender equality, responsibilities of agencies, organizations, families, individuals in exercisinggender equality. Ensure gender equality in all fields of politics, economy, culture, society and family; to support and provide man and woman with conditions for them to bring into play their abilities; to give them equal opportunities to take part in the process of development and to benefit from the achievements of the development. - Support gender equality activities in the remote and mountainous areas, in areas of ethnic minority groups and areas still in extremely difficult socio-economic conditions; to support to create necessary conditions to increase the GDI in the industries, fields, and localities where the GDI is lower than the average level of the entire country.

Policies for partnership development	Decree 98/2018/NĐ-CP of the Prime Minister dated 5 July 2018 on policy to promote collaboration and partnership in production and trade of agricultural products	- This Decree deals with the incentive policy for development of linkages in production and consumption of farming, breeding, aquaculture, forestry and salt production produces. - Linkage from supply of materials and other inputs, production, harvesting, preparation or processing to consumption of agricultural products.
	Cultivation law, No. 31/2018/QH14 regulates activities which are supported and invested by the state budget.	Bio-inoculant research activities will be invested by the government. Bio-inoculant production activities will be supported by the government Bio-inoculants is listed in the official list of agricultural material input.
	No.55/2015/ND-CP encourages organizations, individuals doing contract with partners along value chain to access favourable credit source.	- Government have specific credit supports for model that link production and market to sell agriculture products - Links in agriculture is the form of cooperation, links on the basis of the contract signed between the objects is personal, household, business, home farm, cooperative, partnership, and cooperative, Association of enterprises in the process of agricultural production through the provision of inputs for production services, acquisition, processing and consumption of agricultural products. - Follow the links in the value chain of agricultural production is linked in the form of agricultural production according to the enclosed chain from production to the acquisition, processing and consumption of agricultural products
	Decree 57/2018/ND-CP on incentive policies for enterprises investing in agriculture and rural development sector.	- This Decree deals with a number of additional incentives to investment and procedures for giving incentives to enterprises investing in agriculture and rural development sector. - The government encourage enterprises investing in sectors such as afforestation, forest protection, planting medicinal plants, non-timber forest products, organic agricultural production.
Other relevant policies	National Sustainability Curriculum (NSC) as the official extension documents for all trainings of farmers beyond the World Bank's Vietnam Sustainable Agriculture Transformation (VnSAT) Project	- The project promotes agricultural restructuring, through increasing the sector's institutional capacity, renewing sustainable cultivation methods for coffee crops in the Central Highlands. - National Sustainability Curriculum (NSCs) are fundamental elements of the Sustainable Coffee Program's (SCP) approach to globalizing

		sustainable production. An NSC is a document created by both private and public stakeholders in a producing country, which creates alignment on the biggest threats to production and the sustainable farming techniques that should be applied to address them.
	Decree No.55/2015/ND-CP was issued to replace Decree No.41/NĐ-CP which provide credit policy agriculture and rural development.	- This Decree stipulates the credit policy for agricultural and rural development, and contribution towards rural reforms as well as improvement of the living standards of farmers and rural population. - The credit policy for agricultural and rural development stipulated hereby has not already included the credit policy for agricultural and rural sector introduced by the Vietnam Bank for Social Policies and Vietnam Development Bank. This policy can enable for farmers to transform from conventional agricultural to agroecological or organic agriculture
	Circular No. 65/2010/TT-BNNP-TNT on issuance of amendments on list of seeds, fertilizer which are permitted for production, trading.	- Circular No. 65/2010/TT-BNNP-TNT has not listed bio-inoculants. Therefore, there is lack of legit list of bio-inoculants. This poses a question about what kind of bio-inoculant will be permitted to use and trade. - This Circulars influences practices of farmers in using input materials for agricultural production resulting in positive impact on ecosystems and ecological environment - Issue list of veterinary drugs, vaccines, biological products, microorganisms and chemicals for veterinary use, which are allowed to be used in Vietnam. To update for the circular

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