A strategy for the future of the agricultural sector in Bang Phluang area, Prachinburi Province

Results of a participatory process (2017-2019)

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Summary

The agricultural sector in the Bang Phluang area – in a simple way, the downstream part of Prachinburi River Basin - is an area of intensive farming, and in particular involves both rice production and fish and shrimp farming. This sector is evolving and is facing increasing challenges, as in many areas of Thailand. In particular, farms there have to face a decrease or instability of agricultural product prices, farmers' ageing, and difficulties to get fresh water during the dry season. The present work describes a participatory process that took place during two years to build scenarios for the future of the agriculture in this area by 2029, and to identify the actions that can be implemented so that the agriculture sector is transformed as hoped for by local actors. This process mostly involved farmers, representatives and staff of subdistrict administrations, and staff from the Ministry of Agriculture and Cooperatives.

In a business-as-usual scenario (the current trends go on without any specific initiatives to solve current challenges), rice farmers have failed to transform and, due to the limited profitability of rice farming, many rice farms are in crisis by 2029. Moreover, in such a scenario, fish and shrimp farmers have failed to set up collective action so as to enhance farm production techniques and better negotiate product prices. By contrast, the desired scenario describes a well-functioning agricultural sector, thanks to actions taken place at local, regional and national level. In such scenario, water management has improved thanks to new infrastructure and to better coordination between farmers, local subdistrict administrations and public agencies. Land rent has become more secure, enabling farmers to engage in the transformation of their farming systems even on rented land. Many rice farmers have developed non-rice production or organic farming. Farmers' collective action has become more active and successful, especially in the fish and shrimp sector. This collective action has enabled an improvement in production techniques and in farming profitability. Rural tourism has developed, in strong connection with the development of sustainable farming systems. Finally, specific policies have been implemented to support the installation of young farmers. Most of these actions are connected and have the potential to support each other.

Such a participatory process was initially a challenge, as generally actors meet to focus on solving short-term issues. However, actors actively engaged in discussing scenarios and strategies to achieve the preferred scenario. This work helped identify some challenges (such as security of land rent or the involvement of young farmers) that are generally not discussed but that are key to support the sustainability of agriculture in the Bang Phluang area, and more generally in Thailand.

This document may become a useful reference to help structure existing and future actions to support the development of agriculture in the Bang Phluang area within a coherent and long-term perspective. This document identifies also important stakes in the agricultural sector of Thailand and shows how policies at national level may be combined with initiatives at local level in order to build pathways toward the sustainability of this sector.

More information and reports from the project can be found at: http://deltasoutheastasia-doubt.com/ประเทศไทย. For more information, contact Kassirin Phiboon (kassirinp@gmail.com).

Content

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1. Introduction

Agriculture is the backbone of the economic and social life in the Bang Phluang area, in Prachinburi Province. There, farms have evolved to adapt to changes taking place in terms of water resources, agricultural value chains and within farming families. However, there are increasing interrelated challenges, among them, the decreasing profitability of rice farming and the aging of farmers.

The Doubt research project (2017-2019) was implemented by various research organizations and NGOs[1]. In Thailand, it aimed to ***support discussions among actors of the Bang Phluang area to jointly build a vision for the agricultural sector in 2029, and a strategy to achieve this vision***. Such a vision defines ways to jointly address the challenges that the agriculture sector faces, in particular in terms of how to: i) get sufficient water for farming activities, in terms of quantity and salinity and in terms of flood management; ii) ensuring farming activities that are sufficiently profitable (and less impacting on the environment); iii) enabling the successful involvement of a new generation in farming. A participatory process was implemented to design various scenarios for the future, to identify a preferred one, and to discuss a set of actions able to make this preferred scenario happen. This document presents the context of the work, the methodology used, and the main results in terms of vision and strategy.

2. The Bang Phluang area

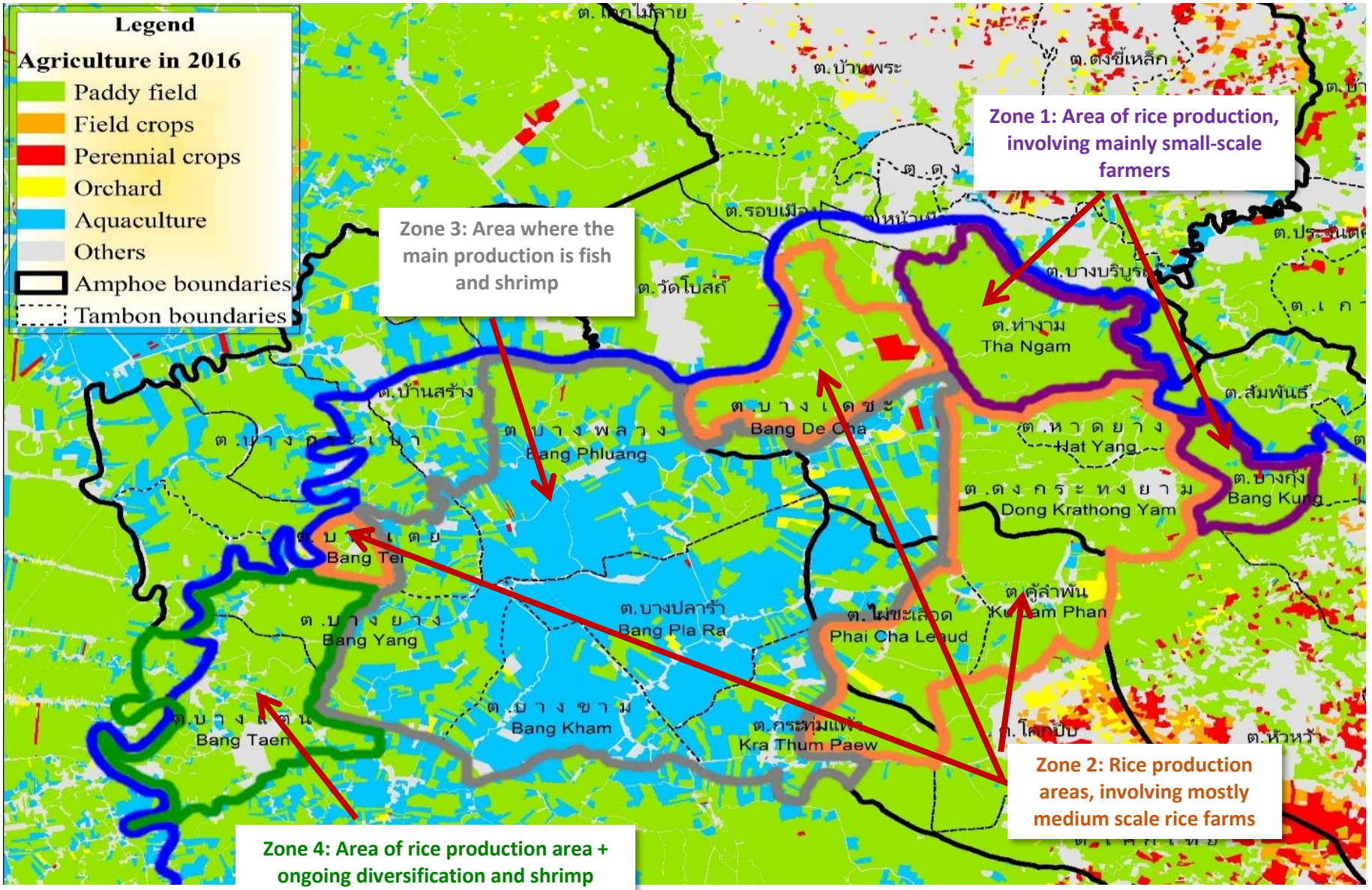
The Bang Phluang area encompasses the low-lying areas located west of Prachinburi Province, on the left bank of Prachinburi River (see Figure 1). This area includes a diversity of farming systems, in particular small-scale and large-scale rice farms, and fish and shrimp farms. Most of the area belongs to the Bang Phluang Irrigation scheme. In the present work, the area was divided into four zones (Table 1 and Figure 1), based on the main types of farming systems present in each zone.

Table 1. Four zones

Zone	**Main characteristics**	**Subdistricts located in each zone**
Zone 1. Area of rice production, involving mainly small-scale farmers	- Small-scale farms - Aging farmers - Mostly rice production, a bit of diversification	Bang Kung, Tha Ngam
Zone 2. Rice production area, involving mostly medium scale rice farms	- Medium and large-scale rice farms - Mostly rice production, a bit of diversification	Dong Krathong Yam, Hat Yang, central part of Bang Tei, eastern part of Kra Thum Paew, northern part of Bang De Cha, Ku Lamphan, southern part of Phai Cha Leaud
Zone 3. Area where the main production is fish and shrimp	- Mainly fish and shrimp farming, some rice production - Irrigation water obtained from Bang Phluang Water Gate	Bang Pla Ra, Bang Kham, Kra Thum Paew, eastern part of Bang Tei, central part of Bang Yang, Bang Phluang, southern part of Bang De Cha, northern part of Phai Cha Leaud
Zone 4. Area of rice production plus ongoing diversification and shrimp breeding	- Mainly rice production with some shrimp breeding - Organic group and ecotourism project	Bang Taen, Northwest of Bang Yang

[1] see http://deltasoutheastasia-doubt.com/ประเทศไทย for more details

Figure 1. Zoning of the Bang Phluang area



3. Methodology

The research and multi-stakeholder dialogue took place in 10 steps. The steps 2, 3, 4 and 5 were undertaken with a specific focus on one subdistrict per zone: Bang Kung for Zone 1, Bang Pla Ra for Zone 2, Dong Krathong Yam for Zone 3 and Bang Taen for Zone 4. From Step 6 onwards, each zone was considered as a whole.

- **Step 1. Preliminary analysis at catchment level.** An assessment of land use change over the past 20 years and related changes in agricultural water demand was done for the Bang Pakong catchment.
- **Step 2. Preliminary analysis at subdistrict level**. From 2017 to 2018, data was collected on past land use, land use change, farm structure, water management and age structure at Subdistrict level[2]. This enabled to identify current and future drivers of change at subdistrict level. Other studies were done to identify possible drivers of change at national and provincial level, and at the level of the Bang Pakong River catchment.
- **Step 3**. Throughout the process, **four groups of farmers were supported** (one in each of the four focus districts). This support enabled to build trust with local actors, but also to get a detailed knowledge of farming activities, challenges and possible solutions.
- **Step 4.** A total of 17 **individual interviews** were made with representatives of subdistrict administrations, head of villages and farmers about how they see the future of their Subdistrict. All interviewees expressed possible futures for their Subdistrict in terms of a "business as usual" scenario and a "hoped for" scenario. Based on these interviews, two preliminary scenarios for the future of the agricultural sector in each focus area were redacted.

> We developed two scenarios. One scenario is called **business-as-usual**. It describes how the area will be in 2029 if on-going trends are prolonged and no new initiative is taken to modify these trends and to address on-going challenges to the agricultural sector. The other scenario is the "**hoped for**" scenario: here, participants describe how they would like to see the future of their area in 2029.

- **Step 5.** We organized **scenario workshops** in each of the four "focus districts" in October and November 2018, with around 80 participants overall (members of subdistrict administration office, village leaders, members of farmers' organizations and water user groups, and lay inhabitants). During the workshops, participants discussed change drivers at local, catchment/province, and national levels, based on 1) an assessment of the main changes that took place over the past 15 years, and a 2) presentation of current drivers of change now and in the next 10 years. Then, the two preliminary scenarios for each focus area were presented. Participants discussed and revised the contents of the scenarios for their focus area. They also assessed their plausibility and to what extent they would like these scenarios to take place.
  In the 4 scenario workshops at local level (step 5) participants individually assessed their preference for each scenario and to what extent they thought that each could happen (see Appendix). They confirmed that they preferred the alternative scenario, and actually were not too pessimistic about the possibility to make it happen.

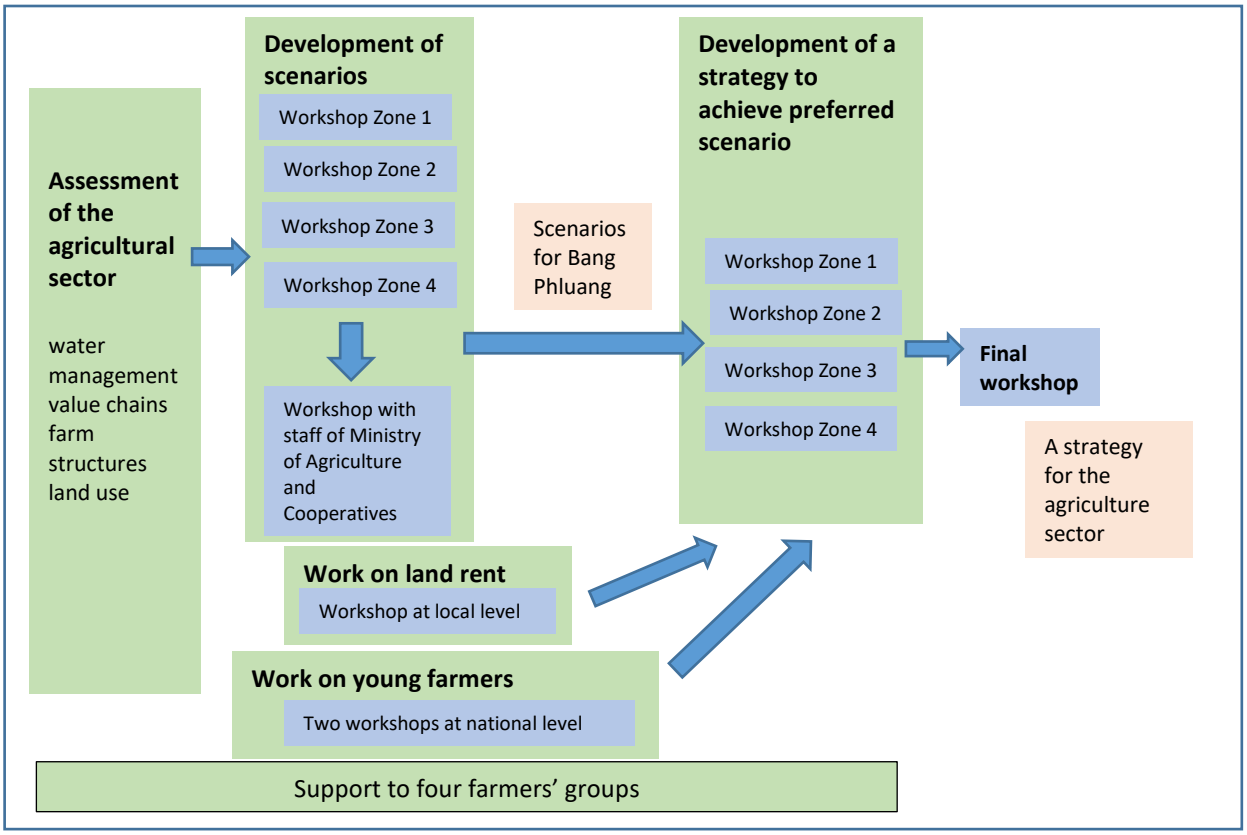
[2] see reports on http://deltasout-heastasia-doubt.com/ประเทศไทย/

- **Step 6**. Based on this work, 15 complementary interviews were done in other subdistricts of each zone. Interviewees were presidents of subdistrict administration, heads of villages or heads of water user groups. We also collected general data on agricultural structures in these subdistricts. We discussed with interviewees their assessment of current and future drivers of change and possible scenarios for the future. We then presented the preliminary scenarios prepared in the previous phase and discussed to what extent these scenarios were relevant in their subdistricts. Based on these interviews, we wrote scenarios for each zone and we wrote **two synthesis scenarios for the whole study area**.
- **Step 7.** We organized a **scenario workshop** with representatives from the Ministry of Agriculture and Cooperatives and from the provincial government on January, 2019. During the workshop, 1) we presented change drivers at local, catchment/province, and national levels over the past 15 years, current drivers of change, and over the next 10 years, and 2) participants discussed the series of scenarios for the four zones and for the whole Bang Phluang area.
- **Step 8**. The topic of young farmers and of land rent were studied and discussed in a specific way. A series of studies were done on young rural people and young farmers and two workshops were organized at national level to discuss possible ways to support the **installation of young farmers**. A specific workshop was organized in Bang Phluang area to discuss how to improve **security of land tenure**.
- **Step 9**. We organized **strategy workshops** with each focus area in March 2019. There were in total 144 participants: farmers, staff of the subdistrict administration offices, and staff from the Ministry of Agriculture and Cooperatives.
- **Step 10.** We organized a **final workshop** in May 14th, 2019 to present and discuss the whole process. There were 38 participants: farmers, staff of the subdistrict administration offices, staff from provincial office, and staff from the Ministry of Agriculture and Cooperatives.

Workshops with staff from the Ministry of Agriculture and Cooperative in Prachinburi City and with young farmers in Bangkok

The Figure 2 summarizes the main steps of this work.

Figure 2. The multi-stakeholder process



4. Challenges for the agricultural sector and future drivers of change

The initial assessment enabled to characterize the main challenges for the agricultural sector and the main future drivers of change in the area. We describe hereafter the main current and future challenges.

Water management

The farming sector has to deal with flooding during the rainy season and lack of fresh water during the dry season. In 2016, the Naruebodindrachinta reservoir started operating, and it releases fresh water during the dry season. However, in the future, the probable increase of water use by industries in the upstream part of the catchment and the creation of a new irrigation scheme downstream Naruebodindrachinta reservoir may lead to the reappearance of problems of brackish water in the river during the dry season.

At local level, water is distributed thanks to a complex web of canals and gates. Bang Phluang Irrigation Office operates some gates connecting the main canals to the river, and some gates within the system. However, in most parts of the system, there is no organization for water distribution: there is no infrastructure to control that water is distributed according to a specific plan, and no local organization in charge of achieving this. As a consequence, farmers downstream of some canals do not get sufficient water during the dry season.

Farmers' ageing

The average age of population and of farmers has increased over the past 10 years. The ageing of farmers is particularly rapid for small-scale rice farms, as children of retiring farmers are generally not interested to take over the farms of their parents.

Low or unstable prices of agricultural products

Since the end of the rice scheme in 2015, rice profitability has decreased, and this has in particularly impacted small-scale farms. In the fish and shrimp sector, prices are often unstable (for instance, fish price strongly decreased during the 2016-2018 period).

Insecure land tenure

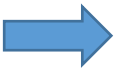
Most farmers that rent land for rice production have short term land lease agreements, often based on a one-year contract. Such short-term contracts were not much negatively impacting farmers doing conventional rice. Nowadays, many farmers in the area would like to move away from conventional rice farming, which appears to be more and more unprofitable. However, farmers that would like to shift to organic rice or to do non-rice crops need to make investments on the land they farm, for instance, they need to build dykes, organic farmers need to modify the biological functioning of the soil, etc. Insecure land tenure is a key limitation that impedes tenants to move away from conventional rice farming.

Set up of large-scale plantations

In Bang Yang, Phai Cha Leaud, and Bang De Cha, four large-scale companies have bought land and started plantations on a large scale (from 200 to 5000 rai). According to actors interviewed, a positive outcome is the provision of employment, but a negative one is that these large-scale farms block expansion of floods.

Table 2 summarizes the main consequences of each of these drivers of change.

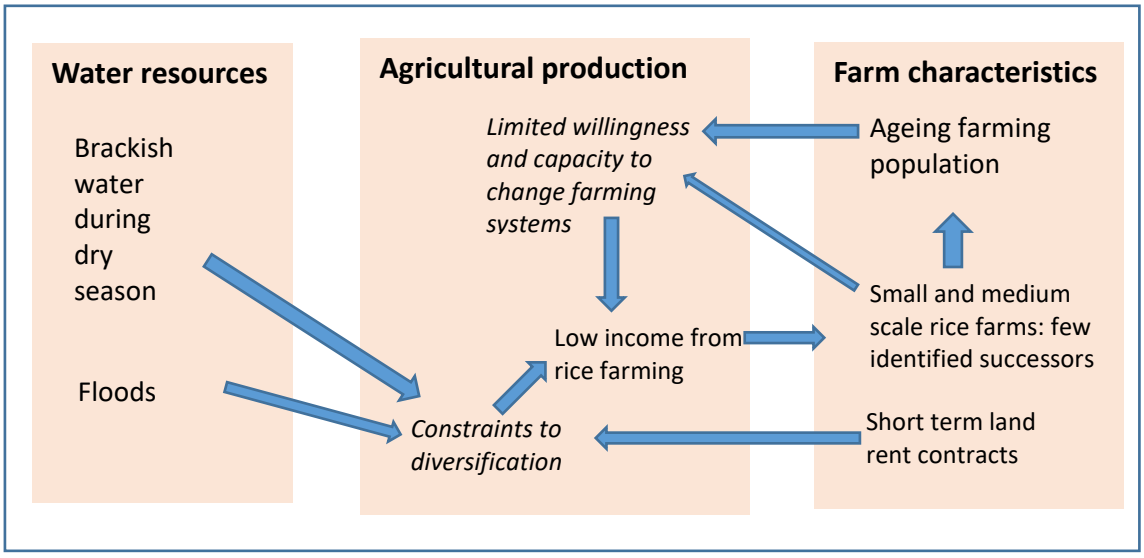
Table 2. Main drivers of change in all focus areas, currently and in a business as usual scenario

Scale	Drivers of change 2002-2018	Consequences	Drivers of change 2019-2029	Consequences
Local level	Lack of water management	Insufficient water during dry season	 *Same drivers and same consequences*	
	Shift to rice farming using mechanization and chemical inputs	High production costs, mechanization, increased employment of labor that comes from outside the area		
	Urbanization, expansion of roads	Blocking of flood drainage		
Regional level	Expansion of industries upstream	- Water pollution - Decrease in fresh water during the dry season - Blocking of flood drainage		

	Naruebodindrachinta reservoir (since 2016)	- Decreased flooding problems - Less saline water during the dry season	New irrigation scheme downstream of Naruebodindrachinta reservoir	Decrease of available fresh water for irrigation during the dry season
			Wang Chan Weir or other infrastructure	Under discussion
National level	Unstable price of rice, fish and shrimp Decrease in rice profitability	Lack of interest of young people to work on farm. They move to cities	→ *Same drivers and same consequences*	

These challenges are actually interrelated. Many farmers (especially those involved in rice production at small or medium scale) are increasingly trapped into a vicious circle as described in the following Figure 3. In particular, small to medium scale rice farmers face low profitability of farming, due to external constraints (low prices of rice). They face problems to change farming systems (e.g. towards diversification or organic farming) in particular due to insecure land tenure or water related problems (brackish water, floods). As a consequence, few successors come to take over the farm, farmers are ageing, and they have more and more limited willingness and capacity to change their farming system, and this impedes an improvement of the profitability of the farm.

Figure 3. Interrelation between challenges to the agricultural sector.



5. Scenarios

5.1. Zone 1. Rice production area, involving mainly small-scale farmers

5.1.1. Business as usual scenario: a strong decrease of farming

Main drivers of change: *farmers ageing, decrease of rice profitability, no change in rental practices and in irrigation management*

In 2029, in Zone 1, a few farmers have tried shifting to other crops, such as pomelos. These farmers have invested to control floods, by uplifting the land or by making dykes. However, this concerns a small minority of farmers, around 10% of them, who own the land. Moreover, many of them are not close to the river and thus have to deal with insufficient irrigation water during the dry season. Most farmers in Zone 1 keep on renting land on an annual basis. Because of these constraints in land tenure and water access, other farmers have not attempted to diversify. They still produce mainly rice on limited areas and makes high use of chemical. This impacts them in terms of health problems, high farm production costs, and chemical contamination of water and soil. Profitability of rice farming on small areas has become very low. As a consequence, many paddy fields have been sold for urbanization for building houses, especially to migrant people who work in factories located near Bang Kung area. Almost all young people do not work in Zone 1: they have left the area or they commute daily to work in the factories. Only 10% of them have inherited land from their parents and go back to work on farm.

5.1.2. Desired scenario: diversification

Main drivers of change: *farmers ageing, decrease of rice profitability, improved agreements for land rent, improved irrigation management*

In the years 2020s, there have been changes at national level, leading to new laws for land rental and to an actual implementation of these laws. In 2029, in Zone 1, owners rent land for at least 5 years for farming aiming at diversifying or producing organic crops, land rent price is controlled and it is difficult for farmers to sell agricultural land for shifting to another land use. Moreover, irrigation in the area is improved so that more farmers can access water during the dry season. As a consequence, many small-scale farmers have felt much more secure in investing on the land they rent. Diversification has taken place on approximately 40% of land, where people own land or rent land (the contracts specify that the landowners allow them to modify land and land use). Those farmers can access irrigation. These farmers have invested in the land to protect from floods (e.g., by building dykes or raising field level). Some of them have diversified farm production (apart from rice), some have developed safe-pesticide farm practices, and some start organic farming. Besides, farmers have developed new market channels (i.e., community markets, community shops, and coffee shops) that are linked with rural tourism and that enable them to manage marketing by themselves. Some of these farmers have also initiated rural tourism and they sell their products via community shops, and coffee shops to increase their income.

As a result, many young people have come back to do farming as they have seen opportunities to get satisfactory incomes. Some of these young people do diversification farming; others do farming in parallel with other income-generating activities. However, a majority of farms have still not initiated diversification, because these farmers are aged and because of high investment costs. They have become involved in public programs to reduce a bit production costs, but rice profitability remains limited.

5.2. Zone 2. Rice production area, involving mostly medium scale rice farms

5.2.1. *Business as usual scenario: a rice sector in crisis*

***Main drivers of change**: limited access to sufficient water, decreasing of rice profitability, aging farmers*

In 2029, despite several attempts, there has been no improvement of water management in zone 2. Rice profitability has decreased, due to an increase in the costs of inputs for rice production, and because farmers still face high pumping costs. Lack of sufficient water also impacts on rice yields. As rice profitability is low, the children of aged farmers are not interested in working on farm and they prefer working in factories. Aged rice farmers hire more farm operators and laborers or rent-out land to farmers in Zone 2 and to farmers coming from outside Zone 2 and who seek areas to grow rice. This also contributes to competition for renting land among farmers that leads to increases of the land rent price. Moreover, low profitability of rice has forced some farmers to sell their land: some have stopped farming to do other jobs, others go on rented land with high renting fee. Land has been sold to investors for building shops or houses, and to a few large-scale farm businesses. Due to lack of well-organized distribution of water during the dry season, few farmers who own land and who have a capacity in terms of farm investment shift to other crops. Moreover, as the rate of rented land increases, there are less and less farmers able to start diversification on their own land.

5.2.2. *Desired scenario: increased water control and diversification*

***Main drivers of change**: improved water management*

In 2029, improved infrastructure and better irrigation management enable to secure access to water during the dry season, for all farmers in zone 2. Moreover, these improvements enable to decrease the irrigation costs. Improvement of water infrastructures took place thanks to an agreement between the Bang Phluang Irrigation Office and farmers. In exchange of better infrastructure, farmers have accepted that their areas become a flood inundation area (monkey cheek) from mid-August to October. A water user group also takes a central role in acting as a water service provider to other areas. Farmers that rent land keep on producing rice, but enhanced water management enables a decrease in rice production costs and an increase in rice yields. Thanks to good water management, they plant dry season rice early and they can harvest it before mid-August and before the area starts operating as a monkey cheek.

Land security for tenants has been improved, especially thanks to better implementation of the existing act. Approximately 30% of farmers (both land owners and tenants) in the area have started diversification (i.e., several types of plants/vegetables and fruits, raising livestock/aquaculture/poultry). Farmers who diversify have built dykes or have raised land to avoid flooding of their fields. Some farmers apply organic farming to get a better price. Several farmers groups have been initiated to exchange in terms of farm knowledge, and to jointly organize processing and marketing. Besides, initiatives have been set up to create tourism activities and home stays. Tourists can discover sustainable agriculture and visit local markets.

Some landowners have sold land to investors for other uses or rent out land to rice farmers who come from outside the area and who offer high renting fees, because they know that irrigation is performing. Due to improved profitability at farm level, farmers can improve income to support their family and pay back debts. Some young people take over the farms or work on farm along with their parents because they see the opportunity to get a satisfying income.

5.3. Zone 3. Area where the main production is fish and shrimp

5.3.1. *Business as usual scenario: individual production and marketing*

***Main drivers of change**: Failure of collective action, unstable fish and shrimp price, farm technical advice on agricultural production, underperforming collective water management*

In 2029, farmers in Zone 3 keep growing mainly fish and shrimp production and young people (not all) still get involved in farming by working with their families. However, all attempts during the 2020s to trigger collective action between farmers have failed. As a consequence, farmers work individually. They look for information on how to breed fish and shrimp individually. Several of them still face problems of animal diseases or unexpected animal death. They keep on having to adapt to unexpected changes in markets, on which they have no control. The majority of farmers adapt to these risks in production and in market prices by focusing on a decrease in farm production costs. However, in doing so, they do not manage to increase the quality of products. They are not able to meet the growing demand on the market for quality certified fish and shrimp. Farmers are compelled to sell at low price so many of them are indebted. Some could not handle these issues so they shifted to work other jobs such as farm laborers, or start small plot of diversification along other jobs. Besides, there is no improvement in water management in the area. Because of increased pumping from industries, water salinity issues, which had disappeared in the early 2020s thanks to Naruebodindrachinta reservoir, have come back. Gates linking Prachinburi River to irrigation canals are closed during the dry season. Farmers are not involved in decision making with regards to the management of the gates and the canals, and farmers do not get sufficient water during the dry season. There is little support from the government agencies due to failure of collective action.

The rice farmers located in Zone 3 prefer to work individually. They do not share knowledge on production techniques and they do not market collectively. They still keep growing rice as they do not dare to shift to grow other crops due to lacking of experience of growing non-rice crops and due to high farm investment. Some of them rent out land to other people from outside the village that come to invest in fish and shrimp farming.

5.3.2. *Desired scenario: successful farmers' collective action*

***Main drivers of change**: successful collective action, transparent process, improved collective water management*

In the 2029, farmers still keep growing mainly fish and shrimp and most young people (not all) still get involved in farming. They are working with their families. Water management has been improved, thanks to increased capacities to control water flow in the area, increased storage capacities and farmers' involvement in decision making for the management of gates and canals in the zone. Farmers manage to have sufficient water during the dry season and to adapt to the increasing salinity rates in the river due to the expansion of industries in the upstream of the Bang Pakong Basin.

Several fish and shrimp cooperatives have been established at local level. They have joined together to form a union of cooperatives for the whole area, especially to organize marketing together. The management of these cooperatives is transparent, and this has enabled the building of trust between members and the management committee of these cooperatives. These farmers' organizations support their members in terms of improving breeding techniques, accessing farm inputs at a lower price, joint marketing, and running a fish market. They do not just react to external changes; they proactively make plans especially in the way to produce and market their products. These cooperatives

have also successfully got involved in active networks with other farmers' organizations in the region, public administration, etc., in order to enhance farmers' capacities for efficient production of fish and shrimp. Occurrence of diseases has strongly decreased as a consequence. Cooperatives have obtained joint certification and are able to provide certified fish and shrimp both for domestic market and for export, for which demand has increased during the 2020s. Cooperatives and other farmers' organizations have started processing of fish and shrimp, and marketing of processed products.

Rice farmers located in Zone 3 shares information on production techniques. They have managed to reduce production costs by doing so. However, they still market rice individually.

5.4. Zone 4. Area of rice production plus ongoing diversification and shrimp

5.4.1. *Business as usual scenario: a "dormant" agriculture*

***Main drivers of change**: aging farmers, decrease of rice price, expansion of industries, limited adoption of organic farming, failure of ecotourism initiatives*

In 2029, rice remains the main production in Zone 4. Since 2016, 4,000 rai have been converted to urban or industrial use. Farmers are mainly concerned about reducing farm production costs due to low price of rice. However, many of them still rely on chemical inputs and use external work force. As a consequence, rice profitability remains low and some farmers are in debt. Some farmers try to grow fish cages along the river or other crops such as growing fish and shrimp for getting more income, but this requires investments and it is a risky activity. In particular, farmers who raise cage fish are impacted by the increase of industries upstream that sometimes pollute the river. Only a few farmers have shifted to organic farming, due to intense farm work and lack of profitability (most of them sell it at the same price as conventional rice). Some of them do organic farming mainly for home consumption because of health concern.

Only few young people take over farming as a fulltime or part-time activity, when their parents who owned land are retired themselves. Young people move out of villages. Public organizations have tried to set up rural tourism in the 2020s, but this was done based on small projects, involving limited activities. These initiatives were eventually not successful. Many people are working now in industries, those recently installed in zone 4 and also others in the surroundings.

5.4.2. *Desired scenario: organic production and rural tourism*

***Main drivers of change**: strong farmers' groups, successful organic farming, successful ecotourism initiatives*

In 2029, in Zone 4, a large number of farmers have engaged in organic production. Farmers have created several groups and organizations (cooperatives, etc.) and developed networks with public agencies and organic agriculture networks to support them in terms of farm production (to reduce production and water problems, increase soil fertility and to improve yields) and processing. They obtained several certifications and jointly sell their products to several marketing channels with a price higher than conventional rice. They sell in particular their products in Bangkok, where there is now an important demand for organic products and they do so with support from public and private organizations. As a result, farmers get a satisfying income so they have increased their confidence for adopting and expanding rice organic farming and also other farm production such as vegetable and livestock, produced in an organic way. Most farmers grow organic farming for getting an income, but some aged farmers also produce organic products mainly for home consumption. Moreover, there has

been a successful development of eco-tourism projects, with the support of several public organizations. Inhabitants from Bangkok come over week-ends to stay in the area, learning about organic farming, and they collect organic produce by themselves. Several (not all) young people agree to take over the farms of their parents, since producing organic products plus getting income from rural tourism enables to have overall a satisfying income. These young people adopt many innovations to improve their farm production, processing and marketing.

Table 3 presents a synthesis of the scenarios for the 4 focus areas.

Table 3. Synthesis table of the scenarios for the 4 zones

Focus area	**Business as usual scenario**	**Desired scenario**
Zone 1. Area of rice production, involving mainly small-scale farmers	A strong decrease of farming - Limited number of farmers to do diversification due to insecure land access and insufficient water in dry season - Rice farmers earn low profits because of high farm production costs and unstable rice price - Few young people take over farm when they inherit land	Diversification - Diversification has expanded because of improved conditions for land rent and better irrigation management - Decrease in the use of chemical inputs (i.e., safe-pesticide, organic farming) along with rural tourism to improve income - 30% of young people work on farm; some of them have also other jobs
Zone 2. Rice production area, involving mostly medium scale rice farms	A rice sector in crisis - Few farmers try to diversify due to lack of improvement of water management - Rice yields decreased and pumping costs remain high so rice profitability has decreased - Some farmers stop farming and some rent-out land - Young people are not interested in farming	Increased water control and diversification - Farmers have access to sufficient irrigation water - The area works as a flood inundation area during the rainy season - Rice farmers improve rice yields and decrease pumping costs - 30% of farmers who own land adopt diversification - Some young people come back to take over the farms of their parents
Zone 3. Area where the main production is fish and shrimp	Individual production and marketing - Failure of collective action and no improvement of collective water management - Diverse individual farm strategies to deal with unstable price of fish and shrimp - Low profitability: some farmers are indebted, some stop farming, some rent-out, etc. - Some young people still get involved farming	Successful farmers' collective action - Success of collective action for improved water management, improving breeding techniques, accessing farm inputs at low costs, joint production planning, processing plus marketing - Improvement of farm profitability - Many young people get involved in farming
Zone 4. Area of rice production plus ongoing diversification and shrimp breeding	A dormant agriculture - Rice profitability has decreased because of high farm production costs and unstable rice price - Only few farmers try to adopt organic farming due to intensive farm work and limited profitability as farmers sell organic rice at the same price as rice produced with chemical inputs - Lack of success of ecotourism projects - Few young people take over the farms of their parents	Organic production and ecotourism project - Success of organic farming and ecotourism projects, so farmers become more confident in organic production and marketing - Decrease of farm production costs, improved health of farmers and environment - More young people work on farm

4.2 Two synthesis scenarios for the Bang Phluang area

These sets of scenarios for the four zones can be merged into two synthesis scenarios for the whole Bang Phluang area.

4.4.1 Business as usual scenario

***Main drivers of change**: Failure to improve water management, limited success of initiatives to transform farming systems, limited farmers' collective action, limited development of tourism*

In 2029, most rice farms in the area have failed to move away from conventional farming practices with lacking of power to negotiate price. The share of farmers doing diversification and organic rice remains very limited. Some groups received support, especially from public organizations, to do organic products or non-rice crop. However, they did not manage to continue once the support ended.

Many farmers have sold land and some rented out to other farmers from different origins such as other subdistricts in Bang Phluang area and other provinces (i.e., Samutprakan, Chacheongsao) to invest in fish and shrimp farming. Some farmers sold land to companies that invested in plantations and in factories. These companies provide employment, though many invest in mechanization and technologies to limit need for labor force. These companies also built dykes to protect from floods, thus also contributing to higher floods in their neighborhood. There is high competition to rent land with high rent fees due to limitation number of cultivated land.

Initiatives to improve water management have failed. Rice farmers keep on producing rice, though with a key focus on decreasing production costs and some apply new technologies (such as sowing machines and using drones for spraying) to improve farm production, but they still face the issue of increase renting and pumping costs. Some farmers could not deal with these issues so they stop farming and shift to do other jobs. Only some farmers managed to secure a better access to irrigation water thanks to the installation of individual pumps and the digging of canals to bring water from Prachinburi River to their farms.

Farmers' key focus is to decrease production costs, and they do not improve the quality of their products nor their capacities to negotiate prices of farm products. Profitability is low and very few young people are interested to become farmers. Besides, these young people have face difficulties to start farming in terms of accessing land, knowledge, and the understanding of their parents.

There were attempts to support the creation of farmers' groups for improving farming techniques and marketing, especially in the fish and shrimp sector, but these initiatives have failed. Similarly, there was limited success of initiatives to promote rural tourism, due to limited coordination between actors and limited budget dedicated to development of touristic activities and their promotion.

4.4.2 Desired scenario

***Main drivers of change**: improved water management, successful initiatives to transform farming systems, strong farmers' groups, successful tourism initiatives*

In 2029, various initiatives successfully managed to support the evolution of farming systems. Access to irrigation water during the dry season has improved, for two reasons. First, infrastructure was improved, thanks to an agreement with the Bang Phluang Irrigation Office, that rice fields in the area are also used as flood expansion areas during the rainy season. Second, water user groups are working better and there is now some coordination about water distribution. Many farms that were previously

farming conventional rice have shifted to produce organic rice or diversification crops under some support from the government agencies and some farmers initiate by themselves. Many farmers change farming techniques to improve quality and quantity of farm production. More generally, beyond these specific changes, the farms have improved their capacities to evolve and to change the crops produced depending on new constraints and opportunities. One reason is that lessees have increased the security of land tenure and thus they can invest with confidence on improving soil characteristics and equipment of the farm. Second, several farmers' organizations have successfully become engaged in joint technical advice and marketing. Some young people have started farming for three reasons: 1) profitability of existing farms (i.e. organic farming, agricultural tourism along with their farm production, etc.) is interesting: 2) they see that their farms can evolve positively in the future; 3) some public policies accompany the installation of young farmers such as sharing benefits between old and young farmer who want to start farming. Successful tourism activities have been developed, such as visit of cultural places and natural sites, homestays, and visit to organic farms.

Table 4 presents a synthesis of the scenarios for Bang Phluang level

Table 4. Synthesis table of the scenarios for Bang Phluang level

Business as usual scenario	**Desired scenario**
○ Failure to move away from conventional farming practices and limited power to negotiate price of agricultural products ○ Initiatives to improve water management have failed ○ Focus on decreasing production costs but limited improvement in the quality of farm products ○ Some farmers could not deal with challenges at farm level so they stopped farming and shifted to do other jobs ○ Many farmers have sold land and some rented out to other farmers from different origins ○ High competition to rent land with high rent fees ○ Few young people interested to become farmers in the rice sector	○ Improvement of access to and distribution of irrigation water during the dry season ○ Many farms have started producing organic rice or diversification crops with some support from the government agencies and some farmers initiated these changes by themselves ○ Lessees have increased the security of land tenure and thus they can invest with confidence on improving soil characteristics and equipment of the farm ○ Several farmers' organizations have successfully become engaged in joint technical advice and marketing ○ Some young people have started farming, with support from public policies ○ Successful initiatives to organize tourism activities (in part in linkage with sustainable farming) and promote it at regional level

6. Strategy to achieve preferred scenario

6.1. Actions

6.1.1. Water management

Zone 1

In the area, improving water management entails that farmers get sufficient irrigation water during the dry season on the whole area of the two subdistricts and that irrigation costs are reduced. To achieve this, first, a set of actions will be implemented to *improve irrigation infrastructure* at local level. Agreements with landowners will be obtained so as to get permission to extend irrigation canals to all

areas of the subdistricts. Stored water will be increased thanks to the building of ponds in public areas (a survey will be made to assess available public land in each area) and to the dredging of canals and properly set up of the pumping bases at the entrance of canals. Some water gates will be built for a better control of water distribution. Second, there will be *an agreement with the RID about water release from Naruebodindrachinta reservoir* for planning of water release, especially during the dry season. Based on the agreement, farmers will be able to improve the implementation of the rice production cycle. Third, farmers' groups will get *gas pumping machines*, because pumps that had been provided by the RID are old and there are few of them, making difficult to provide irrigation to the whole irrigation scheme area. It is easier to move gas pumping machines than electric pumps. Farmers' groups will manage these pumps collectively and farmers will be able to use also these pumps for pumping water to their fields.

Zone 2

Improvement of irrigation infrastructures can take place in three ways.

1) *Option 1: Wang Chan weir and digging of the Hat Yang canal.* The Wang Chan weir will be built. This weir will be located just downstream Hat Yang Subdistrict, on Prachinburi River. The Hat Yang canal will be deepened and will start from the lake upstream the weir. Water level in this lake will be higher than previously, which entails that there will be no need to pump water from the river to the main irrigation canal and then to the whole area.
2) *Option 2. Digging of the Hat Yang project and electric pumping machine.* This option can take place if the Wang Chan weir is not built (for instance because some environmental actors oppose it on the ground that it would damage ecosystems in the river). The Hat Yang canal will be deepened. During the rainy season, water flows by gravity to this canal, but during the dry season, farmers still need pumping water from the river to the canal. The Royal Irrigation Office will install an electric pumping machine that enables a decrease in pumping costs compared to the previous pump.
3) *Option 3: Digging the entrance of the Hat Yang canal + setting the underground tube from the river to Hat Yang water gate.* This project can be implemented in the short term, as there is no need to wait for the implementation of the Wang Chan Weir. If this option is implemented, there will be no need to pump water from the river to canal because water level in the river higher than underground tube so water could flow directly to the canal.

In all options, the digging of canals with be done in a way that the bottom of the canals will be curved (not flat). Moreover, improved management will be enabled thanks to the building of more gates within the irrigation system, and dredge canals in order to store more water.

Zone 3

The first factor is to get sufficient water for farming activities on the whole area. To achieve this, first, *canals will be dredged* in order to store more water. Second, *water gates* will be set up at various places within the irrigated area in order to better control water distribution, and in particular in order to better separate water distribution for rice and for fish and shrimp farmers. Third, canals will be dug so as to avoid using underground tubes under main roads in order to ease water flow during rainy season (this concerns Noi Tad canal in Krathum Paew subdistrict and Chacheongsao border canals). Forth, the participation from farmers will be increased by creating *a joint committee for water management* between water user groups (representatives of farmers who live in upstream, middle and downstream of Bang Phluang canal), TAOs, and the Bang Phluang Irrigation Office. In places where water user groups will be created, the president of the group will represent farming in the joint committee. Village heads will represent farmers in the areas without water user groups. The joint

committee takes decision in terms of building and maintaining water infrastructure, in terms of water distribution by organizing the timing of irrigation among farmers, and in terms of managing gates and canals. The joint water committee will organize distribution based on surveys to understand farmers' water demands.

Zone 4

Water management will be improved first thanks to an *increased involvement of farmers and the subdistrict administration* in joint decision making with the Bang Phluang Irrigation Office about the operation of some water gates in the system. Second, water distribution will be improved thanks to *agreements between farmers* about the timing of this distribution. Third, *water gates* will be built in the main canal of the area to better control water distribution.

6.1.2. *Improve current farm management*

There is a need to decrease and get rid of *debts of farmers* in order to improve farm production. The office of Farmer's Reconstruction and Development Fund will not only help rescheduling of debts in actively, it will also support cancellation of debts with specific criterion to choose which farm to support. Support will be concomitantly provided to help farmers shifting to more profitable farming systems (e.g., diversification, organic farming) so as to avoid getting back into debts. Moreover, support will be provided to the *acquisition of plowing machines*. With regard to the latter, the goal is to make more machines available in the area, in order to reduce the long queue for being able to use them and the high costs for renting them.

6.1.3. *Successful farmers' collective action*

Zone 3

Capacity building and support will be provided to help *set up farmers' cooperatives* for fish and shrimp production and marketing, at local level. These cooperatives will assist their members with several services to improve production of fish and shrimp (e.g. providing fingerling/larva, feed, agriculture lime, etc.) with special price and low interest of credits for members. In particular, cooperatives will receive m*aterials and training to produce farming inputs* by themselves, for instance, producing fish and shrimp feed, in order to decrease farm production costs. Moreover, the cooperatives will help farmers in decreasing the occurrence of death of fish and shrimp.

Cooperatives will support their members in terms of obtaining certification, and marketing. The union of cooperatives will be in charge of negotiating with large actors, in terms of purchase of farm inputs and in *terms of marketing*. Moreover, linkages will be built between these cooperatives and *export* thanks to support from related organizations (i.e., the offices under Ministry of Commerce). Specific *fish and shrimp processing groups* will be set up and registered as community enterprises in each area. There will be initiatives for joint selling of processed products between these groups and farmers' cooperatives.

6.1.1. *Land rent*

Increased *security in land rent* will be achieved. This will be done thanks first to capacity-building of land owners and tenants about the recent Land Rent Act. Second, the *writing of land contracts* will be facilitated by public officers, who will act as a third party to ensure correct implementation of the current regulation. Third, at local level, negotiation between land owners and tenants will enable to define *specific rental conditions* (in particular, specific rental price and lease term) for specific farm

practices in the area. For instance, farmers who rent land to do organic farming, will be able to rent during a term of at least 5 to 10 years. All these changes will enable tenants to make changes in terms of farm practices and farm productions.

6.1.2. Support to the installation of young farmers

Support to the installation of young people will be implemented in particular thanks to *subsidy for their first investments* and support to help young people to access loans more easily. Second, young farmers will be *connected to rural tourism projects* so that they can sell their products on local touristic places. Third, education system will provide a *source of inspiration* for young people to work on farm. Finally, young people that would like to start farming will receive *capacity-building* on modern farming technical and financial support to start farming.

6.1.3. Improve diversification and organic production

Zone 1

There will be support to help farmers adopt more diversification/safe pesticide/organic farming, and decrease farm production costs. Such support will entail first *supporting access to funds with low interest and to some farm inputs* (i.e., seeds, seedlings). It will also entail *providing knowledge to change farm practices* that will be suited to local specificities.

Zone 2

Diversification and organic farming will take place thanks to continuous support from public agencies, i.e, a support that will not be limited to the first moments of the shift to non-rice crops and organic farming. Training will help farmers reduce production costs and achieve good quality and certification for their organic products. Increased land rent security will help tenants start diversification and organic farming.

Zone 4

in order to improve organic rice production, there will be first some support for farmers to obtain high quality seeds, that are adapted to local conditions and can provide high yields. Second, specific organization should be present to provide knowledge on organic farming and assist farmers in terms of marketing. There will be a continuous support to farmers' organizations in terms of providing farming knowledge. This support will not be terminated at the end of a specific project. Third, programs will be set up to increase the awareness and understanding of both farmers and consumers about organic productions.

6.1.4. Support rural tourism in relation with local markets

Zone 1

Actions will be initiated so that farmers are more in control of the price at which they sell their farm products. More support will be provided in terms of *processing and marketing channels* to link with rural tourism so as to increase market opportunities. A *wide promotion of local markets* will be implemented at regional level. Indeed, only few of consumers understand the differences between conventional farm practices, pesticide-safe practices and organic farming. Initiative will be made to raise the awareness of consumers so that they make a difference between each farm practice. This will be achieved thanks to direct communication between farmers and consumers on the markets or on

farm trip, or via the media. There will be support to develop farmers' *collective action to produce quality farm products*. *Farm models in the area* will be developed for tourists who interest in farming to come to observe farm and discuss with farmers. On-going policies to support local tourism will be continued, but with a more holistic and coordinated approach (e.g., in the way to link OTOP projects to community markets and rural tourism).

Zone 4

There will be a development of rural tourism projects for the whole area with local communities, TAO and related public agencies in terms of making development plan to keep supporting the project and building infrastructure (i.e., concrete road). Rural tourism projects will be related to markets (i.e., floating markets, community shops along the main road, etc.). Moreover, there will be a promotion of tourism in the area and of touristic activities (such as boat travelling to pray at temples located along the river).

6.1.5. Synthesis

Table 5 summarizes the main actions to be implemented to achieve the strategy, and at which level they will take place.

Table 5. Main actions to implement strategy

Axis for achieving the vision	**Strategy level**	**List of main proposed policies/actions**
1.Improve water management	Local	▪ Build water gates along the main canals to improve water distribution Zone 1 ▪ Extend irrigation canals ▪ Support pond building in public areas to store water ▪ Create agreement between farmers and the RID about the timing of release of water from Naruebodindrachinta reservoir ▪ Acquisition of gas pumping machines ▪ Dredge canals Zone 3 ▪ Dredge canals and install water gates within the area ▪ Build canals instead of using underground tubes under the main road ▪ Create a joint committee for water management involving farmers' representatives, subdistrict administrations, and the Bang Phluang Irrigation Office Zone 2 ▪ The Water User Group takes a central role as water service provider ▪ Improvement of water infrastructure so as to avoid pumping in the river ▪ Dredge canals Zone 4 ▪ Increase participation of subdistrict administrations in decision making over the management of the gates in the system ▪ Create agreements among farmers in terms of water distribution within area

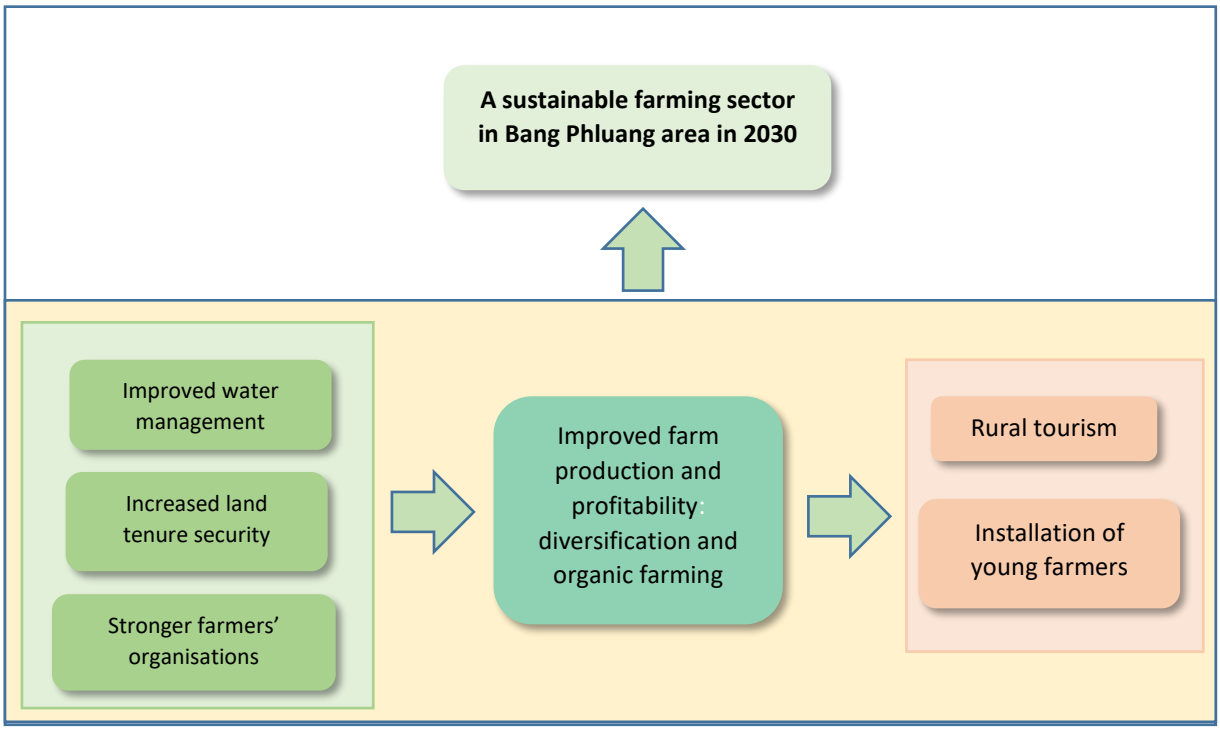
Axis for achieving the vision	Strategy level	List of main proposed policies/actions
2. Successful farmers' collective action	Local	Zone 3 ▪ The cooperatives provide many services to their members to improve production of fish and shrimp.
	Local/ regional	Zone 3 ▪ The cooperatives receive support to be able to produce their own animal feed. ▪ The union of cooperatives organize joint purchase of farm inputs and marketing ▪ Links are built with export, thanks to support from public agencies ▪ Processing groups are created and registered as community enterprises
3.Increased security on land rent	Local	▪ Capacity-building about the content of Land Lease for Agriculture Act ▪ Guarantee a balance in writing land rent contract, thanks to support from a third party ▪ Set up specific rental price and lease term for specific farm practices in the area
4. Support rural tourism link with market	Local/ Regional	Zone 1 ▪ Enhance farmers' capacities to the price by themselves, thanks to support collective action among farmers to produce quality products ▪ Develop local market for direct contact with consumers ▪ Creation of farm models for communication with consumer ▪ Initiate rural tourism in the area to increase market opportunities for selling farm production Zone 4 ▪ Create original touristic places ▪ Promotion of local touristic places ▪ Develop rural tourism projects with local communities, TAO and related public agencies in terms of building infrastructure and development plan
	Regional	▪ Wide promotion of local markets ▪ Link local initiatives with the promotion of rural tourism in the area at provincial level
5. Improved farm production and profitability: diversification and organic farming	Local	Zone 1 ▪ Rescheduling of debts in actively, and supporting cancellation of debts, for specific farms (selection criteria will be established) Zone 3 ▪ Support access to funds with low interest, and support to the provision of specific inputs (e.g., seedlings) ▪ Provide capacity-building to farmers to change farm practices Zone 4 ▪ Provision of high quality rice seeds ▪ Presence of support organizations which provide capacity building and help with marketing. ▪ Continue implementation the related projects to support farmer groups in terms of capacity building ▪ Raise awareness of farmers and consumers about organic farming
6.Installation of young farmers	Local	▪ Help young farmers sell their products in local tourism markets
	National	▪ Provision of subsidies and loans to help young farmers start ▪ Show being a farmer in a positive way in main education system

Axis for achieving the vision	Strategy level	List of main proposed policies/actions
		▪ Provide farm machines, modern farm knowledge, and financial as a grant via collective action at local level

6.2. Towards a change pathway

The different actions presented above can be organized into 6 axes (see Figure 4). *The work on all these axes can start as soon as possible, but the actions of* improved water management, increased land security, and stronger's farmer organizations *will really help the success of actions of improved farm productin and profitability (diversification and organic farming)*. Similarly, actions related to this axis will help the ones of supporting rural tourism and installation of young farmers. Altogether, actions related to these 6 axes delineate a "change pathway".

Figure 4. Change pathway



6.3. Most promising axes for action in each zone

The Table 6 was drafted based on discussion with actors and on the individual assessment that participants made at the end of each strategy workshops about the most important actions to be implemented to reach the desired scenario. Farmers always give priority to secure a good access to irrigation water, based on new infrastructure and enhanced management.

Table 6. Most promising axes for intervention in each area

	Improved water management	**Increased land tenure security**	**Support the transition to diversification and organic farming**	**More active farmers' collective action for production and marketing**	**Promotion of rural tourism**	**Support to the installation of young farmers**
Zone 1. Area of rice production, involving mainly small-scale farmers	***	***	**	*	***	***
Zone 2. Rice production area, involving mostly medium scale rice farms	***	**	***	*	**	***
Zone 3. Area where the main production is fish and shrimp	***	*	*	***	*	*
Zone 4. Area of rice production area plus ongoing diversification and shrimp breeding	***	***	***	**	***	**

Note: *** key factor; ** important one; * less important

6.4. Proposed work plan for some water management

During the final workshop, participants detailed some actions for improved water management. Participants discussed about 1) detailling some actions, 2) how to implement these actions in practice and what should be the first steps; and 3) which actors should be involved and which one should be in charge of coordination.

Organisation

Various joint water committees should be created: one for the whole Bang Phluang area, and at least three local ones for the upstream, midstream and downstream zones of Bang Phluang area. Each committee will involve: the Bang Phluang Irrigation Office, representatives from subdistrict administrations in each zone, representatives of Water User Groups and local leaders (i.e., village heads, chief of village heads). The main committee will involve the same type of participants, in particular representatives from up-stream, middle and downstream zones.

Role of each actor

In each subdistrict, group leaders will be chosen. They will be in charge of coordination at local level, in particular in terms of cropping calendar and water management.

Bang Phluang Irrigation Office will gather and share data on water infrastructure, farmed area, and cycle of crop production, updated situation of water resources (quantity, salinity). This office will contact directly group leaders in each area.

The subdistrict admninistrations will play as an important role to coordinate between subdistricts

Actions of the committees

The committees will be in charge of setting up crop production calendars and water management plans. They will also make decisions in terms of operatings water gates in the whole area. Subdistrict administration will support these committees by adding specific budget via their development plans

The committees will also be in charge of supporting the implementaton of the other actions scheduled as part of the present strategy:

- Improvement of water infrastructure so as to avoid pumping in the river
- Build water gates along the main canals to enable better water distribution
- Some Water User Groups take a central role as water service provider

A survey should be conducted among farmers about their views of proposed water structure. Finally, it would be interesting to consider the compensation mechanisms in case of damages from artificial flooding (flood expansion areas)

7. Conclusion: main lessons and way forward

This analysis shows the **very high connection between the different topics** addressed in this study. For instance, increased land security can help farmers currently producing conventional rice to shift to non-rice crops or organic farming. But also, increased land tenure security may be important for young farmers that want to start their farms but who do not have sufficient funds to buy land from the outset. Similarly, the development of rural tourism activities may provide a promising complementary income for young farmers. There is also strong connection between actions which can be done at local level (e.g., development of diversification, local markets) and actions which generally need initiatives at national level (e.g., support to young farmers, increased land security).

The issue of **pollution** due to conventional rice farming was of importance for farmers aiming to shift to organic crops, however the environmental dimensions of farming was of a lesser importance for other rice farmers and for farmers doing fish and shrimp breeding. Such issue was not frequently discussed during the workshops; This said, in the proposes vision, certification of farming activities will be developed both in the rice and in the fish and shrimp sector, enabling also an improvement of farming practices in terms of their environmental impacts.

The **actors (farmers' groups, offices under the Ministry of Agriculture and Cooperatives, and TOAs) were generally actively interested and involved** in the process. Sometimes, some actors felt difficulties to understand the benefits of spending time to discuss a "vision at 10 years time". Indeed, many farmers and development officers are used to organize meetings to discuss "burning" issues. The present work shows the interest of working on a such medium-range period. First, some issues that are key for the future but rarely discussed appeared, such as the issue of land tenure or the installation

of young farmers. Second, it enabled actors to delineate a “desirable future” that could be really different from the present situation, such as for instance the development of various cooperatives for fish and shrimp production and marketing.

The first phase of the project mainly focused on one subdistrict per area, in terms of supporting group’s activities and building trust with actors. In a second phase, the process was up-scaled to other subdistricts in Bang Phluang level. The actors of these other areas felt difficult to understand the whole process of scenario building. As a result, fewer actors from these subdistricts participated in the scenario and strategy-building workshops. There was overall **less involvement in the process for the actors of the subdistricts that were not involved from the outset**. This shows the importance of sustained presence in the area to build relation with actors and to help them understand the process.

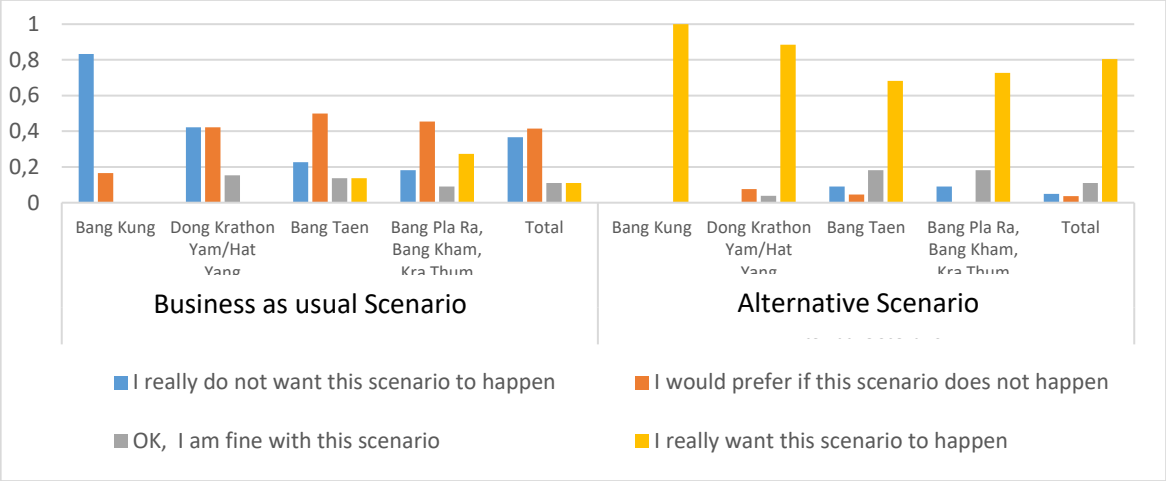
The research project organized several workshops with farmer’ groups and invited related organizations such as representatives from subdistrict organisations, river basin committee, staff from the Ministry of Agriculture, and occasionally academics or specialists (e.g., on the new Water Law). n doing so, it helped build a **connection between the knowledge all these actors**. Actors gave importance to the workshops as place where they could learn from others in a constructive atmosphere.

The **next step** for such a work would be to jointly identify which actors should be involved in the implementation of each action, who should take the lead in terms of coordination, and how the actions proposed here could be integrated within existing public policies or trigger new ones, at regional or national level. This said, many of these actions are not necessarily to be initiated in the frame of public policies and can be initiated by actors at local level.

8. Appendix. Participants' evaluation of scenarios

As Figure 5 shows, participants clearly preferred the alternative scenario as these people could see the opportunity to improve their income from farming in a sustainable way. Moreover, some of participants (i.e., diversification farmers in Bang Kung/Dong Krathong Yang/Hat Yang, and farmers doing organic rice farming in Bang Taen area) already get some benefits from activities described in the alternative scenarios.

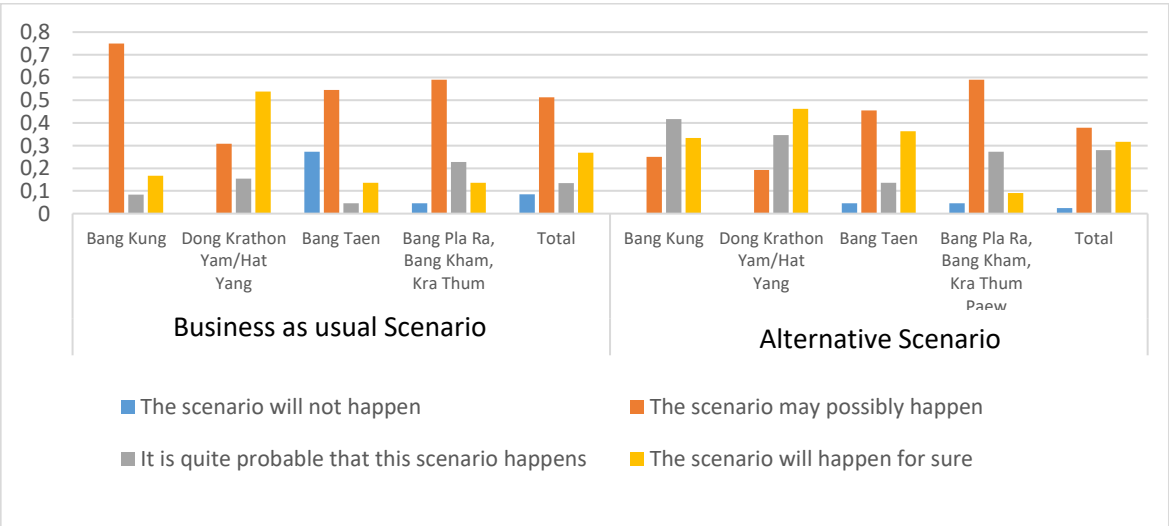
Figure 5. Scenarios preferred by participants in the workshops at Subdistrict level



(The graph shows the percentages of answers by participants in each of the four scenario workshops - Step 5 of methodology)

Participants in the four workshops generally have a similar assessment of the probability that each scenario will occur. In particular, they believe that the alternative scenario can occur (Figure 6). They are confident that the main drivers of change (i.e., improved land lease act, improved water management, success of diversification, organic farming and collective action) may enable such a scenario.

Figure 6. Assessment by inhabitants of the likelihood that each scenario occurs



(The graph shows the percentages of answers by participants in each of the four scenario workshops – Step 5 of the methodology)