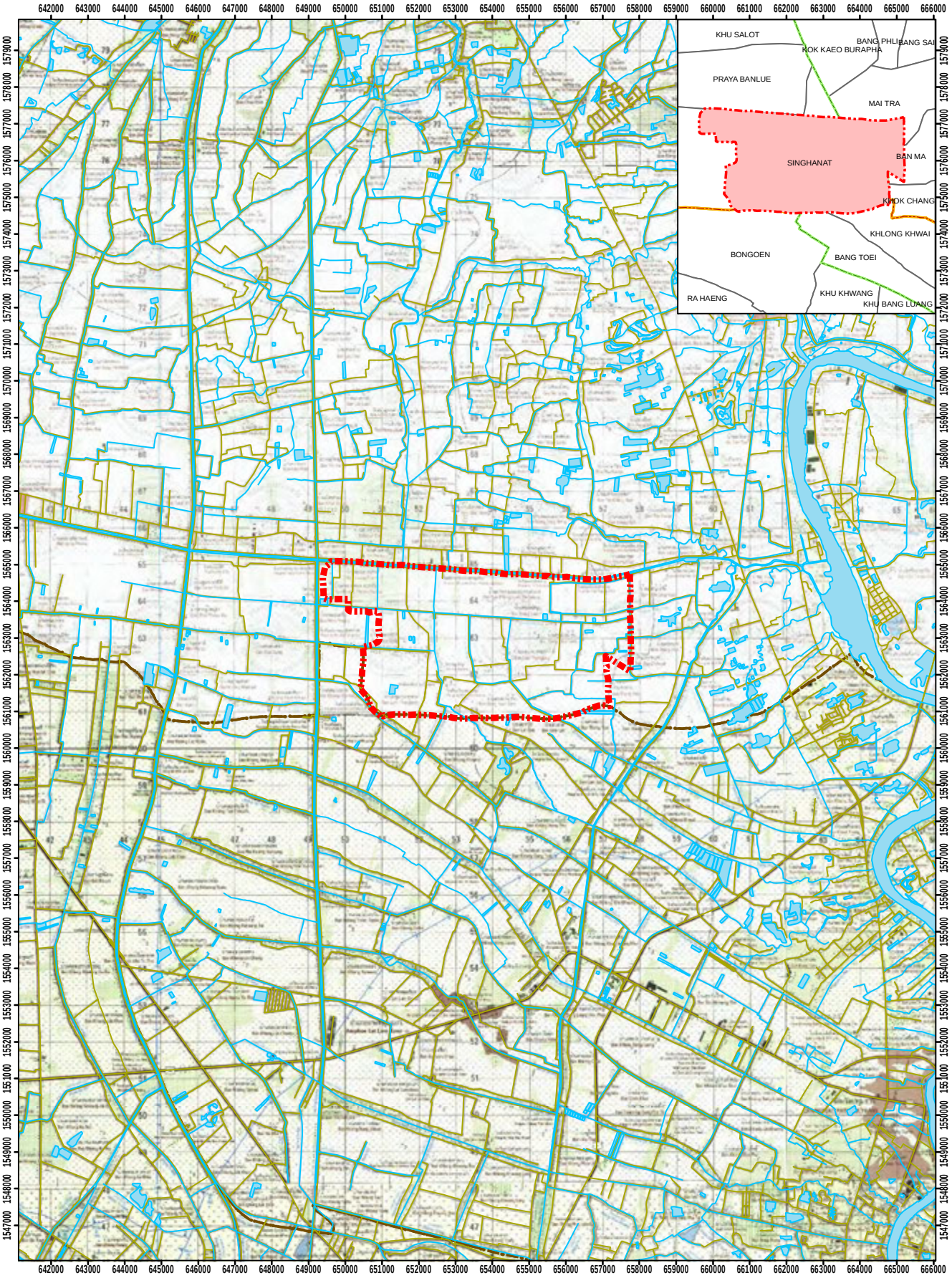
Community Case Study

Tambon Singhanat, Lat Bua Luang District

Ayutthaya Province

Content



Legend

- Provincial Boundary
- Tambon Singhanat
- Water body
- River
- Road

Note

Data Source:
Neibouring Tambon Boundary: GISTDA
Other data: RID

Scale 1:100,000

1 0.5 0 1 2 3 4 km

Date July 2013

Project for
Flood Countermeasures
for
Thailand Agricultural Sector

JICA

Topographic Map of Tambon Singhanat, Amphoe Lat Bua Luang, Ayuttaya Province

1. General Information of Singhanat sub-district

History

In the 5th reign of the Chakri Dynasty, after the abolition of slavery, there were 2 officers named Khun Singhanat and Phraya Bunluea staked a claim to the land of Singhanat and Phraya Bunluea sub-district in the present. Back then, the whole land was Rajchakram sub-district under the jurisdiction of Bang Sai district. Later, on 1st December B.E. 2480, the government had reorganized the new administrative divisions in order to constitute LatBuaLuang sub-district, Bang Sai district, Ayutthaya province.But we still have a part of Rajchakram sub-district under LatBuaLuang district in Ayutthaya province.Also, the ancients named one part of the land as “Singhanat sub-district”, which is called by the name of the landholder, Khun Singhanat.

Singhanat sub-district is located 14 kilometers east of LatBuaLuang district and 60 kilometers south of Ayutthaya province. The total area of the sub-district is about 28 square kilometers or 17,199 rai, which includes the agricultural area of 16,329 rai. There had been 14 villages until in B.E. 2536. 7 villages are separated to be administered by Phraya Bunluea sub-district. Singhanat sub-district has governed another 7 villages ever since; Ban NhongSanun, Ban Loom Ta Rod, Ban Luang Prasit, Ban Nhong Sanun 2, Ban Loom Tong Lang, Ban Nhong Num Som, and Ban Loom Tong Lang 2. Moreover, Singhanat sub-district council was elevated to small-sized Sub-district Administration Organizations (SAO) on 23rd February B.E. 2540.On the top of that, it was elevated again to middle-sized Sub-district Administration Organizations as the decision No.3/2551 ofthe Sub-district Administration Organizations executive committees in Ayutthaya province on 26th March B.E.2551

Boundaries

To the North	Khlong Phraya Banlue sub-district,LatBuaLuang district, Ayutthaya Province
To the South	Bo Ngoen sub-district,LatLumKaeo district,PathumThani Province
To the East	Mai Tra sub-district,Bang Sai district,Ayutthaya Province
To the West	Khlong Phraya Banlue sub-district,LatBuaLuang district,Ayutthaya Province

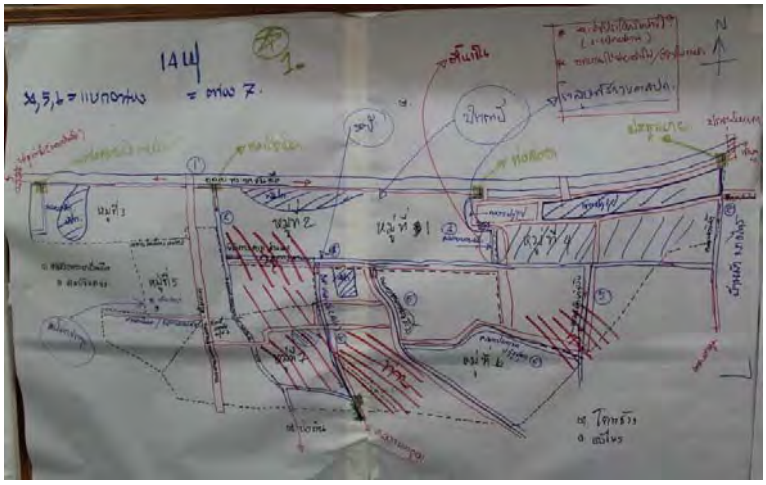
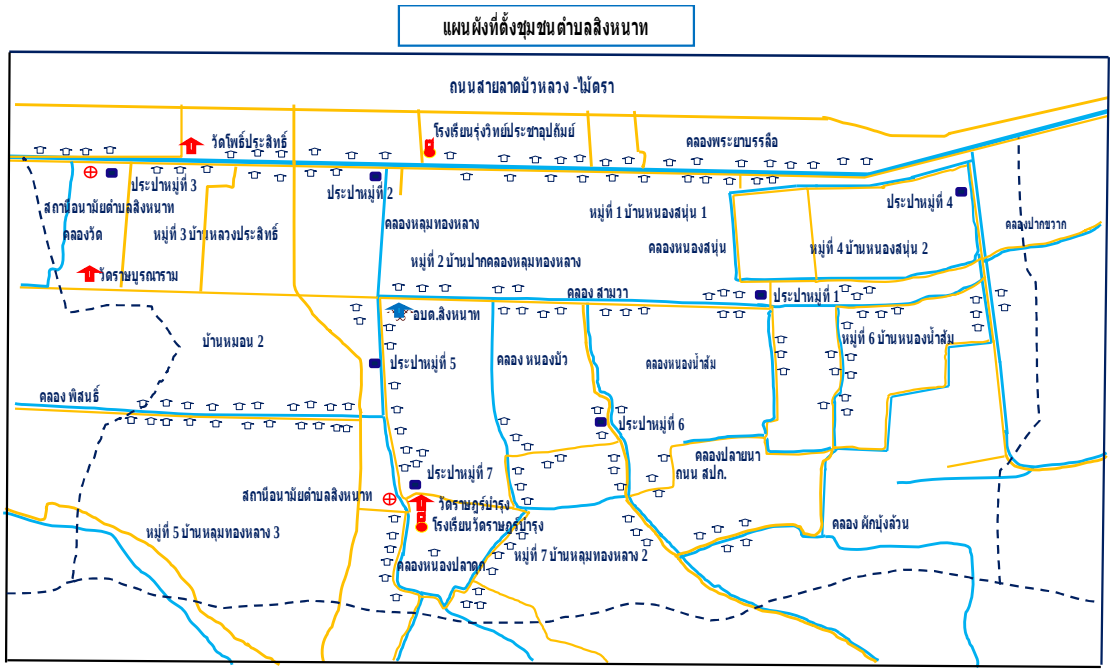


Figure1 Map of Singhanat sub-district



Map 1 Singhanat sub-district

Administrative Division

This sub-district is subdivided into 7 villages, which are;

Village 1 Ban NhongSanoon 1,Village headman is Mr. AreePunpreuk

Village 2 Ban Pak Khlong Loom Tong Lang (Ban Loom Ta Rod), Village headman is Mr. AiyoopPrajunsri

Village 3 Ban LuangPrasit(PanyaDaeng), Village headman is Mr. TripopSaengarun

Village4 Ban NhongSanoon 2 (Ban Pak Boong Luan),Village headman is Mr. NiruthButrisap

Village5 Ban Loom Tong Lang 4,Village headman is Mr. BunchaPuangsawad

Village6 Ban NhongNumSom, Village headman is Mr. ManopChantana

Village7 Ban Loom Tong Lang 2 (NhongPlaDook), Village headman is Mr. ArthitYindeesit

Population

Table1 the Number of Population

Village	Men	Women	Total	No. of Houses
Village 1 Ban NhongSanoon	206	244	450	124
Village 2 Ban Pak Khlong Loom Tong Lang	182	182	364	121
Village 3 Ban LuangPrasit	249	263	512	143
Village4Ban Pak Boong Luan	271	281	552	154
Village5 Ban Loom Tong Lang	216	222	438	119
Village6 Ban NhongNumSom	216	222	438	119
Village7 Ban NhongPlaDook	248	250	498	164
Total	**1,588**	**1,664**	**3,252**	**974**

Data in January B.E.2554;Population Growth rate since B.E.2529 –2554is1.01%

Remark:Only Thai Nationality withone's name in the house registration

Geography and Culture

It is floodplain in the flood season with natural river and the canal which is as important as blood vessel. This is related to the way of life of the people in community, which can be divided into 2 different ways; Buddhist way and Islamic way.

There are natural bodies of water,13 irrigation canals and water delivery systems throughout the villages. They consist of Samwa canal, Phraya Bunluea canal, NhongSa Noon canal, Loom Tong Lang canal, NhongBua canal, Pisonthi canal, NhongPlaDook canal, NhongNumSom canal, WatRadpanunam canal, MhonNheung canal, Plai Na canal, Pak Boong Luan canal, Ban Ma canal and SaowWaPlai Na canal.

Figure2Pisonthi Canal

Religion and Belief

The community has multicultural believes and religion. In the sub-district, there are both Buddhist community and Muslim community. People in the society live interdependently with the harmonious culture like this from the very start. Only some ceremony has an exception of participation, like Buddhist ordination ceremony. 80% of the community is Buddhist and 20% of Muslims, and both have their own religious ceremony. This also includes supernatural believes, which the sacred objects have been respected since the ancient times, but it was not widespread.

Occupation

Most people in the community are farmers. Some are hired for both agricultural and industrial jobs in the neighborhood. Growing fruits and perennial plants are secondary professions. Some livestock are kept for the religious worship, especially the beef in Muslim community.

Transportation

There is 9 routes that connect the district to all the villages; 7 routes of unpaved road and 2 routes of paved road.

Land Holding

The total of landholding area is 17,199rai

The total of farming area is 16,329rai

For the ownership of the landholdings, some farmers rent the land reform area of LatBuaLuang district. Thisallows the farmers to buy the proprietary rights of 5 raimostly on the annual instalment planfrom the Agricultural Land Reform Office (ALRO) of LatBuaLuang district.Sale or resale is prohibited. 70% of the land is rent for the agriculture, and another 30% farmers use their own lands.

Table2 Agricultural Area

Village Name	Ban NhongSanoon	Ban Loom Ta Rod	Ban LuangPrasit	Ban NhongSanoon2	Ban Loom Tong Lang	Ban NhongNumSom	Ban Loom Tong Lang 2	Total
No. of Village	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**7**
Total Area (rai)	2,040	2,233	931	2,515	2,069	2,239	2,855	**14,882**
Farming Area (rai)	2,040	2,228	925	2,515	2,069	2,239	2,855	**14,877**
In-season rice field / Double-crop field	1,850	2,050	800	2,150	1,805	2,100	2,600	**13,355**
Fruits/Perennial plants	160	128	80	275	164	79	220	**1,106**
Vegetables	20	20	15	30	50	30	20	**185**
Flowering/Ornamental plants	-	-	-	-	-	-	-	**-**
Others	10	30	30	60	50	30	15	**231**

2. Physical andBiological Features,Social Culture andEconomics

Physical Features

An important configuration of Singhanat sub-district is the ecological agriculture, which consists of natural landscape and cultural landscape.The major element comes from natural changes and those inventions made by human being. Singhanat sub-district has rice as the most important factor. There are agricultural system, crops, fruit trees, canals, irrigation system, residences, and lands. They are combined together to become a structure of small group. The connection of fruit trees and perennial trees, like mango, neem and pine forest, has become the house of species distribution and bird breeding. The important water resources are Phraya Bunluea canal, Sam Wa canal, Nhong Sa Noon canal, Loom Tong Lang canal, NhongBua canal, Pisonthi canal and NhongPlaDook canal. There are ponds, marshes, swamps and rice field together as the ecosystem background and its role is to be the major rice production resources of the people in the community.

Important canals come from the nature and were made by human in order to control the water system. Farm water, fish habitats, and the most important thing is water resource. Canals can change the agricultural system of rice field, which is the community's industrial drop.

Figure 3 Canal

Canal Developmental Agricultural System to the Improvement of Rice Farming

The canal development in B.E.2430, the 5th reign of the Chakri Dynasty – King Rama V, Thai rice was known as rice with good quality.They began the canal development to support the farming. It had started from digging Phra Pi Mol canal and Phraya Bun Luea canal. After that, Siam Lands, Canal, and Irrigation Company Limited, which was established in B.E.2431, has taken care of all managements and the shipping fee to maintain the canals.

Prince SaiSanitvongse, with M.R.SuwapunSanitvongse – the oldest son, Mr. Erwin Müller,Mr. CheunBunnag,LuangSathonRachaYutand Mr. Joachim Grassihad become a partnership and established the company in order to manage the irrigation system, control and maintain the water level in the canals, and make sure that there will be enough water all year round, especially collective farming. The collective farming is a type of agricultural production in which the holdings of several farmers are run as a joint enterprise.Everyone will receive equal apportionment and product as the cooperative owner of the property, including the allocation of sufficient water for consumables.

The canal development project in the past had given Siam Lands, Canal, and Irrigation Company Limited the ownership of the land along the canal; 40 lines or 1,600 meters of wide canals and 25 lines of small canals. The company has the rights to sell them to the third party by collecting the shipping fee which will give the government 20% profit.

The role of the 7 canals is irrigating the water for the agricultural system. This covers the steepl and that is a part of the agricultural reform land. ALRO had constructed the pumping station called BCA (Business Center association) pumping station.

Table3 Rainfall Statistics in B.E. 2547-2553 (millimeter)

Month/Year (in B.E.)	2547	2548	2549	2550	2551	2552	Total (2547-2552)	Average (2547-2552)	2553
January	11.4	-	-	-	-	-	11.4	2.28	-
February	7.8	-	-	5.3	-	-	13.1	2.62	-
March	69.4	5.6	45.5	-	4.2	1.6	126.3	21.05	-
April	22.5	13	16.7	7.6	6.9	10.2	76.9	12.81	1.12
May	96	103.2	26.7	50.2	17.5	40.4	334	55.67	3.33
June	13	26.2	80.7	20.7	26.2	62.8	229.6	38.27	0.55
July	81.6	37.9	74.1	42.4	69	8.6	313.6	52.27	0.36
August	71.3	126.5	67.1	29.3	16	34	310.54	51.76	1.28
September	69.6	95.3	183.2	69.4	152.5	41.3	611.3	101.88	-
October	126.3	73.8	56.2	7.4	38	19.1	320.8	53.47	-
November	36.5	33.2	-	-	11.9	-	81.6	16.32	-
December	18.4	-	-	-	-	-	18.4	3.68	-
Total	**623.8**	**514.7**	**550.2**	**232.3**	**342.2**	**218**	**2,481.20**	**413.53**	-
Average	**51.98**	**42.89**	**45.85**	**19.35**	**28.51**	**18.17**	**206.76**	**34.46**	

*Data fromLatBuaLuang district

Rainfall Statistics (Millimeter)

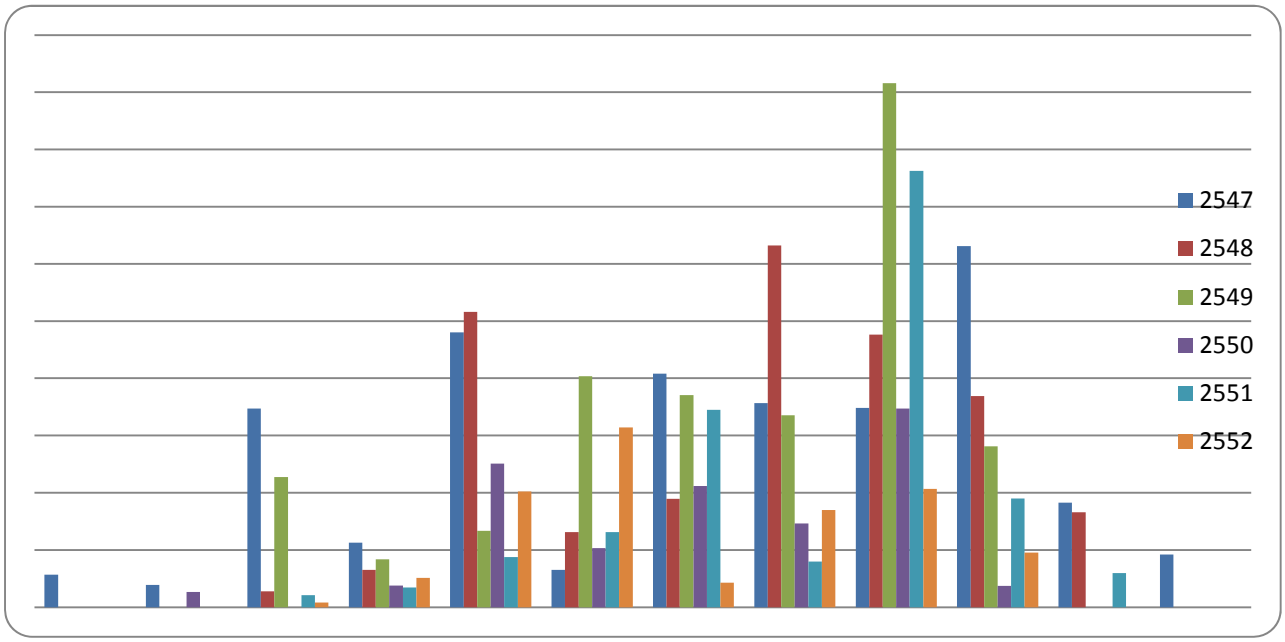


Diagram1 Rainfall Statistics in B.E.2547-2552

Map2Canal Irrigation System at Singhanat sub-district

Types of Irrigation

Flood Irrigation

Suitable for

Plants that grow close together or plants which are usually sown, except plants that needs accumulated water in the field, like paddy rice. Most of plants that do not need the tillage, and are not too high or too low. The slope of regular plants should not be less than 0.5%, and not more than 4% for short-stemmed plants.

Key Features

It can give high efficiency water flow if it is well-designed andconstructed correctly; designing on appropriate lands and being suitable for the machinery. If it needs to drain the excess water away, it can be drawn off quickly. It doesn't use much power.

Limitations

It should be on flat land with level slope. Small plants may be damaged when watering. Some soil may be cracked after the flooding. This is not suitable for sandy soils because there will be high percolation losses into the root zone.

Furrow Irrigation

Suitable for

Row crops, like vegetables or fruit trees. Furrows can be used on most soil types, except sandy soils. Theslope should not exceed 2%, and for the plenty rainfall areas,the ditch slope should not exceed 0.5%.

Key Features

The dimension of ditches depends on the stream size. In case of the drainage, it will quickly use the channelsfor the irrigation or excessive rainfall. It can be used with any types of irrigation.

Limitations

Use lots of power in order to irrigate. It needs the even slopes. Not suitable for growing seeds with small watering.

Sprinkler Irrigation

In sprinkler irrigation, water is piped from the sprinklers into the air of one or more central locations within the field. The water was sprayed as steady as the rain, so sometimes it is called Raining Irrigation.

There are many ways to deliver water into the field; such as, irrigation, pumping, culvert drainage system, valve of a rubber tube and siphon. Irrigation is the lift of water from resources to be high enough to flow down to watercourse. Since there are many buildings block the waterway, irrigation will be efficient for the area that has flowing water resources only. Obstructed buildings will block the waterway until the water is as high as it is needed. Then the sufficient water will flow into the watercourse. If there is so much water in the watercourse that can be released into farmlands to grow crops, it will automatically flow either over the irrigation building or through it. Pumping in this situation means pumping water to the agricultural areas by using devices or pumping machines.

A pump is a device that gives power to move fluids as wish from one place to another through the closed valve system. The power imparted into a fluid may come from an electric motor of wind energy or other power resources. Culvert drainage system is a way to release water by using hoses or pipes as the equipment to draw water through canals or roads. Drainage is a way to get rid of excessive water from the area to maintain the good condition and make sure the land is ready to use, for example, city’s drainage, agricultural drainage, highway drainage, etc. Culvert is a device for passing the water

through roads, railways or banks. Culvert can be found in many types of substances like concrete, iron or plastic.

Culvert has different shapes and sizes; circle, square, oval or trapezoid, depending on the design that is compatible to its usage. The design is based on its major duty and the volume of needed water. The main materials that use culvert are concrete, iron and plastics (PVC). Sometimes, it can be combined between two materials like steel pipe with farm ditch at the end. A small opened watercourse takes water from FTO and releases it to farmlands. With its zigzag appearance all the way through the farmlands like giblets, farmers named it Giblets canal (Sai Kai canal).On the other hand, releasing water via the closed watercourse like pipes out to the agricultural areas, farmers called it syphon. It is a process of transferring water from one place to another using water pressure. To create the syphon, it needs tube or pipe to transfer the fluids, which the tube makes fluids flow uphill. It flows higher than the source of the liquid and come out at a level lower than the surface of the source. These are types of agricultural irrigation system that farmers in the area use. It is one of the high production cost, especially canal pumping system.

Types of Soil & Their Uses

The land has clay soil. It came from sediments that piled up for a long time. This type of soil is suitable for agriculture. Groups of soil are divided as the following:

1. MahaPhoe soil group is deep clay soil. It is black or dark gray color with dark brown dots. The reaction of the soil is high to very high acid (pH 4.5 – 5.5).The lower part of the upper soil is sandy clay soil with brown or brown-gray powder. It has red and yellow brown dots. Yellow dots like color of straw can be found in the lower soil, generally 1 meter deep down from surface. Its oily surface, furrow and soil surface will crack if the soil is dry. The reaction of the soil is high to very high acid (pH 4.5 – 5.5).The lower part of the lower soil is muddy clay soil with dark gray color. The reaction of the soil is acid. The area is flat land with 0 – 1% of slope, so it has bad drainage. The water on surface flows slowly. The absorption of water is also slow.
2. Chachoengsao soil group is very deep soil. The upper soil is always clay soil with dark or very dark gray color. It also has brown dots or red- yellow. The reaction of the soil is high acid (pH 5.5).The lower part of the upper soil is clay soil, brown-gray or gray color with red-yellow and dark brown dots. The reaction of the soil is neutral (pH 7.0).The lower of lower soil is brown-gray clay soil with yellow-brown dots, sometimes as yellow as straw. In the depth of more than 100 centimeters, there is muddy clay soil. It is blue with low amount of sulfur and furrow in the lower soil. The reaction of soil is neutral alkaline (pH 8.0).The area is flat to very flat land with 0 – 1% of slope, so it has bad drainage. The water on surface flows slowly. The absorption of water is also slow.
3. Bang Khen soil group is deep soil. The upper soil is dark gray clay soilwith yellow-brown dots. The reaction of soil is neutral (pH 7.0).The lower part of upper soil is clay soil. It is gray to light

brown-gray with dark brown dots. The upper soil has dark gray or black color with dark brown or yellow-red dots. The reaction of soil is low acid (pH 6.5).The lower part of lower soil is clay soil with brown-gray or gray color. The reaction of soil is low acid (pH 6.5).It has yellow-brown and red dots. Deep down under the lower soil, there is blue muddy soil with low amount of sulfur and furrow. The area is flat to very flat land with 0 – 1% of slope. The land is 2 -4 meters high from sea level. It has bad drainage. The water on surface flows slowly. The absorption of water is also slow.

4. Ayutthaya soil group is very deep. The upper soil is dark gray clay soil. The reaction of soil is neutral (pH 6.0).The upper part of lower soil is clay soil with gray or brown-gray color and red dots. The reaction of soil is high acid (pH 5.5), and yellow dots like straw can be found as well. At the depth of 100 – 150centimeters, crystal of gypsum and furrow mark can be found in between of upper and lower soil. The soil has high amount of sulfur and the reaction of soil is high to very high acid (pH4.5 – 5.0).The area is flat land. It has bad drainage. The water on surface flows slowly. The absorption of water is also slow. To be utilized for natural plants and the land, it can be paddy-sown field.

In Singhanat sub-district, there are 2 problems on the land. The first problem is the quality of soil. It is sour and acid soil. It also lacks of nutrients in the soil. Drainage and absorption are problems as well. Another problem is the holding of farmlands and houses. The land allocation by Agricultural Land Reform Office (ALRO) in B.E.2518 in the area of Village 1, Village 2, Village 4, Village 6 and Village 7had caused conflicts in the past. ALRO has reallocated the area by buying back lands from owners for 2,000 baht per rai. People in the area used to make a complaint because someone lost their farmland holding from 25 rai to 12 rai. Some farmers rent the area of reform land in LatBuaLuang district which will allow farmers to buy the proprietary rights of 5 rai mostly on the annual instalment plan from the Agricultural Land Reform Office (ALRO) of LatBuaLuang district. Sale or resale is prohibited. 70% of the land is rent for the agriculture, and another 30% farmers use their own lands.

Table4the Proportion of Land Holding

Village	No. of Houses	Percentage of farmland holding	Percentage of habitat holding	Percentage of Non-property
Village 1	89	90	90	10
Village 2	78	90		10
Village 3	80	10		90
Village 4	155		90	10
Village 6	151	21 houses with no habitat and farmland		
Village 7	125	90	90	

In the state of land holding, some people in the community rent lands for farming and also the house from generation to generation. After the flooding, concerning the rice price, the rental tended to be increased. For the housing, construction is still the same because the owner will not allow any renovation.

Fruit trees and perennial plants is not only considered as monoculture like mango and santol, but also as mixed farming with elements of mixed agricultural system; such as, small pond, house, vegetables, fruit trees and perennial plants. They are connected together as residence and farmland of patch garden and corridor garden.

Patch, patch garden, perennial patch, mixed patch, patch house, patch is the habitat of birds; such as, Asian Open bills and Weavers. It can also be the natural breeding place for birds. Corridor garden, growing neem along the ridge, protecting natural forest, growing Sakae or Kratoom along the ridge, growing neem along the road can become habitat and breeding place of birds, lizards and fish. Moreover, both patch and corridor gardening are ways of fertility treatments in Singhanat sub-district.

Figure4Species Distribution

Some physics are man-made; such as, cultural landscape, inventions, constructions, transportation, road, bridge, irrigation, water gate, canal, pumping stations, houses, temples, mosques and government offices.

Road Transport

The main street consists of 7 routes of unpaved road and 4 routes of paved road, for example, Bang Toey – Loom Thong Lang road, Pisonthi canal road. Unpaved roads can normally be seen along the ridge of irrigation canals or the way to farmland. After the flooding, all routes were under water, but not much damaged. Some roads along the irrigation canals had collapsed. Some were washed away and became bumpy, but people can still drive along.

Suggestion: The roads should be constructed strongly and firmly. They should be lifted up to higher level to prevent the street from floodingand becomebank in the flood season.

The drainages in the agricultural system are canals, water gates and water supply system. There are 3 wells and 7 water supply systems; one in each village. The Effect of using water supply system is it could not work during the flooding time. To use water supply system, all villages need to have their own system, which the problem is the quality of water. Water supply comes from water in wells that contains limestone. Sometimes, when the water is released from wells, it also has red rust and

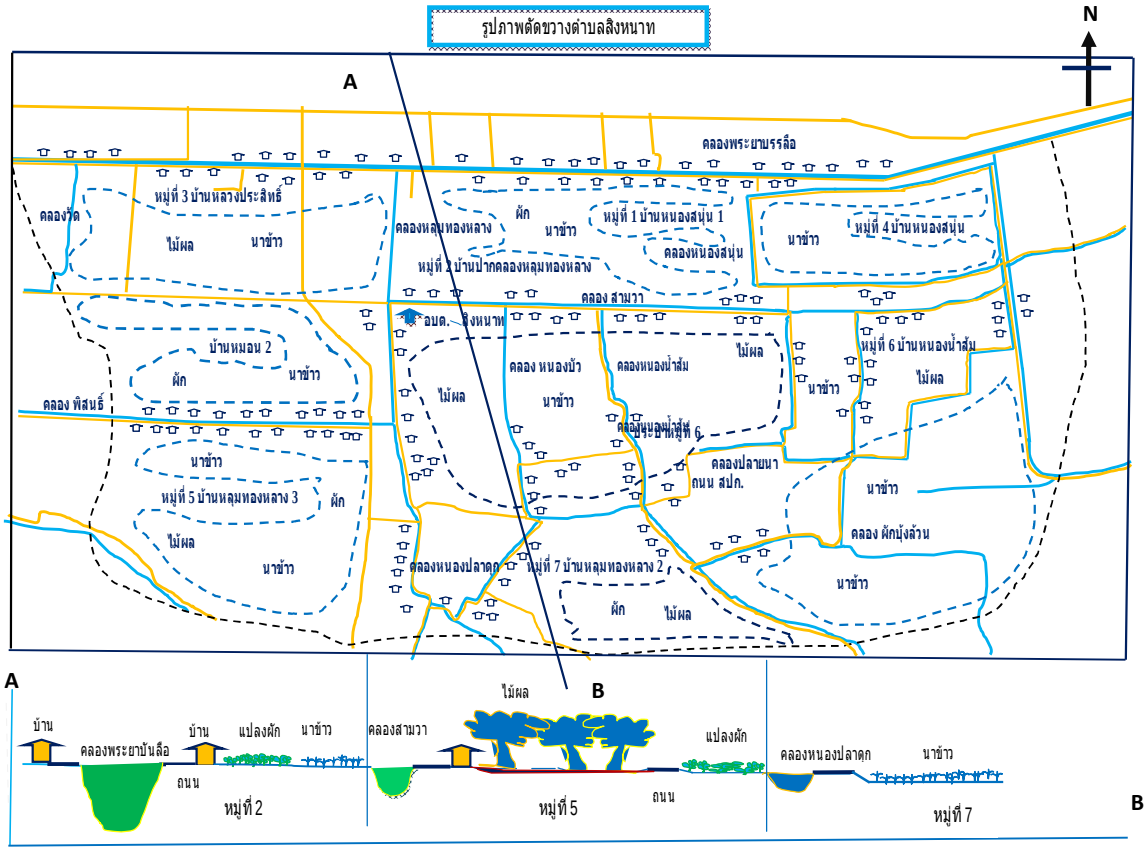
sediment in the water. Drinking water should have passed through filters or alum in order to strain sediments away. Normally, people don't drink rainwater because it is not clean. It contains dust, bird droppings and air pollution, and has black color. Rainwater will be drinkable in the late rainy season because the roof has been cleaned.

Geological conditions in each area can affect the quality and soluble minerals in well water as the following:

- Chloride causes salty taste in water.
- Iron and Manganese cause red color, iron rust and/or black manganese.
- Hard water makes limest one dirt stick around the pipe wall. It causes blocking problem. Pipes can easily break.

Suggestion

- Water filtration systems installation or finding new water resources
- For the housing, houses should be built separately in farming area and near canals.
- Other constructions; schools, temples, mosques, sanitarium, Sub-district Administrative Organization (SAO) and learning centers



Map3 the cross line shows that houses were built along the road.Crops are harvested by furrow planting in the upland, no flood, with lower rice field.

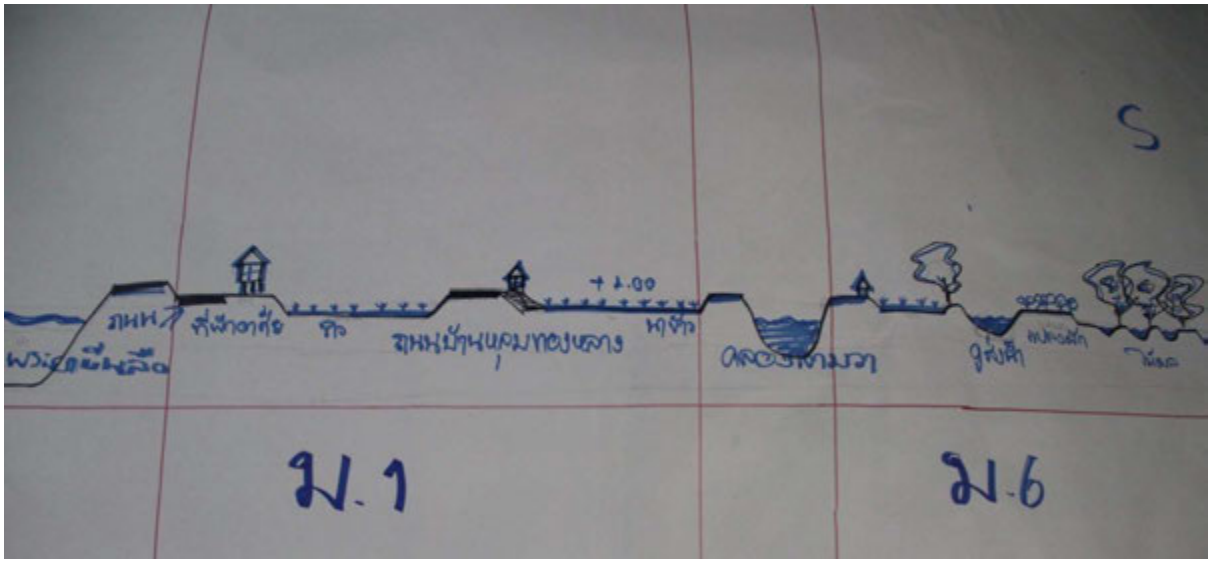


Figure5The Physical Structure of Singhanat sub-district

Biological Features

Industrial Crop

Agriculture in Singhanat sub-district, LatBuaLuang district, Ayutthaya province is growing rice, fruit trees and vegetables. Lowland areas are suitable for agriculture and irrigation, so farmers can pump up water for agricultural purpose all year round. Rice is an important product. Farmers grow rice all year round for both in-season rice field and double-crop field. In-season rice field starts from May to October and double-crop field starts from November to April. Species of rice that farmers use can be bought from LatBuaLuang district and the mill in the area.

There are many species of rice; Chainart,Kor-khor 31, Kor-khor 41 and Phitsanulok. The species that farmers will use depend on the growing season and its disease resistance. Rice used in paddy-sown field is about 25 kilograms/rai in average and it becomes about 900 kilograms/rai after the production. Farmers will sell the product after harvest to the local mill in LatBuaLuang district for 12 baht per kilograms at the average price. The given price is based on the quality of rice and how much humidity remains in the product. Farmers in the area grow rice totally for sale and buy rice from other places to eat. They gave reasons that their rice is too hard to eat and they had used lots of chemical in the production like insecticide and herbicide.

For the production cost per rai, farmers spend around 6,500 baht each. It may be higher or lower depending on the production factors of each person; fertilizers, chemical and farmland rental areas. Farming rental areas are one of the factors because 60% of sub-district own land are rent for agriculture and another 40% is private property. Farmers pay 1,000 baht/rai for the rental, which cause the high production cost. In the average of the production, there will be about 4,300 baht/rai left after farmers deduce it from the production cost. Agriculture of the farmers in Singhanat sub-district, LatBuaLuang district, Ayutthaya province can be identified as shown in the diagram below.

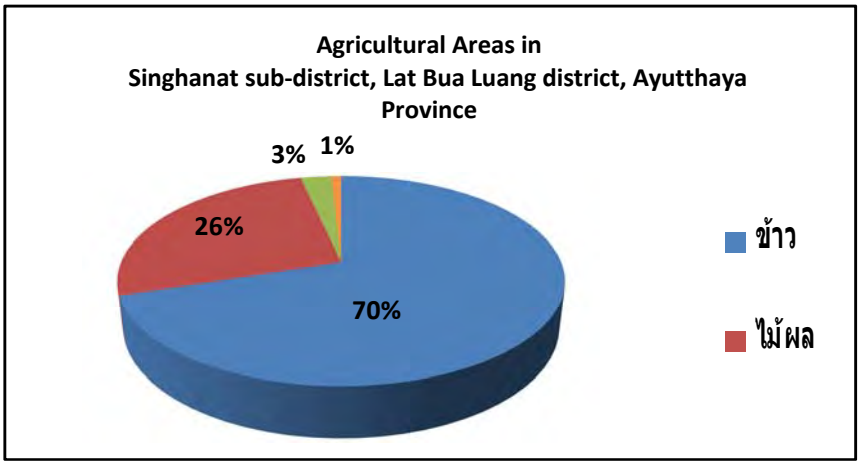


Diagram2Agricultural Areas in Singhanat sub-district, LatBuaLuang district, Ayutthaya Province

The agricultural area in the diagram shows the percentage of area consuming for agricultural purpose in the sub-district. According to the diagram, it shows that most area of 7 villages, for 70%, is rice field – in-season rice field and double-crop field.Rice fields are spread around the farming area as mentioned earlier.

Farmers grow fruit trees for 26% of the area. Most of them are mango gardens and some are coconut gardens.Fruit trees had been damaged by the flooding in B.E. 2554, especially mango gardening areas which the whole sub-district was all destroyed. Same thing happened to some of coconut gardens.Because of flooding, some farmers have changed from fruit gardening to rice farming. They have also grown more vegetables in the sub-district to lower the risk of flooding.

Figure6 Farming Area inSinghanat sub-district

Farmers grow vegetables for 3% of land in the sub-district, and the percentage tends to grow higher because this has become the secondary job after the flooding. Growing vegetables is a cooperation of farmers. They aim to grow them for the company as an export product. Middlemen will buy the products in some areas. To avoid marketing and pricing problems, farmers in the area will grow vegetables as many as the demand from the company, depending on each season.

There is only 1% of animal husbandry. Animal husbandry mostly takes place in the Muslim community, which is a traditional occupation in the community because of their Muslim way of living. Animals are fed with natural grass along the road or around the houses, considered as husbandry area. The following is the map showing an overview agriculture of each village in Singhanat sub-district.

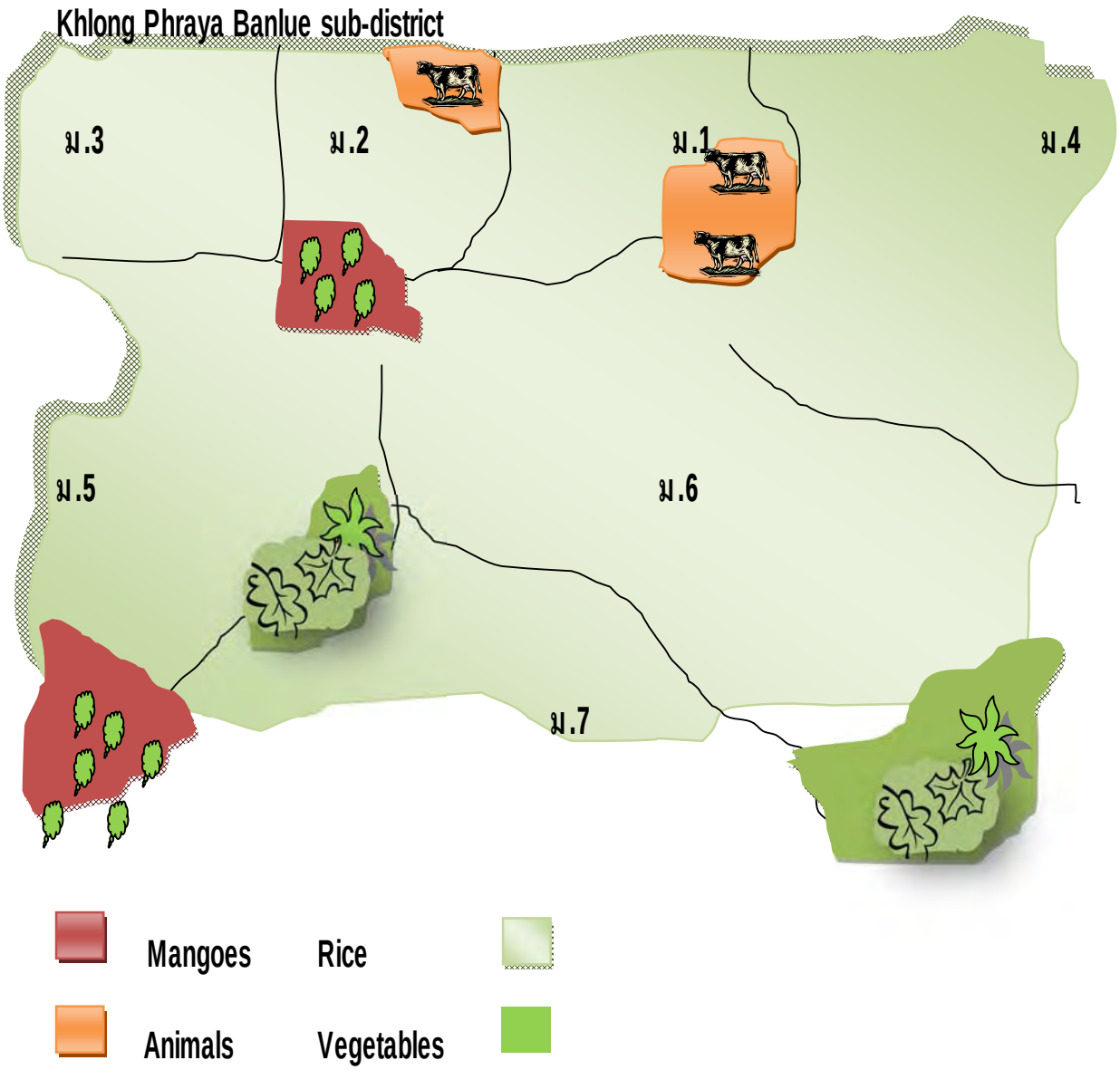


Figure7 The Overview of Farming Area in Singhanat sub-district, LatBuaLuang district, Ayutthaya Province

From the above figure showing an overview farming area of Singhanat sub-district, it can be explained that rice farming, in-season rice field and double-crop field, is the major occupation of people in all 7 villages. They also grow fruit trees, mango and coconut garden, in Village 2 and Village 5.Growing vegetables in Village 5 and Village 6 is a subordinate agriculture that becomes a gathering for exporting to EU. Lastly, husbandry of cow and goat in Village 2 and Village 1 is the traditional way of living of Muslim community.

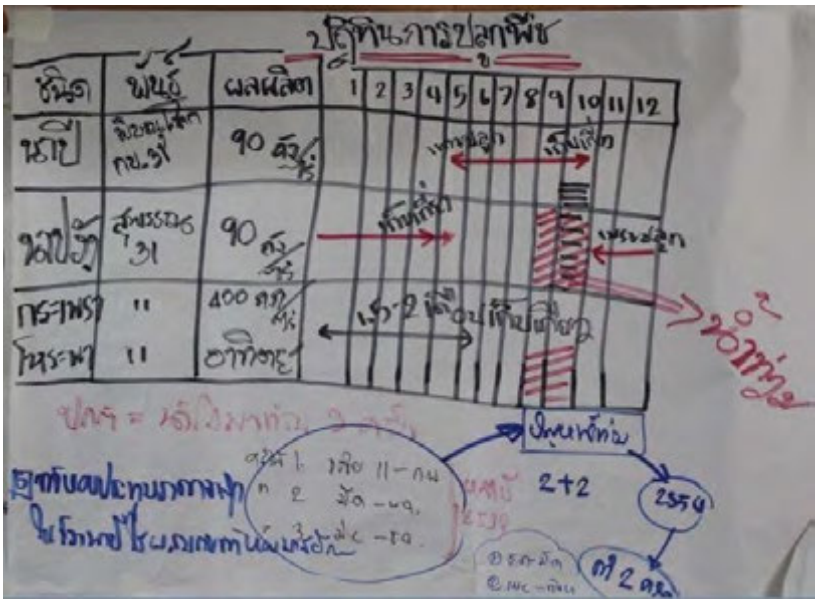


Figure8Vegetable Harvest Calendar

Table 5 Rice Harvest Calendar; in-season rice field & double-crop field in Singhanat sub-district, LatBuaLuang district, Ayutthaya Province

Type of product	Species	Month												Production (per rai)
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
In-season rice	Phitsanulok 41, Kor-khor31 Kor-khor41					Grow				Harvest				90 buckets
Off-season rice	SuphunBuri31			Harvest									Grow	90 buckets

According to the rice growing calendar, it shows that in this sub-district there are 2 periods to grow rice as the following:

For in-season rice, farmers will start sowing seeds in May. The day to start sowing is based on the preparedness of each person. In order to prepare soil and seeds, farmers normally do it in May which is the starting month.When they grow in-season rice, they choose species of rice that can stand water and rain like Phitsanulok 41, Kor-khor 31 and Kor-khor 41. From the day they start sowing until the harvest day, it takes around 120 days.During the harvest season, farmers will not harvest everything at the same time because each of them has different day of sowing as mentioned earlier.Farmers mostly harvest in September – October. It depends on period of time and suitability of farmers.The production of in-season rice is around 900 kilograms/rai.

For off-season rice, farmers will start sowing seeds in November. The period of sowing may be changed due to the climate or geological condition in the farming areas. For example, if the area was flooded, farmers might postpone the sowing period.The rice that farmers use in this season is SuphunBuri 31.Farmers in the area explained that this specie of rice can stand the cold, has strong stem and will give lots of product. Moreover, during the off-season, it is usually cold which directly affect the farming.Harvest period is from March to April, depending on the sowing period. The average production is about 900 kilograms/rai.

Considering the agricultural plan, the period of both in-season and off-season farming will not be affected by the flooding season. So, there should not be any effect on the rice field because the flooding season is in between of in-season farming and off-season farming.

Table6 Production Cost of 1rai Singhanat sub-district, LatBuaLuang, Ayutthaya

No.	Description	Cost (Baht)
1.	Grain	500
2.	Plough prices	300
3.	Gasoline (25 Litre)	1,500
4.	Chemical fertilizer (1 sack)	850
5.	Herbicides+ Wages	500
6.	Chemical	1,000
7.	Harvest costs + gasoline	450
*8.	Rent	1,000
9.	Wage of weedy rice control	300
	In total	**6,500**
	Compensation / rai	
	900 kg.X 12 baht	10,800
	10,800 baht – 6,500 baht	**4,300**

Resource: Data from farmers and community leader of Singhanat sub-district (Focus Group stage)

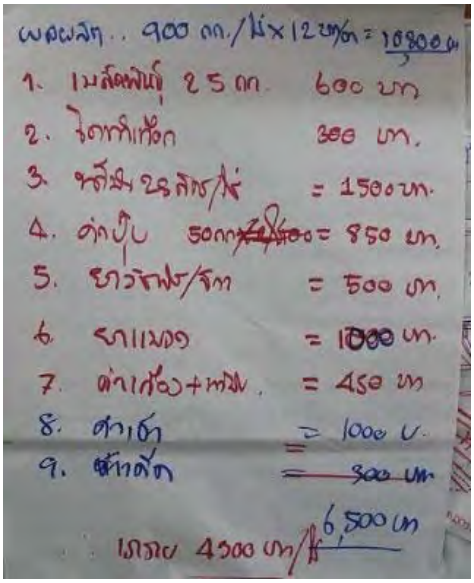


Figure9 the Capital of Growing Rice

According to a discussion from Focus Group stage about the production cost of farming and gardening, it turns out to be really high due to economic situation nowadays. Since today's goods are more expensive, the agricultural factors have also become more expensive, for example, chemical fertilizer, herbicide, insecticide, gasoline and labor wages. It would be more expensive for those farmers who pay for the farm rental because they have to pay land holders around 1,000 baht/rai/year or give them some products as the rental.

From the higher production cost, there should be some plans to reduce the expenses and encourage farmers to use bio-fertilizer and fermented plant juice with their agriculture in order to reduce chemical in soil and protect soil from getting damaged. Farmers should gather and cooperate in farming and purchasing factors of production to reduce expenses.

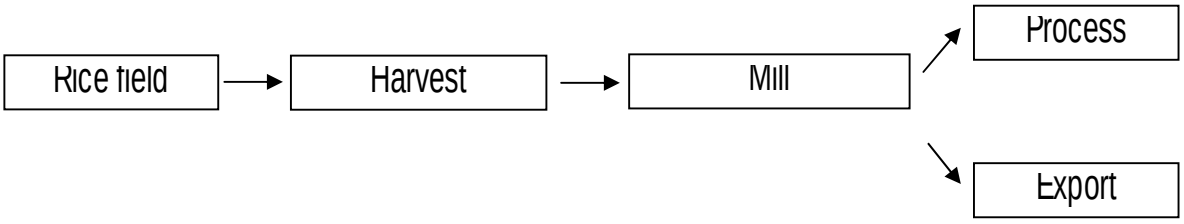


Chart1 Market Forces of Rice inSinghanat sub-district, LatBuaLuang district, Ayutthaya

For market forces in rice farming, farmers will directly sell paddy rice to local mills in LatBuaLuang district, without middlemen.Since rice markets and rice mills are in local areas, farmers can deliver the goods easily. There is a yard opened by local mill in Singhanat sub-district. It is there to buy goods from farmers in the area. Some farmers have to sell goods to the mill that they borrow money or agricultural factors from before they start growing crops; such as chemical fertilizer, other chemicals and seeds.After harvest season, farmers need to sell paddy rice to the mill. Then the mill will deduct

money back from the farmers. This is one of the market forces that merchants or mills make an agreement with farmers, which the mills are from the government's rice pledge project.The problem of this market forces is the low price of rice. When farmers harvest and sell paddy rice to one of the mills in the project, they would get the lower price of rice because they don't know how to handle paddy rice after harvest. So, the humidity still remains in paddy rice, which causes the low rice price.

Growing Crops

Growing crops is a cooperation of farmers who grow for sale with the company, which middlemen will buy goods from local farmers. The cooperation of Village 5 and Village 6 is set up for making money besides farming. They had created a group of organic vegetables gardening. Farmers in the group will make an agreement with the trader company about gardening management and quality control. There have to be no chemical at all in vegetables that send to the company. The company will send some officers to train farmers about how to grow organic vegetables and how to use chemical in organic gardening. They have organic collecting point in an area of Village 5.Board of the group will send the products to several companies; Chatchawan Import Export, PDI, All Way Fresh and Thanasarn, to grade the quality and export them to EU market. If there are bad quality goods or excessive amount from the company, middlemen will buy and sell them to Talaad Thai fresh market and Makro.

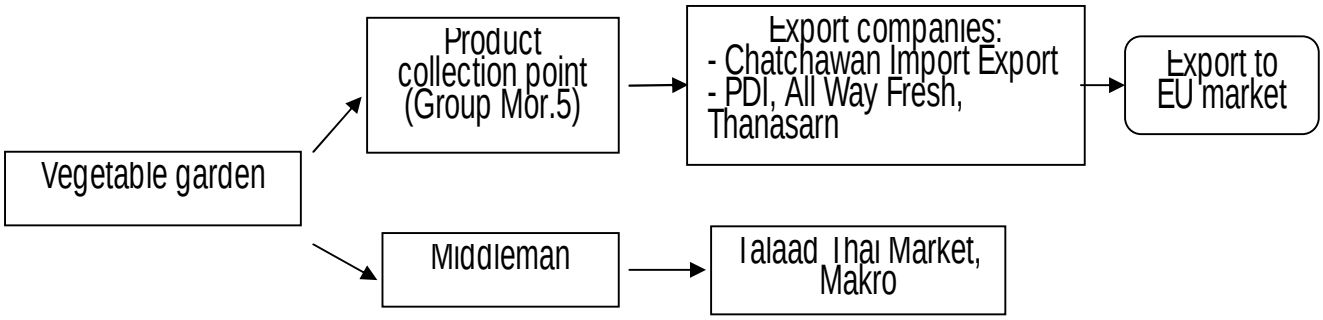


Chart2 Market Forces of Vegetable in Singhanat sub-district, LatBuaLuang district, Ayutthaya

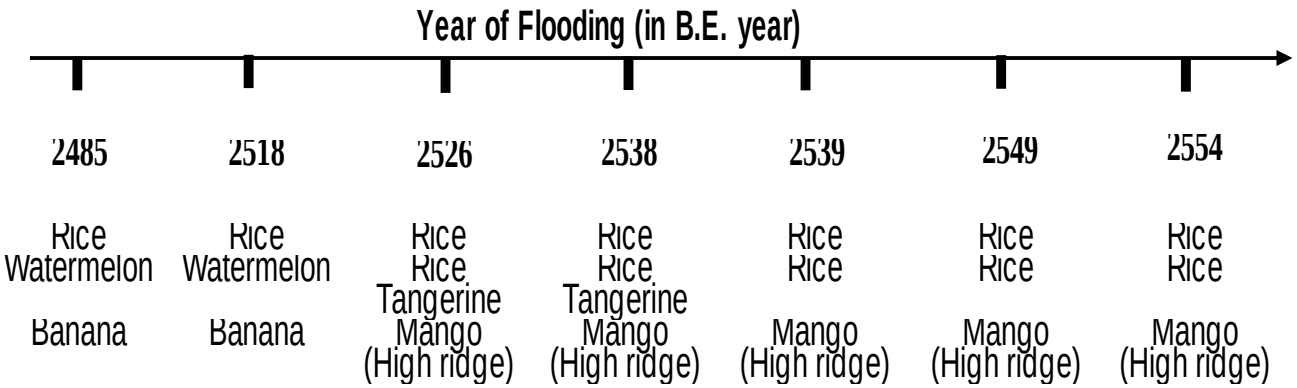
They have market force of growing rice in Singhanat sub-district. They should also encourage local farmers to grow vegetables as another way of making money. To grow vegetables potentially, they need the development of suitable farmlands, sufficient water resources and also supported markets. All of this will help to reduce risk of growing crops after flooding. There should be an organization support the group of farmers by encouraging or holding trainings about organic gardening, chemical usage and quality control, so that there will not be any problem in exporting. Agricultural production cooperative of local farmers will help them to negotiate the price with the company and middlemen.

Table7Vegetable Harvest Calendar Singhanat sub-district, LatBuaLuang district, Ayutthaya

Type of product	Species	Month												Production (per rai)
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Thyme	Thyme	← Grow		Harvest →										400 kg./ rai/week
Basil	Basil							← Grow		Harvest			→	400 kg./ rai/week

In growing vegetables of the organic gardening group, they mainly grow thyme and basil for export. Farmers will grow vegetables as they are needed in the market for each season. After 1.5 – 2 months of growing crops, farmers will start harvesting. The crops are normally 5 -6 month old, then farmers will start growing new crops in the area. The average production is around 400 kilograms/week/rai. Farmers will harvest the goods and bring them to the group to grade and do the quality control before the products are sent to the company for an export. Some farmers grow crops for selling to merchants in Talaad Thai market, but they will have the pricing problem and no supported markets. Recently, there had been some officers in local area to encourage farmers about growing crops in the sub-district. Farmers start to form a group to grow crops and sell goods to the company for exporting to EU market. Community leader is the main person who moves the cooperation forward, and manages the group to grow good quality products that meet the standard of the company, including chemical control to prevent chemical residues before export.

Chart3 the Evolution of Agriculture



An evolution of agriculture during the flooding season, low pricing products, supported markets and flooding areas make farmers grow new crops that are suitable for the lands. The main crop that they grow is definitely rice because it is the industrial drop of the sub-district.Flooding had caused huge damage to fruit trees, especially mango gardens. From flooding in the past years, farmers had prepared by lifting up the ridges to prevent the flood in gardens. However in B.E. 2554, the flooding had

destroyed all mango gardens in the sub-district. According to that, farmers who grow fruit trees have started to grow rice and vegetables instead to reduce the damage of flooding.For rice production, farmers used to grow rice for 3 times a year, but after the flooding, they grow rice only 2 times a year because the 3rd time will risk to be damaged from the flooding and cause high expenses.Some years farmers got only small products because of flooding, diseases and insect pests in rice fields. So, most farmers in the area grow rice only when it is in-season and off-season to avoid all problems that may happen.

Table8the Trends in Farming and Animal Husbandry

Type of Product	Past	Present	Future
1. In-season rice	Phitsanulok41, Kor-khor31, Kor-khor41 Wet rice cultivation High intensity of rainfall	Phitsanulok41, Kor-khor31, Kor-khor41 Wet rice cultivation High intensity of rainfall	Phitsanulok41, Kor-khor31, Kor-khor41 Wet rice cultivation High intensity of rainfall
2. Off-season rice	SuphanBuri31 Stand in the cold, strong plant,high production	SuphanBuri31 Stand in the cold,strong plant,high production	SuphanBuri31 Stand in the cold,strong plant,high production
3. Mango	Mango Marketable and good price	Mango Flood, damaged product	Rice and Vegetables Lower the risk of flooding
4. Thyme	Thyme Marketable and easy-to-grow	Thyme Marketable and good price	Thyme Marketable and good price
5. Basil	Basil Marketable and easy-to-grow	Basil Marketable and good price	Basil Marketable and good price
6. Cow	Cow Raised by the way of Muslim community	Cow Raised by the way of Muslim community	Cow Raised by the way of Muslim community
7. Goat	Goat Raised by the way of Muslim community	Goat Raised by the way of Muslim community	Goat Raised by the way of Muslim community

According to the above table, it shows factors that affect the agriculture in the area. Factors are supported markets, product pricing and risk of flooding in the area. There are animal husbandries in some areas by the way of Muslim community. For agricultural plan, farmers have changed their strategies; agricultural preparation and adjustment of period of time.

Growing rice twice a year, lifting up furrow of fruit and vegetable gardens and building ridges around the agricultural areas, these are ways to prevent the flooding problem and reduce agricultural production damages.

Agricultural Problems

1. High production cost and high wages
2. Product quality doesn’t meet the standard of market’s demand.
3. Disease outbreaks and insect pests
4. Pricing problem due to the low production

5. Economic risk
6. Rental problem of agricultural areas
7. Agricultural capital
8. Natural disaster

Suggestions for Agricultural Development

1. Establishment of seed bank and demonstration plots.
2. Encouraging and training farmers to understand about production plan.
3. Encouraging farmers to reduce production cost by using bio-fertilizer and fermented plant juice.
4. Supporting farmers to improve product quality in order to meet market's demand.
5. Encouraging farmers to have production gather for negotiating about product pricing.
6. Organizing a community stage to discuss about rice management and increasing value of rice.
7. Organizing a stage to brainstorm and share experiences for zoning flooding areas and effects in the residence areas.

Social Culture

This means social, community and culture. Singhanat sub-district is a traditional community on the flat land in the central of Thailand. This is a cultural community that people live with water and flood and near Phraya Bun Luea sub-district and LatBuaLuang sub-district. In the past, LatBuaLuang district used to be LatBuaLuang sub-district which was under the administration of Bang Sai district since B.E. 2457.Later, the government had elevated it to district on 1st November B.E. 2490. The word "LatBuaLuang" came from the condition of the geography; lower slopes, flooded with lots of royal lotus (BuaLuang), so people have called it LatBuaLuang until nowadays. People built the houses near farmland and canals. An important local canal is Phraya Bun Luea canal, Pisontis canal and Sam Wa canal. Cultural way of living used to be the way of living in this agricultural community in the past. The development had changed the way of living by relating to the development of utilities, roads, canals and agricultural system. From traditional farming became economic farming and rice industry like nowadays – only for sell, not for eat.

Singhanat society is a traditional community. It has different believes and religious. 80% of population is Buddhist and the rest 20% is Muslim. Belief, way of living and house construction are all related to traditional ceremony, for example, basket merit – It is the merit for the personal angel of the first child in the family as Thai-Mon belief. They believe that personal angel will protect family members and for own sake. They also believe that if anyone do not obey and follow the tradition, that person will have difficult time or something bad may happen. Someone in community is a psychic who runs the ceremony and communicates with spiritual lives. Mostly, the people will hold the ceremony when the

child is around 5 – 7 year old because kids know how to kneel by this age. The basket will be prepared with all required things; banana, mango, coconut, etc. They also invite 5 monks to give blessings. After the ceremony, only people with their own personal angels can eat the food in the basket, ordinary people cannot.

Feeding a ghost in a pot is a way to worship the ghost of the house. Every house will have ghost in each house as said Thai-Mon belief. Every year people will have a ceremony for the house ghost, so they can make a wish and get blessed. This ceremony has been passed since an ancient time from generation to generation among family members. Basically, people in the community are Mon that migrated from Sam Kok district in PathumThani province.

In the past, people way of living is close to water, so they built houses close to water and farming area. The houses were built same as stilt houses with high space underneath the houses which was used for rest, as a recreation area of the family. They can also eat meals and keep agricultural machineries there. But nowadays, people start to build new style houses with single-storey on the ground floor.

Houses in community were built separately around the canal and farming area. Comparing the structure of houses in the past and nowadays, traditional houses would be less damaged in flooding season than new constructions of single-storey on the ground floor because they were stilt houses with high space underneath the houses. The community had suggested brainstorming and cooperatively drafting the conditions of house construction for new buildings in the area. It should be like stilt house or be designed to reduce the damage that may happen if it is flooding season.

There is a suggestion for Local Administrative Organization to participate in new buildings design so that builders can choose the pattern to build their new houses in the community. Further than that, it could be developed and become a regulation of the sub-district that allows the construction in local area which should be the same or close to the house pattern in order to reduce the effect of flooding as mentioned in that regulation. This is another way to adapt and live in community with the disaster.

Figure 12the Structure of Stilt House

The joint culture is related to water geography. People are using water transportation, and live with water mostly. Giving food offerings to Buddhist monks along the canal is an annual traditional custom, which normally take place in December. They will invite monks in community and neighborhood area to receive food and canned food from the whole sub-district and the sub-district nearby. In the past, people and monks would transport by boat. But due to geological change, standard structure development and the different way of living, water transportation is not the main transportation any more. So nowadays, people are not using boat as transportation like before.

Even the way of living in some communities has been changed; giving food offerings to Buddhist monks can still be seen in every day live. Belief and ceremony in family and community still exist and will carry on like a ceremony for the goddess of grain. That is a ceremony to praise and recall the kindness and beneficence of the goddess of grain. People will do something out of gratitude to return the kindness of land and crops that have been feeding them for such a long time. They also have a Bai Sri SooKwun welcoming ceremony for agricultural product, which farmers will put the harvested paddy rice together in the ceremony. There is a ceremony called giving honey offerings to Buddhist monks. People will give the honey to monks in the middle of October, so that monks can drink it while working. The merit on 100th or 50th is a ceremony for deceased or ancestors.

As there are cultural custom that people strongly abide, it has become a strong point that people carry on doing the same thing from generation to generation. This shows the unique characteristic of the community. There is a suggestion on reviving the traditional way of living like giving food offerings to Buddhist monks by boat. Boat used to be the main transportation in the community. If the community can revive this activity, it will not only be a conservation of traditional custom but also a publication of well behavior to new generations. Other people can learn the traditional custom, and community can develop the activity to cultural tourism.

In Muslim community, they built houses in a group near place of worship. Aummasaya is Muslim community that lives in 2 Villages; Village 1 and Village 2. People in the community grow rice and raising goats and lambs for worship.

For the development of habitation in Muslim community, it is assumed that they migrated from Pattani province since the time that people had started digging Phraya Bun Luea canal by Singhanat community. Phraya Bun Luea moved to dig the canal and settled in the area after King Rama V had allowed commercial company to conduct the digging in B.E. 2430. At that time, the price of Thai rice was quite high because it was internationally well-known of its quality. Because of that, the lands for farming closed to Bangkok were really expensive. The land in LatBuaLuang district and the nearby area are interesting and many people wanted it. So, the commercial company had asked to conduct to digging of PhraPimon canal and Phraya Bun Luea canal. This commercial company is Siam Lans, and Irrigation Company Limited which was established in B.E. 2431. They aim to provide water supply for agricultural purpose. They control and maintain water level in canals and make sure that there would be sufficient water through all the year, especially for rice farming. They also provide water for the consumption of people in the community.

For abidance in the way of living, Muslim women have to cover their head with cloth. There are some religious ceremonies; such as, prayer, Eidul-Fitr which is on the 1st of 10th month in Islamic calendar. This is a lunar calendar consisting of 12 lunar months; each month must not be less than 29 or more than 30 days and in a year of 354 or 355 days. After one month of fasting, Muslims will be celebrating. Zakat is alms, which is one of the Five Pillars of Islam. People in community will give of a fixed portion of one's wealth to charity, generally to the poor and needy. In this area, people mostly give rice. This activity has been done continuously, and it shows that people in the area strong abide to the religion. In Singhanat sub-district, Mu HammaDiya Mosque is located in Village 2 as the center of religious ceremony.

The social relationship is generally a family member, people in neighborhood or people related through social ceremony. Even people are not as closed to rivers and canals as before, they still build houses near family members. Power structure and smooth relationship go together in the community. Local administrative organization has compromising way of administration. The president of sub-district administration organization is a Buddhist while the vice president is Thai-Muslim. In local organization, they have sub-district headman and village headman as general Thai government organization. They have good relationship between local areas, and coordinate work closely and continually. The conflicts of power, structure and cultural life cannot be found.

The relationship of family member and among elders is quite strong, even the present relationship is not as strong as before. Since this is a tradition community that has been together for a long time, people can live peacefully in this multi-cultural community.

Education System

Education system is divided into a group of grade 4 – 9, high school, vocational diploma and bachelor degree. There are 2 schools, which are in responsible of Singhanat sub-district administrative organization.

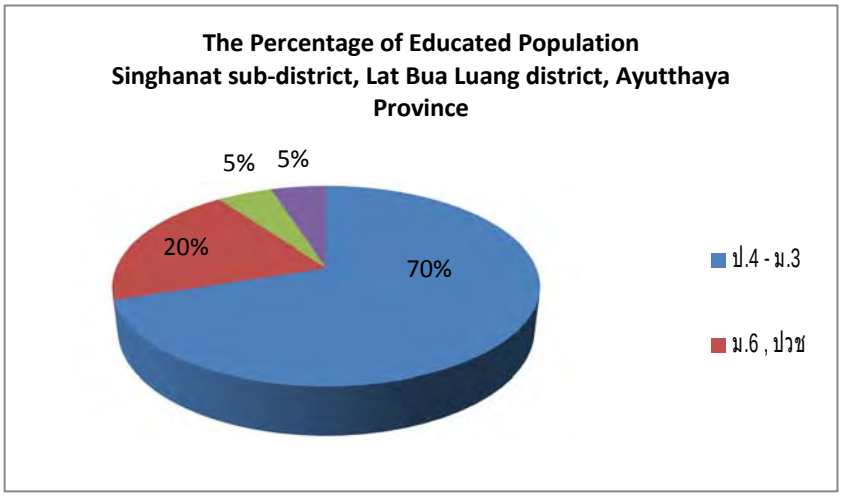


Diagram3 the Percentage of Educated Population

Non-formal education, educational training, seminar, workshop center and center of the study of sufficiency economy and rice have been operating education for farmers continuously. The related organizations, like Sub-district Administrative Organization, Department of Agricultural Extension, Community Development Department, Agricultural Reform Land Office, etc., have many courses; short course, long course, workshop, a course of quality development for organic vegetables, an encouragement project of safe and high quality agricultural product and a training of rice farming development.

Community Organizations

There is a group of organizations that was a consequence of farming by external organization, a group of natural relation and a group of cultural relation; such as, a group of joint plantation, a group of cow husbandry and a group of farmer housewives. There are many knowledgeable people in different studies; Mr. ChoteSaiduang – guru of Thai dessert and ceremony, Mr. ChamoiSaiduang – guru of organic vegetables, Mrs. Ploy Puangsawas – a representative of Thai dessert group, Mr. AisupPrachansri – a representative of Budu sauce group, Mr. BunchongChaya – guru of ceremony and Mr. SutepButrsup– a representative of good rice community enterprise.

Economics

Agriculture is a major occupation, which is related to local family's income. Families in the community have both average income and high income due to irrigation system. Irrigation that came from the change of management system, especially at Phraya Bun Luea canal (Phraya Bun Luea canal

water supply and maintainance project)with the agricultural reform land that is always be supportive, these things make more occupations that help farmers to do farming all year round. New occupations, like organic vegetables gardening or animal husbandry, suitable geography, being convenient in delivery and distribution system help to expand the agriculture and are related to community's economy and income.

The community's development in earning money and building stability among organic farmers includes production quality control that meets domestic and international standard. In selection process, lots of vegetables are excluded which still in good quality. In the past, people used to burn all excluded vegetables, so people suggested the new way to increase value and make money from these product. One group suggested feeding animals with these vegetables while another group suggested cooking for food or selling in local area because though the product quality didn't meet the standard of EU market, it is still better quality than those vegetables in the local market.

Besides, the community has a plan to expand the group of farmers who grow vegetables to increase more goods and make more money to the community. In the development, the bigger scale of trader markets is another important thing which makes farmers feel confident and lowers the opportunity of excessive product that can affect the pricing. The strong point of good vegetable farmers is diligence. If farmers own some land, growing organic vegetables is a good alternative of making money together with growing rice, the main job of the community.

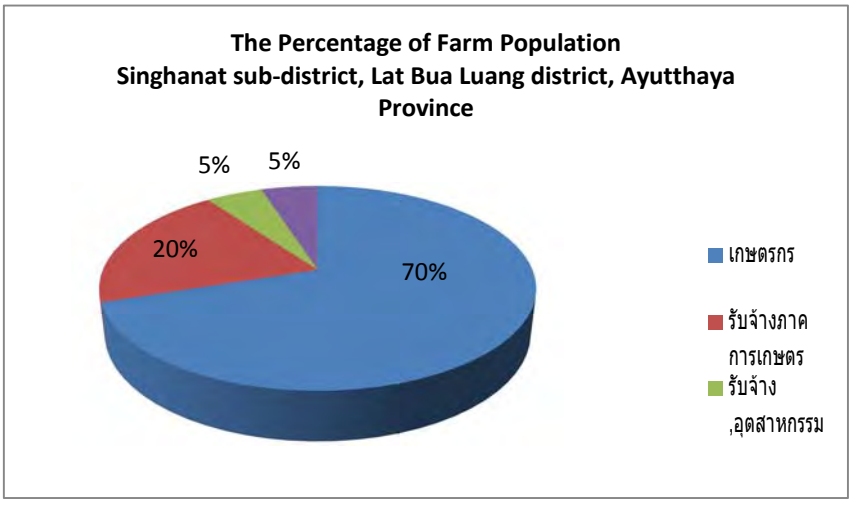


Diagram4 the Percentage of Farm Population

The main income is from agriculture. This is not a single occupation. It is mainly rice farming which goes along with growing mangoes. An average income of people in the community is 63,856 baht/house/year. The total main income of most families in Singhanat sub-district is 6,002,500baht.The group of people who are hired to do agricultural work has average income at 59,400 baht/house/year.

Figure13Combined Farming System of Vegetable Garden and Rice Field

Debt and important financial sources; Bank of Agriculture and Agricultural Cooperatives (BAAC), Agricultural Cooperative,LatBuaLuang Credit Union Cooperative, Siam Commercial Bank (SCB), external mills and loan like community loan. Some people borrow money from village fund group and savings fund group. In case of Village 5 – Loom Tong Lang, there are 52 members of savings fund group with savings of 200,000 baht, and the money will be borrowed among members in the community. Ban Loom Tong Lang has 1,600,000 baht of savings, 200,000 baht of Interest supported fund from the government and 400,000 baht of associated fund. In the present, there are 99 members in total.

It is a revolving loan, which will revolve debt in different period of time. For example, short-term loan is for long-term debt that has different time of payment up to conditions of each loan resource so that borrower can settle debt in time. The important fund and financial sources in the sub-district are Bank of Agriculture and Agricultural Cooperatives (BAAC), village fund, merchants in the mill (drug store or fertilizer shop), Agricultural Cooperative, Siam Commercial Bank (SCB), external loan.

Rice comes from short agriculture. Farmers grow rice 3 times a year, and mostly grow Kor-khor 31, Kor-khor 41, Kor-khor 47, Chainat 1 and Phitsanulok 2.They normally grow rice for selling to all local rice mills, and will not keep for eating in families. The price of rice is around 9,000 – 12,000 baht, depending on quality and humidity of rice. There are 3 large markets in the area of LatBuaLuang district.

Growing vegetables is an occupation that goes together with rice farming. The biggest market is Si Mum Muang Market. A part of product is exported to internationals through export companies; Thai Food Development Limited Partnership, All Way Fresh,Thanasarn, and Chatchawan Import Export. Another part is sent to Makro by local middlemen who collect and deliver the product to Makro. The price of vegetable is at 20 baht/kilogram in average. After the flooding in B.E. 2554, farmers had moved to sell vegetables to PathumThani merchant in local market, and become the family income for around 6,000 baht /month.

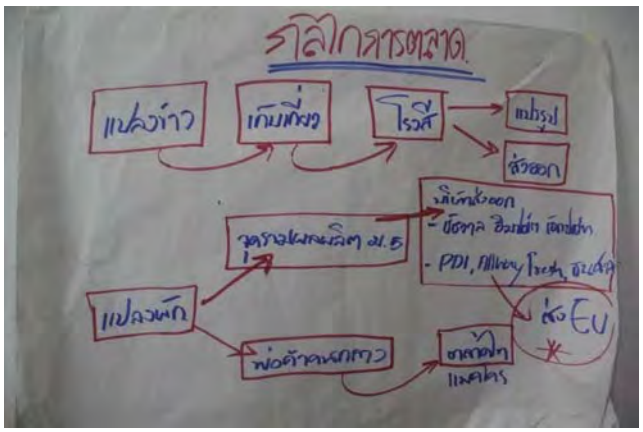


Figure 14 Market Forces (Left)

Figure15 Organic Vegetable Garden (Right)

Expenditure

There are 4 types of expenses which are 1. Investment of production factors like seeds and gasoline, 2.Household consumption, 3.Education, 4. Cultural events like weddings, ordinations and merit or religious ceremony. Religious ceremony normally has expenses around 10,000 – 20,000 baht/ceremony, which is considered as family's debt. Mostly, farmers have around 100,000 – 150,000 baht of debt per house which come from an investment for farming. Besides, some people have more debts from house renovation, buying agricultural machinery, motorcycles or cars.

Table 9 the Correlation of Income, Debt, Turnaround Time and Disaster

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Turnaround Time (Paddy Field)	■	■			■	■	■	■			■	■
Repayment Educational Expenses				■	■							
Income		■						■				
Annual Disaster									■	■	■	

Table10Loans from Sources of Funds in the past year

Sources of Funds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
BAAC Interest 8% / year			Loan ↔ Pay									
Village Fund Interest 5% / Year			Pay ↔	Pay ↔	Loan ↔							
Poverty Project from CDD Interest 5% / year				Pay ↔	Pay ↔	Loan ↔						
ALRO Interest 4% / year						Loan ↔ Pay	Loan ↔ Pay					

Source: an interview

The proposal of creating pilot project for rice system management or product processing was raised to increase the value of products. In the past, after farmers had harvested product, they would sell it right away to commercial mill in local area. Humidity remained in the product caused the low pricing. Community had planned to develop local mills in Village 7, Village 4 and Village 1.The community suggested stage organizing to brainstorm about rice system management, species selection, period of time, turnaround time, seed banks, market forces, processing and increasing product value and an adjustment of production cycle to be compatible with the policy. An establishment of mills and training centers in pilot community of reform land, Village 3, is a guide and as a learning center of the community to increase production ability, reduce risk of flooding and build stability for the community with 12,000 rai of agricultural land.

3. Effects and Losses Due to the Natural Disaster Incident

The climate change is the natural phenomenon that causes the fluctuation in the atmosphere and becomes the natural disasters. The disasters had destroyed food resources, bodies of water, houses and residences, and caused the economic and social damages like every other places on earth. The flood had affected the structural elements in physical, biological, social and economic way. On the top of that, it had mainly affected the victims' way of living.

The landscape of the area is the floodplain, not many slopes. Every year, there would be the flooding in Village 1, Village 2 and Village 7. The community is surrounded by the roads.

Figure16the State of the Flooding

The cause of the flooding in Singhanat sub-district came from the main canal, Phraya Bun Luea canal. It is the connection of Ta Cheen River and Chao Phraya River with 2 water gates called Phraya Bun Luea Watergate and Singhanat Watergate. The flood came from both sides; one side was from the broken Phraya Bun Luea canal which let the water in since October B.E.2554, the other side was the excessive water from Ban Ma canal had flew to Village 5 and Village 6. Since the area is the low flat

landscape, the water came together at Singhanat sub-district until it was flooded. The water remained in the area from October to December. The water came faster and stronger this year, and stayed for 75 days. The water connected Bo Ngoen sub-district, LatLumKaeodistrict, PathumThani province and Khok Chang sub-district, Bang Sai district, Ayutthaya province. They were connected through PhraUdom canal. This caused effects on houses, agricultural system, the way of living and the standard structure of roads and water resources in Singhanat sub-district.

Phraya Bun Luea canal is the connection of Chao Phraya River and Ta Cheen River. The management of water gates has effect on the people in the sub-district. Singhanat Watergate and Phraya Bun Luea Watergate have different functions; such as, drainage of saltwater, lifting water to rice field and pumping out water to PathumThani province to solve the flooding problem.

Figure17Flooding around housing area

Effects and Losses Due to the Natural Disaster

The flood in Singhanat sub-district had started since 13th October B.E. 2554 until December B.E. 2554. 75 days of flooding had destroyed and damaged the area. There used to be lots of flooding happened before, like in B.E. 2485, 2518, 2526, 2538– 2539 and 2549. This showed that the flood has happened continuously, and the community has learned to adapt themselves to survive and lower the effects of the situation. Butfor some communities in the sub-district, flooding is as a part of their ways of living.

Figure18the Flooding Orchard

Rice farming is the main job of the people in Singhanat sub-district. There are both In-season rice field and Double-crop field in the area. The total farming area is 13,355 rai. Rice farming is the main income of the community. An early flooding on 16th October B.E. 2554 had damaged 1,846 rai of rice field. It would cost 4,101,812 baht worth of damage, based on the compensation of the government at 2,222 baht per rai. According to this flooding, it will also affect the production of next year in many ways, including the production cost, debt, strain of rice and change of turnaround time. This effect will include the change of strain of rice that needs to be compatible with the unstable and capricious climate.

Growing fruit trees is the secondary job of the community. People usually grow fruit trees and grow rice at the same time. The trend of expanding area and species of fruit trees, like mango, santol, etc., had faced lots of damage. The standing dead tree of 1-4 year-old fruit trees, which produce the product of 1,179 rai, caused 6,010,542 baht worth of damage, based on the compensation of the government at 5,098 baht per rai. The plants were destroyed for 142.2 rai, 447,930 baht worth of damage based on the compensation of the government at 3,150 baht per rai. Besides, 139 rai of other agricultural products had been damaged from the incident.

Growing vegetable plants and organic vegetables is another thing that people do for living together with rice farming as an idea of growing and selling within the community which will be developed to exportation.

Cow husbandry in the Muslim community had killed 38 cows, 136,800 – 600,400 baht worth of damage based on the compensation of the government at 3,600 – 15,800 baht for each cow. Farmers had tried to move the animals to high places like roads or bridges, even though they slowly became lack of food since the farm was all flooded. They needed to move to another province which had cost them high expenses. 3 pigs were killed. It cost 36,000 – 75,000 baht worth of damage based on the compensation of the government at12,000 – 25,000 baht for each pig. 5,844 of chickens and ducks and 109 of other animals were killed.

For the fishery, 373 ponds had been damaged. 1 prawn pond and 13 other ponds were also destroyed. Besides, lots of agricultural equipment was ruined, for example, the pumping machines, walking tractors, sprayers and cars. This had not included the high production cost. An observation of property damages showed that 333 machineries were destroyed.

The standard structures like canal irrigations were not functional. The water supplies in the community were not practical. 2 schools were under water. Kids' toys were damaged. Some school supplies were not destroyed because they were kept on the 2nd floor of school. Some schools that were not much destroyed had become the community's evacuation centers. Besides, some temples and mosques were under water. Lots of belongings were damaged because people could not move the belongings beforehand. For the transportation, the road connections in the community were closed. People used the water transportation instead, like boats. 34 routes and 4 bridges had been found damaged after the flooding.

For the residences, new generation people in Singhanat sub-district usually build single-storey houses on the ground floor, which would be highly damaged; such as, the kitchen supplies, refrigerator, sofa, air-conditioner, etc. On the other hand, the traditional houses were not much damaged. According to the damage observation, it showed that 139 houses were fully destroyed and 583 houses were a little bit damaged. It was 722 houses in total that had been damaged by the flooding. 3,610,000 baht worth of damage had been calculated based on the compensation of the government at5,000 baht for each house. In addition, 138 cars, 397 motorcycles and 430 electric appliances were found damaged as well.

In economic system, debts and income are related to the harvest of agricultural products. However, farmers could make much income due to the flooding, and their incomes are not compatible with their expenses for school tuition, debts and production costs for the next season. The way to solve the problem is filling the lands and building high ridges, which will be effective in the long-term future.

Figure19Mango, Damaged Fruit Due to Flooding

Natural Disaster Management

1. In the family, do store the agricultural equipment in high place. Beware of the electricity in the residence. Prepare a boat and food for the long-term. Adapt yourself to be able to catch fish.
2. In the community, do explore the waterways. Dam a stream. Block the water pipe. Communicate, keep updated and learn about the danger sign. Observe the situation periodically.
3. In the organization, do offer an urgent help. Radio the danger sign. Set up the evacuation centers. Provide the relief bags and any helpful devices. Volunteering.

Lessons from Flooding

- Being able to adapt oneself and survive in the flooding situation; such as, catching fish, housing adjustment, collecting seeds.
- Family members should be aware of the preparation for disasters.
- The community should always be awakened. The related organizations should coordinate with the external groups.
- The reduction of farming capital due to production factors and natural fertilizers from soil and sedimentation. The comeback of variety species, especially some endangered species of fish.
- Being awakened to improve the standard structure of roads, canals and housing constructions.
- Leaching toxic substances or chemical from the rice field.
- Helping each other and maintain the community's culture among the family members and the people in the area to become more united.

4. Suggestions and Criteria

The way to protect yourself from natural disaster, that can lower the damaging possibilities on the economy, physics, agricultural system, biology, society and culture, has to come from the similar idea in community adaptation based on the relation of human, field and water.

- The concrete way of water management, data system, water protection plan, rescuing preparation for disables and patients. External and internal communications. Also, the development of disaster help center, doctoral equipment, food, boats and nursing home. The management of the whole water system should consider the cultural landscape and landscape ecology of community.
- The adaptation of agricultural system. Avoiding the disaster season by the adjustment of harvest period. Creating seed banks to store native varieties of seeds and breed them in the area. Reduction of agricultural production costs. Encouraging about the price of agricultural products in farmer gathering.
- Society. Culture. Water supply development of the village. An improvement of water system and its quality. Expand and upgrade the transportation routes. Elevating the residences, especially the houses that are possibly devastated according to the regulations of the sub-district.

- Arranging a stage for brainstorming and sharing experiences to zone the possible flooding area and discuss about effects on the residences in the community. Giving proposalsto create pilot project for rice management or product processing in order to increase the product value. In the past, farmers used to sell the product to the commercial mill right after harvested since there still be high humidity remained in the product. It caused the price to be lower than expected. The community has some directions to develop the mill in Village 7, Village 4 and Village 1. They had suggested arranging a stage to brainstorm and cooperate on the rice system management, including the selection of suitable species, period of time, turnaround time, seed banks, market forces, product processing and adding the product value. Turnaround time adjustment should be compatible with the regulation. There is a plan to build mill and the management learning centerfor pilot community in the reform area, Moo 3. This is a guideline for the community to increase their production ability, reduce the disaster possibility and create the stability in the community with 12,000 rai of rice field.
- Using the creation of strong community from within to solve common problems in the society. Creating self-reliant development in the family. Creating activities among the group network to learn how to be helpful and rely on themselves. Cooperating with external networks to create community power in being helpful and supportive in long-term.

2. SWOT Analysis

Strength		Weakness	
Harmony and unity of people in community	**The strong role of community leader**	Low amount of taxation due to the low income in agricultural area	**Lack of resources in community for flood prevention**
Strong leader in community with cooperative capacity		No heavy machine in the area	
The leader played an important role in strong coordination system during the flood		No soil source in the area	
Civil security volunteers in the area are skillful and resourceful	**Community has its potentials to adapt during flood crisis**	Ineffectiveness of local communication chanel: lack of local radio in every village	**Ineffectiveness of water information management**
Local knowledge on building earthen dike		No information system on water and flood situation	
People have knowledge and wisdom to survive during the flood		Lack of coordination and collaboration with neighboring sub-districts	
There is a group of farmers who grow GAP vegetable in order to export to EU market. This group provides seed, knowledge, technology and marketting.	**Strong network of GAP vegetable farmers**	It is annually damaged by flood due to the georgraphics of the area as lowland.	**Geographical Weakness**
There is a center which acummulates vegetable products before it is exported to EU market.		No motor-boat during the flood	**No management system in logistics and transportation**
The vegetable farmers have knowldge on standard of agricultural products for EU market		No mechanism or measurement to control transportation cost during the flood	
The village fund	**The Village Fund**	No logistic system during the flood	
Local wisdom: Bhudda Statue craft, handicraft, Thai dessert, and herbal products	**Quality of human Resource in the community**	No patrolman during the flood	**No management system for people'sliving during the flood**
The capacity of local people to maintenance and repair their machine		No security system during the flood	
There are technicians who can fix and repair household properties		No place to dry their products (rice, grass)	
Local villagers unite to promote the products from their community		No public toilet	
There are experts and specialists in soil and agriculture		No public service for food and drinking water during the flood	
The farmers in fruit tree sector have enough skills to meet standard of exported products		No water work and electrical system during the flood	
There is Khaopandee (literally means good species of rice) group who provides knowledge, rice seed, fertilizer, and capitol.	**There are groups of the farmers to promote agricultural activities**	lack of knowledge of food-processing during the flood	**No other source for additional income during the flood**
There is a farmer council for community resources		No raw material for food-processing from fish	
There is a soil tractor for using in community		No additional or subsidiary income during the flood	
The livlihood of four-foot animals is a low cost production as the farmers raise them with natural resource in local area	**Proper resources in the community for livelihood**	No grass for animal feed during the flood	**Lack of preparation materials and seeds for agricultural activities after the flood**
Farmers have additional income from the livelihood	**There are many ways to earn additional income in normal situation**	No vegetable-specie fund	
There is a farmer group who raises chikens for eggs and traditional chikens		No raw material for animal feed during the flood	
There is a fish-processing group		No community-plantation schedule plan	
There is an internal market chanel in the area			
There is a standard stock and silo system for grass.	**Potentials of Grass sector**		
Market for grass includes internal and			

external market.			
Opportunity		**Threat**	
The coming project for permanent dike along Phrayabanleu canal by RID and Rural Road Department	**The opportunity for restoration and improvement in the infrastructures and public facilities in the community**	The limitation of law and regulation of government agencies	**Insufficient supports from the central government for flood prevention**
The 60 million baht budget for watergate and canal maintenance		Insufficient budget for earthen dikes	
Ministry of Public Healh plans to promote the community health center to community hospital to increase its quality, resources and personel.		Unreliability aiding source or compensation from government agencies	
There were internal and external cooperation to restore and improve infrastructures and public facilities		No mutual benefit with neighboring sub-districts	**The limitation in communication with external organizations**
Public Electric System Projects		No information survey and database of fish specie in the area	
There were many aids from external organizations for survival kits during the flood	**The helps from external organizations for people's living during and afte ra natural disaster**	The factors of production in agriculture are uncontrollable	**An increase in the factors of production effected by the flood or natural disasters**
Phrdabos Project helps community in repairing electronic devices.		During the flood, There was a risk in a shortage of animal food	
Community Enterprise Fund		The high cost of forklift truck service during the flood	
Drug user rehabilitation project by government		Water hyacinth obstructing canals and water cahanels in the area	**The natural invasiveness effecting the water ways**
Price-scheme project for rice by government	**Helps for agricultural sector in community by government agencies**	Diseases in domesticated animals	**Diseases in domesticated animals**
The farmers got a compensation from government		The fluctuation of market system and price mechanism during the flood	**A decrease in products' price due to the flood or natural disasters**
ARLO support the New-Theory of Agriculture in community		No preise and accurate information about flood from government agencies	**No preise and accurate information about flood from government agencies**
Rice Department supports seed to local farmers			
There is an experimental rice field (Banna Rice) by Rice Research Center to develop flood-resistent rice species			
Land Development Department provides agricultural chemicals			
The fishery sector got a compensation from Department of Fishery	**Helps for livelihood sector in community by government agencies**		
Government officers have promoted agriculture and livelihood in community			
Goat Milk Promotion Project by Government			
Save Cows Buffaloes' Lives Project provides cows and buffaloes to community			
Strong market for traditional chickens	**The opportunities of potential marketing chanels for produts from the community**		
EU market for GAP-standard vegetable			
There is a pasteurized milk factory near the community			
An increase in demand for animal food			
An increase in demand for fish products			
An increase in demand for pets			
An increase in marketing chanel for goat milk			
An increase in demand for meat			
The market for fruit in Malaysia is dependable			

Strategic Option Table

Opportunity	Strategic Option	Threat
1 The opportunity for restoration and improvement in the infrastructures and public facilities in the community	To protect basic infrastructures so as to reduce the damage and loss from flood (O1, T1)	1 The natural invasiveness effecting the water ways
2 The helps from external organizations for people's living during and after a natural disaster	To promote and strengthen the community's self-reliance during a natural disaster (O2, T5, T6)	2 Diseases in domesticated animals
3 Helps for agricultural sector in community by government agencies	To reduce the negative impacts on agricultural sector from flood (T2,	3 An increase in the factors of production effected by the flood or
4 Helps for livelihood sector in community by government agencies	To promote farmers' capacity for the resilience of agricultural sector, and to develop agricultural technology in community for less depending on external factors (O3, O4)	4 A decrease in products' price due to the flood or natural disasters
5 The opportunities of potential marketing chanels for produts from	To develop farmers' potential in the post-harvest activities (O5)	5 The limitation in communication with external organizations
	To build the network for integration of water management in the Klongbanleu Canal area (T5, T6, T7)	6 Insufficient supports from the central government for flood prevention
		7 No precise and accurate information about flood from government

3. Strategic Plan

<Selected Pilot Activities>

Strategy	Justification (Why Selected?)	Activity	Organization/ person in charge	Schedule time	Necessary inputs		Issues to be further discussed/confirmed by the	Issues to be confirmed with Japanese experts	Remarks
					JICA	Thai			
To build the network for integration of water management in the Klongbanleu Canal area		- Joint Water Management Committee in communities along Phrayabanleu Canal Project - Flood Prevention Program in Singhanat Sub-district	1.1 Community Leaders 1.2 Department of Provincial Administration 1.3 Department of Natural Resource 1.4 Rural Road Deprtment 1.5 Related Sub-district Administration Organization 1.6 Water Management Network in Ayuddhaya and Neighboring areas	2555/9/19	Yes	From the government organzations in charge and the contribution from the community	1.1 Project Confirmation 1.2 Personnel 1.3 Time Shcedule 1.4 Fund Raising	1.1 The details of the Project 1.2 Budget Approval 1.3 Coordination	There is a question about the management/ meeting cost, such as place, per dium, snack.
To promote and strengthen the community's self-reliance during a natural disaster		- Community Prevention and Relief Plan for Natural Disasters - Floating Vegetable Plantation Project for community's consumption during floods - Trandportation Provision Plan during floods - Floating Toilets Projects for Community's Sanitary during floods - Aiding Program for the Disvantaged (old persons, disabled persons, and patients) during floods							
To protect basic infrastructures so as to reduce the damage and loss from flood		- Water Work System Improvement - Electrical System for Community's Safety - Canal Maintenance and Water Weed Elimenation Activities - โครงการเทคอนกรีตในคลอง - Watergate Constrcution in Singhanat							
To reduce the negative impacts on agricultural sector from flood, to promote farmers' capacity for the resilience of agricultural sector, and to develop agricultural technology in community for less depending on external factors		- Khaopandee Group Establishment Project (Seed Bank) and Planning for systematic rice-growing in community - Vegetable Seed Bank Project in Singhanat Sub-district - Promotion on short-life vegetable plantation project - Enhance Community's Capacity of Fishery Production Project - Community's Fish-processing Enterprise Project - The Promotion on Poultry in Community for Consumption and Distribution - The Promotion on Milk/Meat Goat - The Promotion on Livestock Cattle - The Promotion on Frog Growing in Tyre-Condominium							
To develop farmers' potential in the post-harvest activities		- Freezer/Silo Provision Project for Vegetable Farmers in Community - Rice Silo and Sun-dry Field for frarmers in Community Project - The Promotion on Processing Goat-milk Product Project							

4. Pilot Project Sheets

Tambon Singhanat, Lat Bua Luang District, Ayutthaya Province

Program	Project	T.Sihanat (SHN), A.Lat Bua Luang	Project Code Number
Community-based Disaster Risk Management Against Big Flood (CDRM)	Community Flood Disaster Management Plan (CDRMP)	(1) Community-based Disaster Risk management	SHN-CDRM-CDRMP-1
	Drinking Water Supply during Flood Period (DWS)	(1) Drinking Water Supply System	SHN-CDRM-DWS-1
	Evacuation/ Rescue Center (EVC)	(1) Rescue Coordination Center	SHN-CDRM-EVC-1
Flood Damage Reduction in Agriculture and Livestock Sector (AGRI)	Good Paddy Seed Production/ Seed Bank (SEED)	(2) Production and Community Seed Bank	SHN-AGRI-SEED
	Crop Diversification and Food Security (CRDV)	(1) Introduction of Bio-control, Bio-fertilizer (2) Establishment of Learning Center	SHN-AGRI-CRDV-1 SHN-AGRI-CRDV-2
	Logistics and Market for Agro-produce (MKT)	(3) Rehabilitation of products collection points	SHN-AGRI-MKT-1
	Small-scale Livestock and Pasture Development (LVS)	(1) Feed Production and Storage (2) Training for Livestock Production (3) Installation of a Bio-gas facility (4) Goat Raising	SHN-AGRI-LVS-1 SHN-AGRI-LVS-2 SHN-AGRI-LVS-3 SHN-AGRI-LVS-4
Networking, Supporting and Institution for Community Strengthening (NET)	Networking with Neighboring TAOs (NET)	(1) Networking among Tambons along Praya Banlue Canal (included in EVC)	SHN-NET-NET-1

PILOT PROJECT SHEET

Project Code	Sector	Community-based Disaster Risk Management Against Big Flood
CDRM-CDRMP-1	Program	Community Flood Disaster Risk Management Plan (CDRMP)
Title	Community Flood Disaster Risk Management Plan	
Purpose	To improve/ develop community disaster risk management plan with the participation of the community people	
Location	T. Singhanat, A. Lat Bua Luang, Ayutthaya Province	
Beneficiaries	Community people	
Implementing Agency	Committee for the Community-based Flood Disaster Risk Management, which is to be set-up during the pilot project, with the support of TAO and Provincial Department of Disaster Prevention and Mitigation (DDPM).	

Background/Concept

It was understood through the PRA survey conducted at the early stage of the study that impacts/damages in the community by the 2011 flood disaster was severed due to the lack of appropriate disaster risk management plan/method, such as communication line, evaluation plan for human as well livestock, supply system of necessities. Accordingly, development and implementation of the Flood Disaster Risk Management Plan was identified and selected as a pilot project by the community people. The JICA study supports the development of the plan as well as the implementation of some of activities to be conducted based on the plan during the project period.

The pilot project will be implemented with the support from JICA/DDPM 'Project on Capacity Development in Disaster Management in Thailand (Phase II)' and Provincial DDPM. DDPM's guideline for Community-Based Disaster Risk Management will be utilized for making the Flood Disaster Risk Management Plan. However, the plan to be developed by the community will focus on the flood disaster and impacts on the community will be addressed more comprehensively.

Expected Outcome

- Development of Community Flood Disaster Risk Management Plan, including hazard map, action plan, and committee members to implement the plan.
- Implementation of activities based on the plan.
- Enhancement of the awareness and preparedness of the community against the future flood disaster risk.

Component (Input/ Activities)

- Analysis of problems and impacts caused by the flood, including massive flood in 2011 (as a part of PRA)
- Study tour to the advanced site implementing community-based flood disaster risk management activities
- Workshop to develop Community Flood Disaster Risk Management Plan, including hazard map, action plan, and committee members to implement the plan
- Implementation of the planned activities by the community, with the technical and financial support from JICA study team for some of activities.

Related Program, if any	Evacuation/Rescue Center (EVC)	SHN-CDRM-EVC-1

Cost (w/ Source)
THB 150,000 (JICA Study Team)

Implementing Schedule

Analysis of problems and impacts caused by the flood, including massive flood in 2011 (as a part of PRA)	May 2012
Study tour to the advanced site implementing community-based disaster risk management activities	Jan 2013
Workshop to develop Community Flood Disaster Risk Management Plan, including hazard map, action plan, and committee members to implement the plan	Feb 2013
Implementation of the planned activities by the community, with the technical and financial support from JICA study team for some of activities.	Feb-Mar 2013

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Dec. 2012	● Study tour to the advanced site was designed with the support of JICA/DDPM 'Project on Capacity Development in Disaster Management in Thailand (Phase II)' and through the discussion with the community leaders. Li District in Lamphun Province was selected as a visiting site by the recommendation and coordination of JICA/DDPM project. ● Discussion on the selection of participants was started in the community. ● The JICA study team contacted Ayutthaya Provincial DDPM for possible support/collaboration.
Jan. 2013	● Pre-study tour session was conducted with the expected participants of the study tour on 16 January. Outline of the community-based flood disaster risk management plan was introduced as well as the detail of the study tour. Some learning materials, such as 'Guideline for Community-based Disaster Risk Management', which was provided by the JICA/DDPM project, were distributed to the participants. Staff of Ayutthaya Provincial DDPM also joined the session. ● Study tour to Li District at Lamphun Province was conducted during 23-26 January as planned with the representatives of 3 tambons, namely T. Khlong Ha, T. Gopchao, and T. Singhanat. 9 participants participated from T. Singhanat.
Feb. 2013	● Workshop to develop the Community Flood Disaster Risk Management Plan was held on 7-8 February. The plan, including issues/challenges to be tackled and countermeasures/actions as well as function and members of committees to implement the plan, was developed with the support DDPM Ayutthaya and JICA study team (see the detail in the 'Report on the Development of Flood Disaster Risk management Plan and Practice of Evacuation Drill at T. Singhanat') ● Workshop for planning evacuation drill was hold on 22 February with the participation of the school, community, DDPM Ayutthaya, and JICA study team, and other concerned agencies. Detail of the drill, including date, venue, management, and actions to be taken in the drill was set.
Mar. 2013	● Evacuation drill was conducted on 11 March at the compound of the school in the community based on the plan. There were about 200 participants from the community, schools in the community, TAO, district hospital, health station, police, DDPM Ayutthaya, JICA study team (see the detail in the 'Report on the Development of Flood Disaster Risk management Plan and Practice of Evacuation Drill at T. Singhanat'). ● Result of the pilot project, from the development of Flood Disaster Risk Management Plan to the evacuation drill was presented by the community during the wrap-up seminar at T. Singhanat on 20 March.

*Describe main findings about the project, including progress, problem, issues raised.

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures	● Development of Flood Risk Management Plan is considered effective for the community to prevent and mitigate negative impacts on the flood. Ideas and experience gained the 2011 flood was reflected in the plan. Although actual impact of the pilot project is unknown without experience of the flood, this is considered as a first step to move up the adapted knowledge and ideas for the disaster risk management. It is expected that development of the Flood Risk Management Plan as well as the experience of the evacuation drill could be utilized when the community is affected by possible flood and other disasters in the future. ● Degree of knowledge and awareness of the community people on the flood disaster risk management is enhanced through the activities. ● Through the planning process, including the development of hazard/evacuation map as well as identification of responsible persons and necessary actions to be taken before and during the inundation, the community could have pictures on how to prepare for other flood disasters. ● With its geographic characteristics, the flood disaster risk of the area is not by the flash flood but by the gradual and relatively long-term inundation, which provides the community relatively long time to prepare for inundation and requires community's long-time response during the inundation. It is expected that the Flood Disaster Risk Management Plan is used as a kind of a check-list for the school and community to prepare themselves before and during the possible future inundation.
Timing of Implementation	● Developed Flood Disaster Risk Management Plan covers each stage of the flooding. It is good if the plan is developed/ reviewed by the community before the flood season to prepare for the possible inundation.
Acceptance of technique by community	● Flood Disaster Risk Management Plan was developed and evacuation drill was practiced with ideas gained through the study tour to the advanced site (Lamphun Province). The approach is considered effective to enhance the awareness and to strengthen the initiative of the community on the flood disaster risk management. ● Concepts and methods for community-based disaster risk management, which was introduced by DDPM, was also appropriate and a good leaning for the target people.
Replication and extension	● Development of Flood Disaster Risk Management Plan and practice of evacuation drill can be introduced at other tambons, particularly at neighboring tambons of T. Shinghanat where risk for inundation is high. It does not cost much, but need strong commitment by the stakeholders, i.e., community people, TAO, and school. However, it is it is not easy to encourage the community to work on these issues in non-flood-prone areas. ● DDPM is working in the issue and its support to the community is essential for the implementation. ● Development/implementation of some activities for Flood Disaster Risk Management, such as evacuation drill, may be easier to replicate/extend as an education tool in the school.
Sustainability	● The developed Flood Disaster Risk Management plan can be maintained without costs to be utilized at the time of disaster, though some planned activities require supports from external organizations. ● The plan, including the function and members of committee, should be further examined for the finalization. The plan should be regularly reviewed/ revised for effective use. ● Strong interest and commitment of the community leaders, particularly of committee members nominated during the pilot project, is an essential factor for the sustainability of activities.

PHOTOS

Learning steps to make disaster management plan during the study tour

Interviewing community people on disaster (flood) impacts and countermeasures during the study tour

Learning water management from DDPM staff during the study tour

Workshop for flood disaster risk management plan

Workshop for flood disaster risk management plan

Evacuation drill

Registration at the evacuation drill

Medical service at the evacuation drill

PILOT PROJECT SHEET

Project Code	Sector	Community-based Disaster Risk Management against Big Flood
CDRM-DWS-01	Program	Drinking Water Supply during Flood Period
Title	Drinking Water Supply System	
Purpose	*To secure and keep safety drinking water during flood period*	
Location	T. Shinhanat (SHN), A.Lat Bua Luang, Pra Nakorn Si Ayutthaya Province (AT)	
Beneficiaries	3,252 people, 974 Household in 7 villages	
Implementing Agency	T. Shinhanat and Treat Chemical Co.,Ltd.	

Background/Concept

Shinghanat faces periodical inundation in lowland and causes damage of paddy harvesting but water level does not reach to road usually. In 2011, flood water reached to Ayutthaya province at the beginning of October and TAO started to prepare pile up sandbags on bank of Phraya Banglue Canal. But finally flood water flowed into area from several directions and agricultural land, livestock, houses and water supply system were damaged seriously. During flood period, the villagers evacuated to school and mosque. They relied on drinking water from outside the area and surface water and ground water is not clean enough to drink.

Under these situation, People in the Tambon was given a high priority to introduce a water purified system in cooperation with JICA Study Team when the Participatory Disaster Resilient Planning Workshop held in September 2012. Installation of complete set of water purifier at Tambon office will be able to supply clean water to villagers during flood and normal time.

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Expected Outcome

- To secure safety drinking water during flood period.
- To keep safety drinking water always for flood period.
- To produce cheaper drinking water for community on normal period
- To create income for Operation & Maintenance (O&M) cost by installing the vending machine
- Through O&M with vending system, solidarity in communal area will be enhanced

Component (Input/ Activities)

The Drinking Water Purifying System comprises of a water purifying system house dimension 5 x 5 m. and its equipment as follows,

1. Raw Water Tank
2. Raw Water Pump
3. Color and Odor Filter Column
4. Hardness Filter Column
5. Reverses Osmosis System Equipment
6. Purified Water Tank
7. Ultra Violet Light Set
8. Purified Water Outlet for bottles and tank
9. Drinking Water Vender Machine

Related Program, if any		**Code**

Cost (w/ Source)

337,000Bt supported by JICA Study Team

Implementing Schedule

Component	Dec	Jan	Feb	Mar
Contract between JICA ST & Supplier	▲			
Explanation to the TAO,etc. (components, establish. of water supply management committee, WSMC)		▬		
Implementation		▬	▬	▬
Final Inspection				▲
Support to strengthening the WSMC by JICA ST			▬ ▬	▪
Training to the WSMT				▲

Note: ST, Study Team

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Dec. 2012	Meeting with Suppliers to request the quotations on 7th December. Receiving the quotations and selecting a supplier from 20th to 26th December. After negotiation with a successful supplier, a contract between Treat Chemical Co. Ltd and Study Team was concluded on 26th December 2011.
Jan. 2013	Meeting for explanation of the project in the presence of TAO and village representatives. (components, request the establishment of water supply management committee, WSMC) on 11th January
Feb. 2013 **Final Inspection**	On 15th February, In the presence of TAO members, Purified Water System Management Committee member, Supplier and JICA Study Team, Final Inspection was carried out. After checking the inspection the JICA Study Team pointed out that the drainage pipe to outside of the purified water system house should be expanded. 2sets of Operation manuals were submitted to the TAO. The supplier explained how to operate and maintain the system to the Tambon side and the system was well operational. Water quality result for hardness and turbidness was cleared the standard value. The TAO was decided the main members of Water Purified System Committee(WPSC) namely Chairman, Vice Chairman, Secretary, Finance, Operation & Management, Supporter. The additional members of WPSC and objectives and roles of the WPSC will be decided on 18th February 2013 in the presence of related stkeholders.
Mar. 2013	

*Describe main findings about the project, including progress, problem, issues raised.

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	During normal and big flood, drinking water is able to provide to the people in and around the TAO with free of charge. Due to the construction of the system, it is possible to store drinking water tanks in the storage rooms, etc. and to eradicate worries about shortage of drinking water during flood period Through operation and maintenance of the system including vending system, solidarity in communal is enhanced.
Timing of Implementation (Pre-, During , Post-Flood)	During dry season, the purified water system should be implemented.
Acceptance of technique by community (cost, benefit, easiness, relevance to current practice)	Operation of the system is very easy for TAO staff but, maintenance should be asked for the supplier at least one time per year. Ordinary maintenance fee per year is estimated at 7,000 to 8,000Bt. Therefor water management committee should secure the maintenance fee from benefit of vending machine
Replication and extension (role of stakeholder, cost share, etc.)	A water purified system is very compact and simple. The implementation of the cost is not exceed 250,000Bt excluding the system house. Therefor It will be possible to construct the system for other Tambon with his development budget.
Sustainability (incl. O&M, benefit during normal time)	Ability of purified drinking water production is around 6,000litter per day. So that the operation and maintenance cost could be secure from bending machine but an appropriate water fee such as 0.25 to 0.4 Bt/litter should be set prices of. To get income/benefit more, from plastic pet bottle selling business in effectively so that the FDA (Food and Drug Association) certification will be applied. Ceremonial functions (marriage, funeral, etc.) occur so often in community level and demand of purified water is very high. Therefor TAO and Water Management Committee should make a good marketing plan to promote the purified water system. It is a good advertisement practice that TAO issues the monthly newsletter to introduce the water purified system to the people and during 2months from commence of the operation of the system, drinking water is free of charge to the people.

PHOTOS

Meeting for explanation of the project in the presence of TAO and village representatives. (components, request the establishment of water supply management committee, WSMC) on 11th January

On 15th February, In the presence of TAO members, Purified Water System Management Committee member, Supplier and JICA Study Team, Final Inspection was carried out.

PILOT PROJECT SHEET

Project Code	Sector	Community Based Disaster Risk Management against Big Flood (CDRM)
CDRM-EVC-1	Program	Evacuation Center/ Rescue Center
Title	Rescue Coordination Center	
Purpose	- To improve coordination center - To develop Tambon network for information sharing - To be evacuation center for the neighboring Tambons who suffered from flood	
Location	Tambon Singhanat, Amphoe Lad Bualuang in Ayutthaya Province.	
Beneficiaries	The entire population in 4 Tambons	
Implementing Agency	T.Singhanat、RID (Chaojet and Prayabanlue Operation and Maintenance Office)	

Background/Concept

After the development of protected wall along Prayabanlue canal, Tambon Singhanat will be protected by this wall. Other Tambons above the wall, however, face more risk from flood. Having Tambon Singhanat as evacuation center will be totally helpful. Moreover, regular flood usually attack Singhanat from southern direction. Therefore, it is important to receive early warning from other Tambons about the rise of flood water. Two RID offices will supervise the activity. Six Tambons will involve in this activity namely;

1. Sinhanat TAO, Ladbualuang district, Ayutthaya province
2. Klongprayabanlue TAO, Ladbualuang district, Ayutthaya province
3. Prayabanlue TAO, Ladbualuang district, Ayutthaya province
4. Bor Ngun TAO, Ladlumkaew district, Pathumthani province
5. Ban Ma TAO, Bangsai district, Ayutthaya province
6. Klongkwai TAO, Samkok TAO, Pathumthani province

Expected Outcome

- Coordination office is established
- Information sharing system is established.
- Tambon network is establish

Component (Input/ Activities)

(1) Purchase of container and improve of basement
(2) Organize inter Tambon meeting to set up network
(3) Regular contact will be made by Singhanat TAO by email, telephone and newsletter

Related Program, if any	**Networking with Neighboring Tambon**	**Code NET-NET-1**

Cost (w/ Source)

- Container	140,000	
- Concrete Basement	54,000	
Total	194,000	(THB)

Implementing Schedule

1. Purchase of container	April 2013 to June 2013
2. Construction of concrete basement	May 2013
3. Inter Tambon meeting	June 5, 2013

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
June 2013	- Installation of container
June 5, 2013	- Inter Tambon meeting
May 2013	- Construction of concrete basement

*Describe main findings about the project, including progress, problem, issues raised.

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	● Inter Tambon network could share information on flood for early warning for normal and big flood. ● SHN could be evacuation center for neighboring Tambons in case of big flood. ● During normal period, the center could be used as office for Tambon patrol volunteers for security purpose.
Timing of Implementation (Pre-, During , Post-Flood)	● Everyday during normal time ● Before rainy season for flood counter measure
Acceptance of technique by community (cost, benefit, easiness, relevance to current practice)	● Highly acceptance by Tambon ● Useful for both normal time for during flood ● Low cost for establishment
Replication and extension (role of stakeholder, cost share, etc.)	● Inter Tambon network could be replicated in other Tambon to share information and mitigate risk during flood.
Sustainability (incl. O&M, benefit during normal time)	● SHN will maintain network by regular contact with other Tambons ● SHN will maintain the coordination center by purchasing additional equipment and maintain container. ● RID continues supervision of the information sharing.

PHOTOS

Construction of Basement	Meeting on Tambon Network
	
Installation of Container	**Water Level measured by RID**
	
	

PILOT PROJECT SHEET

Project Code	Sector	Flood Damage Reduction Measures in Agriculture and Livestock Sector
AGRI-SEED	**Program**	Good Paddy Seed Production/ Seed Bank
Title	Promotion of Community Seed Bank	
Purpose	*Overall*: Farmers become able to restart paddy cultivation as soon as flood ebbed *Project*: Establish a stock of paddy seeds ("seed bank") at a community level, which can be utilized to quickly replant paddy after severe flood.	
Location	T. Shinhanat, A. Lat Bua Luang, AT	
Beneficiaries	Paddy farmers	
Implementing Agency	Rice Research Center (RRC), Tambon Administration Office (TAO), Department of Agricultural Extension (DOAE)	

Background/Concept

Negative effect of floods is not limited to a direct damage to crops but there is also a consequential effect. For example, farmers had suffered from a lack of paddy seeds after the flood of 2011. Although farmers would have liked to restart paddy cultivation as soon as flood ebbed, they could not do it due to a lack of seeds to be re-planted. Especially after a flood, paddy seeds become scarce in the market due to significantly increased demands.

Thus, it is better to maintain a certain amount of quality seeds for the purpose to replant in the event of big flood in the future. Those seeds can be also used in usual years. In an emergency case, it can be consumed at evacuation center too. To produce quality seeds, proper farm management is required to reduce the contamination of foreign substances such as weed seeds and seeds of wild rice, and also is a proper processing after harvesting.

Expected Outcome

- Quality paddy seeds are produced
- Paddy seeds are processed with a same standard as certified seeds (not for certification)
- Quality seeds are stored as a "seed bank"
- Rules of using seed banks are formulated

Component (Input/ Activities)

1) Identification of participants
2) Study tour to a paddy seed center in Chainat and Phitit
3) Detailed planning of activities and rules of using seeds
4) Installation of storage at common house designated by the group
5) Processing of paddy seeds
6) Preparation of demonstration media
7) Preparation of guideline

Related Program	Paddy Cultivation Activities for Flood Adaptation	**Code:**	AGRI-PADDY

Cost (w/ Source): *Family labor cost for ordinal maintenance of the field is born by the participants*

- Study tour:	30,000Bt	(JICA)
- Media production:	20,000Bt	(JICA)
- Total (approx.):	50,000Bt	(JICA)

Implementing Schedule: *November 2012 to April 2013*

- Dec. 2012: Main activity is to cultivate paddy under three planting methods (AGRI-PADDY)
- Jan. 2013: Planning of study tour to existing rice seed center(s)
- Feb. 2013 Study tour to existing rice seed center in Chainat (larger scale) and Phitit (smaller scale)
- Mar. 2013 Lesson learned workshop, preparation of media
- Apr. 2013 Final workshop

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Dec. 2012	- No major activity was done as main activity in this period is to cultivate paddy (for more detail, see project sheet of AGRI-PADDY. - It was agreed that the farmers group will manage establishment of seed bank by themselves technically and financially and thus JICA provides learning opportunity through a study tour to existing seed center(s).
Jan. 2013	- No particular activity was done as main activity in this period is to cultivate paddy (for more detail, see project sheet of AGRI-PADDY. - A plan of study tour was drafted; joint study tour is to be organized inviting some farmers group from Ayutthaya province.
Feb. 2013	
Mar. 2013	

*Describe main findings about the project, including progress, problem, issues raised.

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	
Timing of Implementation (Pre-, During , Post-Flood)	
Acceptance of technique by community (cost, benefit, easiness, relevance to current practice)	
Replication and extension (role of stakeholder, cost share, etc.)	
Sustainability (incl. O&M, benefit during normal time)	

PILOT PROJECT SHEET

Project Code	Sector	Flood Damage Reduction Measures in Agriculture and Livestock Sector
AGRI-CRDV-01	Program	Crop Diversification and Food Security
Title	Introduction of Bio-Control and Bio-Fertilizer	
Purpose	To utilize effectively minerals and organic matters brought by flood water and to reduce pest damages for vegetables	
Location	Moo 5, T. Singhanat, A.LatBuaLuang, C. Ayutthaya	
Beneficiaries	'Safety Vegetable Group of TambonSinghanat'(16 members)	
Implementing Agency	LDD (bio-fertilizer), DOAE (bio-control)	

Background/Concept

The target farmers had serious damages by flood in 2011. All areas had been completely inundated including roads, houses and crop fields. The flood water fertilized agricultural lands, but also brought pathogenic fungi and harmful insects. The target group to coordinate vegetable supply to exporters and domestic traders has been looking for quick recovery of vegetable production at the level of 500kg per week. The exporters notice priorities in chemical residues and insects to avoid the ban from EU markets. In order to utilize flood bringing minerals and organic matters and to produce safe vegetables, application of bio-fertilizer and bio-control on vegetable production are requested by farmers.

The major pests of vegetables are thrips, serpentine leafminer (larva of small flies), common cutworm. According to exporter's internal regulation with the contract farms, the contamination of insects should be less than 10 pieces per one kilogram of vegetables. Damaged vegetable cannot be sold due to deformation of shapes. However, spray of chemical pesticide is prohibited during harvest period.

LDD has soil-borne microorganism laboratory to produce several combined bio-fertilizers, and DOAE has biological pest-control centers. The latest technologies developed by the organizations shall alleviate the above-mentioned issues.

Expected Outcome

Farmers can recover the vegetable production from flood damages in a shorter period. The products will meet with consumers' requirements regarding to food safety, therefore, sustainability of activities can be secured by its cash flow.

Component(Input/ Activities)

- Comparison experiments of combination use of LDD bio-fertilizers (LDD-2,3,7 & 12) and biological extract in 8 farms
- Conducting soil analysis
- Holding the seminar to instruct LDD bio-fertilizers
- Conducting field trip to the organic farm of exporter
- Conducting chemical residue test
- Handout to farmers regarding application of bio-fertilizers and bio-control

Related Program, if any	Establishment of Learning Center Rehabilitation of Products Collection Points	**Code:** SHIN-AGRI-CRDV-2 SHIN-AGRI-MKT-1

Cost (w/ Source)

Materials (microorganisms and available biomass), experiment, soil test: 130,000THB
Field trip: 20,000THB

Implementing Schedule

November, 2012: Meeting with stakeholders and identification of detail demands
December, 2012: Preparation and implementation of comparison experiments
February, 2013: Seminar on bio-fertilizer and bio-control
March, 2013: Evaluation of experimental results and analysis of chemical residue

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Nov. 2012	Meeting with stakeholder explanation pilot activity purpose and identification farmers demands.
Dec. 2012	- In order to utilize effectively minerals and organic matters brought by flood and reduce pest damages for vegetables, the experiments of utilization of LDD biotechnology products was conducted. The experiments also combination use of LDD bio-fertilizers (LDD 2,3,7 & 12) and biological extract. - Details of experimental designed are as follows; 1. The experiment will comparison in 8 farm, the size of each farm is 400 sq m 2. Vegetables in the experiment were Morning Glory and Sweet, they were selected by farmers. <u>Problem and Limitation</u> Almost farms are not available then the experiment farm size was decreased, from 1,600 sq m to 400 sq m - JICA expert visited the experimental farms.
Jan. 2013	- Before growing 7 days, the Experiment Activities must start from cultivated LDD3&12 on organic compost 12 and collecting soil sampling in order to analyze soil nutrients such as N, P, K, Ca, Mg, S, OM and pH - Afterwards 7 days, applied to the experimental farm and growing plants. - At the end of the month, both Morning Glory and Sweet were checked stem height and Chlorophyll. - On January 28, arranged study tour to exporter organic farm at Damnern saduak District, Ratchaburi Province, Singhanat Vegetable Group together with the officers from DOAE, DOA and LDD also joined in this travel. - JICA visited the experimental farms.
Feb. 2013	- JICA expert together with the Entomologist from Horticulture Research Institute of DOA visited the experimental farms. To confirm and identify the harmful insects were the purpose, an Entomologist also asked the growers about chemical and pesticide usage. - On February 4, arranged seminar under the title of “Bio Fertilizer and Bio Control” at Singhanat Vegetable Group Collection Point. An Entomologist, Pest control Expert and Soil Organic Matter Expert were invited to be the Lecturers. - On February 11, arranged Beauveria Training at Singhanat Vegetable Group Collection Point. The Agriculturist from Sufficiency Economy Learning Center was invited to be the Lecturer. - Morning Glory plots were harvested after grew 21 days. Soil sampling also collected at that time in order to analyze soil nutrients after applied LDD biotechnology products. - Sweet Basil plots were harvested after grew 35 days and 45 days. Soil sampling also collected at that time in order to analyze soil nutrients after applied LDD biotechnology products. - JICA expert visited the experimental farms.
Mar. 2013	- Sweet Basil plots were harvested after grew 55 days. Soil sampling also collected at that time in order to analyze soil nutrients after applied LDD biotechnology products. - Sweet Basil plots were harvested after grew 65 days. Soil sampling also collected at that time in order to analyze soil nutrients after applied LDD biotechnology products - JICA expert visited the experimental farms.

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	- The flood in 2011 damaged agriculture sector widely and after flooded farmers problems were lack of cash to recovery and purchase materials, inputs cost were increased and appearance of pest and diseases. - Utilization of LDD products will help growers to increase orchid productivity and decrease chemical fertilizer and pesticide.
Timing of Implementation (Pre-, During , Post- Flood)	- The activity is proper to implement after vegetables were harvested because the land will be available.
Acceptance of technique by community (cost, benefit, easiness, relevance to current practice)	- Growers interested and also participated in the experimental. Government Agencies namely DOAE, DOA and LDD are support knowledge and assistance. - The Exporters who concern directly with the famers group agreed with the experiment because they think that it's very importance to increase vegetables productivity and help famers to decrease the production cost.
Replication and extension (role of stakeholder, cost share, etc.)	After the experimented, famers continued to apply LDD Biotechnology products
Sustainability (incl. O&M, benefit during normal time)	- The Vegetables Group who joined the experiments will continue to apply LDD products although the experimental was finished because they found the difference of soil properties and effective of bio-control, bio-extract and bio repellent, by themselves. - In order to produce safety and quality products also with having good health, the vegetables group has confirmed about application of chemical fertilizer and pesticide that they will apply only necessary.

PHOTOS

Meeting with Vegetable Group

Cultivation of LDD3, LDD12 and Bio-fertilizer

Sowing LDD 3&Bio-fertilizer and growing

Field Trip to Organic Farm of Exporter

Spayed the mixed of bio-extract, LDD2 and insect pest repellant

Soil Sampling

PILOT PROJECT SHEET

Project Code	Sector	Flood Damage Reduction Measures in Agriculture and Livestock Sector
AGRI-CRDV-02	Program	Crop Diversification and Food Security
Title	Establishment of Learning Center	
Purpose	To provide learning opportunities for farmers, who have intentions to produce safety vegetables, showing practical techniques	
Location	Moo 5, T. Singhanat, A.Lat Bua Luang, C. Ayutthaya	
Beneficiaries	'Safety Vegetable Group of Tambon Singhanat'(16 members) and any farmer in A. Lat Bua Luang	
Implementing Agency	DOAE (LDD, DOA, exporters)	

Background/Concept

The target farmers had serious damages by flood in 2011. All areas had been completely inundated including roads, houses and crop fields. The flood water fertilizedagricultural lands, but also broughtpathogenic fungi and harmful insects. The situations on farms are similar in flood areas in Chaophraya basin.

Bio-fertilizer and bio-control methods in appropriate technical levels will help to alleviate damages of flood or inundation. Farmers needs access points of materials for bio-fertilizers and bio-control and practical information such as multiplication methods of microbes on farm levels, application methods of bio-fertilizer, application ratio of insect expellant to vegetables, safety vegetable marketing, necessary elements on farm design,necessary tools for making organic compost and net house making in low cost.

Key issues on safety vegetable production in inundated areas aredifficulty on pest-control and farming systemincluding selection of suitable hydrolytic vegetables considering market demands. The learning center will have the functions; i) Place to learn appropriate technologies on bio-fertilizer and bio-control as alleviation of food damages, ii) Opportunity to know market demands in quality and shipping timing in Tambon level, and iii) Distribution points of inputs .

Expected Outcome

Members of group can know and apply appropriate technologies on bio-fertilizers and bio-control. Members can instruct the technologies to visitors including farmers and traders.

Component(Input/ Activities)

- Holding seminar on bio-fertilizer and bio-control
- Display of posters of technical information
- Small-scale demonstration farm with display of tools for bio-control
- Distribution points of input materials
- Handout to farmers regarding application of bio-fertilizers and bio-control

Related Program, if any	Introduction of Bio-Fertilizer and Bio-Control Rehabilitation of Products Collection Points	**Code:** SHIN-AGRI-CRDV-1 SHIN-AGRI-MKT-1

Cost (w/ Source)

Materials:	50,000THB
Seminar:	10,000THB

Implementing Schedule

December, 2012:	Identification of appropriate technologies
February, 2013:	Seminar on bio-fertilizer and bio-control, Improvement of demonstration farms
March, 2013:	Evaluation of activities

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Dec. 2012	1. Interview the expert of EL, get the guideline to extension EL 2. Invite instructors for seminar : LDD (soil micro organics), DOA (mycorrhiza), DOAE (Bio-control), DOAE (vegetable expert) and 2 exports 3. Interview the Entomologist and invited to be the instructors for seminar 4. Find one person who has intention to produce wood vinegar
Jan. 2013	1. Discussion on Learning Center Topic with Vegetable Group at Vegetable Group packing house, Singhanat Sub District.
Feb. 2013	Seminar on bio-fertilizer and bio-control, Improvement of demonstration farms will be conducted on 4 February, 2013
Mar. 2013	SHN group's safe vegetable production information was summarized such as background of group, the best practice of group in sweet basil and cha-om (Thai name).
Apr. 2013	Materials for learning center construction were purchased including correcting a building and monitoring construction.

*Describe main findings about the project, including progress, problem, issues raised.

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	Behavior Change - The project has provided the training course to reduce the cost of production by using organic methods such as compost fertilizer and bio-extract producing. - Farmers have accepted to use organic methods combining with chemical, they all accepted to use those methods to reduce the cost as well as improve the quality of vegetables. Learning Center - Normally, this group has been visited by the outsider to learn a few media. So, the project tried to support them to establish a learning center by construction of building and provision of visual media in the center. This group will be used as a model of the best practice group for other groups in the further.
Timing of Implementation (Pre-, During , Post- Flood)	Pre and Post-Flood
Acceptance of technique by community (cost, benefit, easiness, relevance to current practice)	There are 16 members accepted the technology, which is recommended by the project. In case of much more insects, chemical shall be applied. However, all chemical application will be skipped during two weeks before harvest. According to the exported company's requirement, organic vegetables are still required rather than chemical. Currently, farmers have more confidence that their products shall be accepted by the exporter after improving the quality of their products supported by this project.
Replication and extension (role of stakeholder, cost share, etc.)	All 16 members who used to be a group member is quiet difficult to accept this method. They decided to run away from organic means and turned to use 100% of chemical because it is more easier and convenient way for a common market. It doesn't mean that this method couldn't replicate to others. If we analyze the global trends, we will find that the organic vegetables are required by the people more increasingly. It means that farmers will get a good price from selling organic vegetables with more increasing demands in the further.
Sustainability (incl. O&M, benefit during normal time)	**Sustain ability** - SHN Safe Vegetable Production group has continued their activity more than 10 years. They have been learning to improve their own group and their activities. After having more experiences, its group can be used as a model for other farmers. **Challenged** - To improve the quality of exported vegetables, organic methods should be applied increasingly in order to decrease the production cost and increase the quality of vegetables.

PHOTOS

Farmers problems : Disease

Farmers problems : Disease

Farmers problems : Pests

Charcoal Stove for Wood vinegar (within the village)

PILOT PROJECT SHEET

Project Code	Sector	Flood Damage Reduction Measures in Agriculture and Livestock Sector
AGRI-MT-01	Program	Crop Diversification and Food Security
Title	Rehabilitation of Products Collection Points	
Purpose	To utilize effectively minerals and organic matters brought by flood water and to reduce pest damages for vegetables	
Location	Moo 5, T. Singhanat, A.LatBuaLuang, C. Ayutthaya	
Beneficiaries	'Safety Vegetable Group of Tambon Singhanat'(16 members)	
Implementing Agency	Exporters	

Background/Concept

The target farmers had serious damages by flood in 2011. All areas had been completely inundated including roads, houses and crop fields. The flood in 2011 damaged the packing house in the village. The export of edible vegetables is increasing yearly. The 2011 flood affected on 2011-2012export, which were depressed increasing demands.

Export of Edible Vegetables
(FOB, million THB)

Y2008	Y2009	Y2010	Y2011	Y2012
24,275	29,096	34,145	38,612	42,353

Source: Custom Department

Though discussion with two major exporters shipping from the target group, the level of rehabilitation of packing house should be ones of Primary GMP. As much as possible, contaminations should be avoided and freshness of vegetables should be kept. It is confirmed that the emergent issueis rehabilitation of the cold room and inside of packing space.

Hydrolyticleaf vegetables are suitable crops in flood/inundated areas, but there is a plant physiologic character of high respiration ratio after harvesting. The temperature can reach at 30-40C◦. The heat of respiration degrades the freshness of vegetables. Therefore, it is required to be pre-cool until the time of collection by exporters and domestic traders.

Packing space should be separated from office equipment to avoid contaminations. Originally, the packing house has no windows, which structure is easy to invite fruit flies (*Drosophilidae*).

For domestic marketing to traders shipping to *Talaat Thai*, hygienic treatment is not requested. But the freshness and simple grading of vegetables are the most important factors for transaction.

Expected Outcome

Degradation of quality can alleviate hydrolytic leaf vegetables, which are comparatively suitable crops after flood/inundation.The products will meet with exporters' and traders' requirements regarding hygiene and freshness of vegetable, therefore, sustainability of activities can be secured by its cash flow.

Component(Input/ Activities)

- Interviews to exporters
- Provision of information of the necessary self-monitoring process in farm level
- Replacement of the refrigerator set
- Rehabilitation of packing house (installation of windows, fan, lighting system, wall paints)
- Reduction of contaminations in cheaper methods

Related Program, if any	Introduction of Bio-Fertilizer and Bio-Control Establishment of Learning Center	**Code:** SHIN-AGRI-CRDV-1 SHIN-AGRI-CRDV-2

Cost (w/ Source)

Refrigerator set:	44,000THB
Rehabilitation of collection point inner :	50,000THB (by beneficiaries)

Implementing Schedule

November, 2012:	Meeting with exporters and identification of priority to rehabilitate
December, 2012:	Replacement of the refrigerator set and rehabilitation of packing house
February, 2013:	Seminar on bio-fertilizer and bio-control
March, 2013:	Inspection by exporters to meet with the conditions of Establishment List (EL)

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Nov. 2012	Meeting with stakeholder explanation pilot activity purpose and identification farmers demands.
Dec. 2012	1. Installation Air conditioner 1 set replaced the old one that got damage during flood time. 2. The vegetable group fixed and rehabilitated inner of the collection point by own budget
Jan. 2013	
Feb. 2013	Not only using for collection product but the collection point also using for other activities such as meeting and training; - On February 4, arranged seminar under the title of "Bio Fertilizer and Bio Control" at Singhanat Vegetable Group Collection Point. An Entomologist, Pest control Expert and Soil Organic Matter Expert were invited to be the Lecturers. - On February 11, arranged Beauveria Training at Singhanat Vegetable Group Collection Point. The Agriculturist from Sufficiency Economy Learning Center was invited to be the Lecturer.
Mar. 2013	

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	- The collecting point was damaged from flooded in the year 2011. - Inner facilities and the condenser outdoor must remove and fix the new one - The refrigerator's important for vegetable group because all vegetables will be brought to collecting point and kept in the cold storage before the exporter truck come and bring to Bangkok. - Because of vegetables were harvested in the morning, the exporter truck come at noon or afternoon then without the refrigerator all products wasn't fresh and their quality was effected to export. - To fix the new refrigerator set is important for the collection point.
Timing of Implementation (Pre-, During , Post- Flood)	- The activity is implemented after flood.
Acceptance of technique by community (cost, benefit, easiness, relevance to current practice)	- Farmers group was pleased with this activity because this directly helped were consistence their demand.
Replication and extension (role of stakeholder, cost share, etc.)	- No other vegetable group is nearby the area.
Sustainability (incl. O&M, benefit during normal time)	- The vegetable group can operate and maintain the equipment, this group also has rule and plan to manage their group

PHOTOS

Inside packing house after Rehabilitation
(By Vegetable Group Budget)

The new air conditioner in packing house room
(Fan coil unit supporting by JICA)

The Condensing unit outside packing house
(By JICA Supporting)

Activities in packing house
(Before sending products to exporter)

Inside packing house after Rehabilitation
(By Vegetable Group Budget)

Inside packing house after Rehabilitation
(By Vegetable Group Budget)

PILOT PROJECT SHEET

Project Code	Sector	Flood Damage Reduction Measures in Agriculture and Livestock Sector
SHN-AGRI-LVS-1	Program	Small-scale Livestock and Pasture Development
Title	Feed Production and Storage	
Purpose	To strengthen animal feed production and its storage to cope with the disasters of flooding/drought	
Location	Tambon Singhanat, Amphoe Ladbualuang, Ayutthaya Province	
Beneficiaries	Livestock farmers in Tambon Singhanat	
Implementing Agency	TAO DLD	

Background/Concept

The most serious issue on livestock farmers during last flood in 2011 was shortage of animal feed according to the results of the monitoring survey conducted from June to July in 2012 by JICA Study Team on distributed fertilizers and seedlings distributed through JICA and DLD. To keep livestock healthy and productive, it is very important to supply feed even during and after flooding. To cope with the issue, it is proposed to produce more forage and keep them in the form of hay/silage at each community level. Tambon Singhanat was selected as a model area.

Expected Outcome

- Livestock farmers in Tambon Singhanat could cope with flood/drought by producing forage and hay/silage
- Livestock (cattle and goats/sheep) will be able to keep healthy and productive even during flooding/drought
- Farmer's income can be secured by storing forage
- Livestock farmers will be aware of importance of storing animal feed against disaster

Component (Input/ Activities)

Input : Construction of feed storage and provision of machinery to produce forage crops and hay/silage.

Activities :

- Construction of a feed storage for communal use
- Procurement and provision of machinery and equipment to produce forage and to keep hay/silage in the feed storage, and
- Monitoring and support activities

Items	Qty	Specification
Feed storage	1 place (121㎡)	121㎡ x 5.0(H) m
Mower	1 unit	P2005H(2 wheel mower)
Grass chopper	1 unit	P1133H(chopper)
Vacuum blower	2 unit	Electirc cleaner
Plastic container	30	40kg capacity container

Related Program, if any		**Code:**

Cost (w/ Source)

Items	Qty	Cost (THB)
Feed storage	1 place (121㎡)	266,200
Mower	1 unit	94,000
Grass chopper	1 unit	54,000
Vacuum blower	2 unit	4,000
Plastic container	30	9,000

Implementing Schedule

	2012	2013		
	Dec	Jan	Feb	Mar
Construction of feed storages				
Provision of machinery				

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Dec. 2012	- The site for feed storage was confirmed by the sub-contractor - The site for feed storage is located at Mr. Aree Panpreuk's house, No. 57 Moo 1, Tambon Singhanat, Amphoe Ladbualuang, Ayutthaya province - Procurement of mower and grass chopper was ordered to the manufacture. - Procurement of hay baler was ordered to the manufacturer - Farmers in Tambon Singhanat and Tambon Wang Man refused to accept hay baler - The hay balers were transferred to Chainat ANRDC to use for farmer training - 2 units of blower for silage making were provided to beneficiary group - The contractor was surveyed and verified by sub-contractor (KMITL) - Procurement of milk goat, meat goat and a bull were surveyed and verified by sub-contractor (KMITL)
Jan. 2013	- Mower and grass chopper were provided to the beneficiary group - The contractor was selected and signed the contract on January 4, 2013. - Construction of the hay/silage storage was started on January 10 and 40% completed at the end of January, 2013 - There was lack of labors in Tambon Singhanat. This makes a construction delayed. - 30 pieces of plastic containers for silage making were provided to the beneficiary group
Feb. 2013	- Team leader of the Project, Chief of Singhanat TAO and land owner signed for the MOU (Minutes of Understanding) - Construction of feed storage was completed at about 60% at the end of February, 2013. The roofing work is remaining. - Farmers start to make silage in plastic containers and plastic bags
Mar. 2013	- Completed feed storage was confirmed by the participants of the lesson learned workshop held on March 20. Some rice straw bales and silage prepared in the training about one month ago have been already stored by beneficiaries in the community.

*Describe main findings about the project, including progress, problem, issues raised.

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	- The community had feed storage to store feed against flood period -
Timing of Implementation (Pre-, During , Post- Flood)	- The period of time that is proper to all activities should be in February to April because farmers are available from rice cultivation and there are not rain in this period.
Acceptance of technique by community (cost, benefit, easiness, relevance to current practice)	- The community use their knowledge to apply with their livelihood - The community apply silage and hay making with materials that can find in the area.
Replication and extension (role of stakeholder, cost share, etc.)	- To establish learning center or technology center - The community pleased to be a learning center that can pass on knowledge to other communities. - The community can pass on knowledge to other communities by face to face technique or lecturer technique. - Benefit of Pangola grass cultivation will enable to construct more feed storage in other communities
Sustainability (incl. O&M, benefit during normal time)	- The community has the sustainable plan, regulation and management on sustainable use of the feed storage constructed by JICA. - Community has a rule to select member to join the group - Community helps to maintain feed storage and machinery - To build the unity and power in the group - There should be related agencies to support community (TAO, DLD)

PHOTOS

Commencement of the construction

Installation of Colums

Roofing Work

Completed Feed Storage

Grass chopper

Two-wheel mower

PILOT PROJECT SHEET

Project Code	Sector	Flood Damage Reduction Measures in Agriculture and Livestock Sector
SHN-AGRI-LVS-2	Program	Small-scale Livestock and Pasture Development
Title	**Training for livestock production**	
Purpose	To strengthen livestock farmers in: - Forage production - Forage storage in the form of hay and silage to cope with flood/drought - Livestock management during and after flood	
Location	Tambon Singhanat, Amphoe Ladbualuang, Ayutthaya Province	
Beneficiaries	Livestock farmers in Tambon Singhanat	
Implementing Agency	TAO, DLD	

Background/Concept

Most of small-scale livestock farmers have not enough knowledge about livestock management and feeding. They were seriously affected by the 2011 flood in forage production and lost animals. In order to build capability of livestock farmers to cope with disaster and to increase livestock productivity, it will be better to train livestock farmers by providing them with the designed 3-day training composed of livestock management, feed production and storage.

Expected Outcome

- Livestock farmers will be enlightened on how they should cope with disaster
- Livestock farmer group will work together to store forage and silage at community level
- Productivity of livestock will increase by learning proper livestock management and feeding
- Livestock farmer's income from animals will increase

Component (Input/ Activities)

The 3-day training shall be conducted inviting more than 30 livestock farmers. The training program shall cover livestock management, forage production and its storing, prevention of livestock diseases and processing of animal products etc.

Related Program, if any		Code

Cost (w/ Source)

THB 60,000 including costs of venue, meal etc. for 40 participants

Implementing Schedule

	2012	2013		
	Dec	Jan	Feb	Mar
Training			■	

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Dec. 2012	- Materials of the training were prepared by the JICA Expert - Materials of the training were given to the sub-contractor (KMITL)
Jan. 2013	- The handbooks of the training were made by the sub-contractor (KMITL) - The dates of the training were fixed. The training in Tambon Wang Man will be conducted on January 26 to 28, 2013 and in Tambon Singhanat will be conducted on February 3 to 5, 2013 - Sub-contractor (KMITL) held the training in Tambon Wang Man at Samranrajbumrung School, Tambon Wang Man, Amphoe Watsing, Chainat province Farmers participated in the training for 54 persons - The contents of the training are as follows: ・ Pasture production, pasture management and the utilization ・ Forage production and grass cultivation ・ Hay making, silage making and the utilization ・ Animal breeding, animal selection and beef cattle management for small holders ・ Animal health management and animal health care ・ Prevention, countermeasures and risk management on disaster
Feb. 2013	- Sub-contractor (KMITL) held the training in Tambon Singhanat at village headman's house, No. 57 Moo 1, Tambon Singhanat, Amphoe Ladbualuang, Ayutthaya province - Farmers participated in the training for 41 persons - The contents of the training are as follows: ・ Pasture production, pasture management and the utilization ・ Forage production and grass cultivation ・ Hay making, silage making and the utilization ・ Animal breeding, animal selection and beef cattle management for small holders ・ Animal health management and animal health care ・ Prevention, countermeasures and risk management on disaster
Mar. 2013	

*Describe main findings about the project, including progress, problem, issues raised.

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	- Farmers knew feed reservation method to keep feed on flood period - Farmers knew food processing to produce food by themselves - Community got a map to evacuate animal and human to cope with flood - Farmers want more frequent training on animal husbandry , especially on technology
Timing of Implementation (Pre-, During , Post- Flood)	- The period of time that is proper to all activities should be in February to April because farmers are available from rice cultivation and there are not rain in this period
Acceptance of technique by community (cost, benefit, easiness, relevance to current practice)	- The community use their knowledge to apply with their livelihood - The community apply silage/hay making with materials that can find in the area The community can process products from their household and get more income from these products
Replication and extension (role of stakeholder, cost share, etc.)	- The community pleased to be a learning center that can pass on knowledge to other communities - The community can pass on knowledge to other communities by face to face technique or lecturer technique
Sustainability (incl. O&M, benefit during normal time)	- The community inherits their knowledge to their descendant - The community take knowledge to establish local curriculum

PHOTOS

Starting the 3-day Training

Lecture by Director of ANRDC Chainat Center

Participants

Lecture by a Veterinarian

Mapping by the Participants to cope with Flood

Practical Training of Silage Making

PILOT PROJECT SHEET

Project Code	Sector	Flood Damage Reduction Measures in Agriculture and Livestock Sector
SHN-AGRI-LVS-3	Program	Small-scale Livestock and Pasture Development
Title	Goat raising	
Purpose	To introduce improved goat house with raised floor to cope with flood and to produce goat milk as new income source	
Location	Tambon Singhanat, Amphoe Ladbualuang, Ayutthaya Province	
Beneficiaries	Goat farmer group in Singhanat	
Implementing Agency	DLD TAO	

Background/Concept

In Tambon Singhanat, Muslim people have raised goats for meat production. Most of them evacuated goats to other areas during flood in 2011 because their village is located at low land. Goat size has been getting smaller mainly due to inbreeding and reducing meat productivity.

Goat milk will become new income source and bring them stable income every day. Demand for goat milk products such as drinking milk, soap and yoghurt are high especially in Muslim communities in and around the area and southern part of the country.

In low land areas such as Ayutthaya province, improved goat house with raised floor is recommendable against high water level of flood and for healthy goat raising.

Expected Outcome

- Goat farmers will be able to keep goats during flood by introducing goat house with raised floor
- Goats can be kept health and productivity at 1.5m higher floor than ground level
-Newly introduced milk goats will contribute to increase farm income as new income source

Component (Input/ Activities)

- Construction of an improved goat house with raised floor
- Provision of meat and milk goats (male and female) and utensils for goat milk processing

Items	Qty	Specification
Male meat goats	2 head	Nubian
Male milk goats	2 head	Saanen
Female milk goats	15 head	75% Saanen
Improved goat house	1 house	4.0mX9.5m
Equipment for milk processing	1 unit	Pan, container etc

Related Program, if any	Feed production and storage	**Code:SHN-AGRI-LVS-1**

Cost (w/ Source)

Items	Qty	Costs (THB)
Male meat goats	2 head	20,000
Male milk goats	2 head	24,000
Female milk goats	15 head	180,000
Improved goat house	1 house	396,000
Equipment for milk processing	1 unit	44,500

Implementing Schedule

	2012	2013		
	Dec	Jan	Feb	Mar
Construction of a goat house		■	■	
Provision of meat goats				■
Provision of milk goats				■

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Dec. 2012	- The site for goat house was confirmed by the sub-contractor (KMITL) - The site for goat house is located at Mr. Swit Sangsuwan's house, No. 3/1 Moo 1, Tambon Singhanat, Amphoe Ladbualuang, Ayutthaya province - The contractor was surveyed and verified by sub-contractor (KMITL)
Jan. 2013	- The contractor was selected and signed the contract on January 4 2013 - Construction work of the goat house commenced on January 10 2013 - There are lack of labors in Tambon Singhanat. This make a construction delayed - The contractor built lifted floor with 4 columns - The construction of the goat house was 40% complete.
Feb. 2013	- The Team leader of the project, chief of Singhanat TAO and land owner signed for the MOU (Minutes of Understanding) - The equipment for goat milk pasteurization and the cooler were provided to beneficiary group - The walls and roof of goat house were constructed - Contractor painted some part of goat house in color - The goat house constructed till 80%. -
Mar. 2013	- Early March, the goat house has completed. - On March 19, breeding milk goats were introduced to the constructed goat house.

*Describe main findings about the project, including progress, problem, issues raised.

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	- Farmer can stand even in the period of flooding by increasing household income through raising goats/milk goats
Timing of Implementation (Pre-, During , Post-Flood)	- The period of time that is proper to all activities should be in February to April because farmers are available from rice cultivation and there are not rain in this period. - The pilot project of goat raising accords to the policy of encourage goat raining in the Province Ayutthaya
Acceptance of technique by community (cost, benefit, easiness, relevance to current practice)	- The community use their knowledge to apply with their livelihood - Provision of milk goats will become a new income source
Replication and extension (role of stakeholder, cost share, etc.)	- To establish learning center or technology center - The community pleased to be a learning center that can pass on knowledge to other community --The community can pass on knowledge to other communities by face to face technique - A farmer of neighboring Tambon is interesting in goat raising and wants to establish network with Singhanat - One of villager is going to construct goat house according o the model goat housing constructed by JICA
Sustainability (incl. O&M, benefit during normal time)	- The community has the sustainable plan, regulation and management The community ha a rule to select member to join the group - Community helps to maintain goat house - To build the unity and power in the group - There should be related agencies to support community (TAO, DLD) - The livestock group has a plan of revolving goat to extend goat raising- in the community - There is demand for goat milk and meat in Muslim communities in and around the Tambon

PHOTOS

Commencement of the Work

Goat House under Construction

Goat House under Construction

Goat House ready for Distributing Goats

Provided Milk Goats

Provided Milk Goats

PILOT PROJECT SHEET

Project Code	Sector	Flood Damage Reduction Measures in Agriculture and Livestock Sector
SHN-AGRI-LVS-4	Program	Small scale Livestock and Psture Development
Title	Installation of a Bio-gas facility	
Purpose	Utilization of cattle dung as a renewable energy source which is available all areas where cattle are raising. During flood the biogas facility will be able to use without using forestry resources. I t will contribute to reduce the cost for cooking fuel and to conserve forestry.	
Location	Tambon Singhanat, Amphoe Wat Sin, Chainat Province	
Beneficiaries	The facility will be installed at the backyard of a villager of Tambon Singhanat as a model of biogas facility.	
Implementing Agency	TAO DLD	

Background/Concept

Renewable biogas is useful with sustainability even in flooding period and after flood, and also contributes to preserve forest resources in addition to reduction of expenditure for fuel for cooking. In Tambon Singhanat, 2,900 cattle and 640 buffaloes are raised mainly for meat production. However, cattle dung, by-product of raising, is not used efficiently despite its availability as a source of biogas. Efficient use of renewal sources locally available should be promoted since biogas facility can install at low cost.

Expected Outcome

- Construction of a biogas facility
- Reduction in living expenses for cooking
- Contribution to forest conservation

Component (Input/ Activities)

Input :

・ Installation of a biogas facility available for a family

Activities :

・ Guidance on efficient use of the biogas facility

Related Program, if any		Code

Cost (w/ Source)

THB 8,000 excluding the cost of excavation of the pit done by a beneficiary by himself.

Implementing Schedule

	2012	2013		
	Dec	Jan	Feb	Mar
Installation of biogas facility			■	

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Dec. 2012	- The site for Biogas facility was selected, and the work started
Jan. 2013	- The contractor has been selected and signed the contract - The installation of biogas facility was started - There was lack of labors in Tambon Singhanat. This make a construction delayed - The Biogas facility was installed up to 20% at the end of January
Feb. 2013	- Team leader of the project, chief of Singhanat TAO and land owner signed for the MOU(Minutes of Understanding) - The installation of biogas facility was completely finished - Beneficiary farmer has some cows, so he filled cow dung for the first time. The dung is remaining in the biogas tank for 21 days (21 days for cow dung and 7days for pig dung). Then farmer can use gas from dung for cooking
Mar. 2013	- The participants of the lesson learned workshop held on March 20 confirnmed the completion and in service for cooking.

*Describe main findings about the project, including progress, problem, issues raised.

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	- Household expenses for fuel can be saved at THB 600 to 900 a month by the biogas facility - Forest resource could be preserved
Timing of Implementation (Pre-, During , Post- Flood)	- The period of time that proper to all activities should be in February to April because farmers are available from rice cultivation and there are not rain in this period
Acceptance of technique by community (cost, easiness, benefit, relevance to current practice)	- The community use their knowledge to apply with their livelihood
Replication and extension (role of stakeholder, cost share, etc.)	- To establish learning center or technology center - The community pleased to be a learning center that can pass on knowledge to other communities - The community can pass on knowledge to other communities by face to face technique or lecturer technique
Sustainability (incl. O&M, benefit during normal time)	- Community helps to maintain the Biogas facility - To build the unity and power in the group - There should be related agencies to support community (TAO, DLD)

PHOTOS

Excavation of the Pit by a Beneficiary

Outlet Pit and Gas Tank

Inlet Pit and Gas Tank

Boiling Water by Generated Biogas

5.Tambon Disaster Resilient Plan, T. Singhanat, Ayutthaya						
Project (by priority)	Planned Activity	Procedure detail	Related Agencies	Progress Problems/constraints	Countermeasures Actions to be taken	
					Short-term	Long-term
1. Community disaster protection and mitigation plan	1.1Evacuation Drill	1. procurement of necessary tools, survival bags to participants and development of disaster protection and mitigation plan	DDPM/Wat Rat bamrung School/ Wat Hong Prapat School	• Necessary tools have not been procured. • The drill was held on March 11, 2013 at Wat Ratbamrung School. • Village leaders and villagers didn't well understand the steps of the evacuation plan drillsince it was the first time. They had never drilled this plan before.	• Conduct the drill every year and extend to other crises such as fire, storm and earthquake • Hold the meeting to adjust the plan to meet with community needs • Get the village leaders and villagers understand and aware of their roles in evacuation plan drill	• Makedisaster management planappropriate and understandable to all members of the community • Get DDPM support for knowledge and planning in collaboration with them
	1.2 Setting up Tambon rescue center in front of TAO	1.Setting up Tambon rescue center in front of TAO	TAO/JICA	• In the process for the procurement of containers	• Form a committee to manage the center • TAO will provide budget support.	• The center will be adisaster coordination center of neighboring 3 Tambons
	1.3Develop community evacuation plan	1 Revise the existing plan 2 Drill	TAO/JICA	• There was a meeting for brainstorming to develop the plan • Study tour on CBDRM on January 23-26, 2013 at Lampun • Development of community flood disaster risk management plan, including evacuation	• Get supports from government agencies to frequently hold trainings for community leaders to have common understanding on the plan • Conduct the drill every year to enablecommunity members deal with disasters appropriately	• Extend the activity after achieving short term countermeasures
	1.4 Water Filtration PlantProject	1. Setting up the filtration plant 2. Develop management plan	TAO/Village Chiefs	• Community water filtration plant was set in TAO compound. • Reverse Osmosis water purifiers was set in the plant. • A committee and plan were made under TAO'sresponsibility. • Distribution of free drinking water to villager on April, 2013 to gain confidence of quality drinking water from this plant. • In general, this plant will provide drinking water in cheaper price than in markets and	• Public relations of drinking water to villagers in Singhanat and neighboring Tombons	• Get the Food and Drug Administrationstandard and create their own brand of the water.

5.Tambon Disaster Resilient Plan, T. Singhanat, Ayutthaya						
Project (by priority)	Planned Activity	Procedure detail	Related Agencies	Progress Problems/constraints	Countermeasures Actions to be taken	
					Short-term	Long-term
				free drinking water during the flood.		
2.Promotion project for good rice and vegetable seeds production	2.1 Learning Center of Organic Agriculture	1. Form members 2. Develop potential knowledge for members –study tour 3. Procure equipment 4. Sharing WS	JICA/ /Local Agriculture Office /National Agricultural Goods and Food Standard Administration	• 20 members of farmers are interested in this project • Study tour "Quality Vegetable Planting" at Ratchaburi was conducted. • Project provided herb distiller, air conditioner, tools to build/ fix the learning center, and posters • Meeting and training was held on "Pest control/Beauveria/ Herbal extract/ Appropriate Chemical	• Develop the area as the provincial learning center • Develop the area for meetings and trainings for farmers in the district	• Get GMP Standard to replace GAP Standard • Decrease the cost of cultivation by using organic agriculture methods
	2.2experimental plantation for good rice seed production	1. Action plan and implementation	TAO/JICA/Rice Center/Local Agriculture Office	• Study tour on "Good Rice Seed" at Chainat was conducted. • Action plan is under development.	• Utilize knowledge from the study tour to produce good rice seed on their own	• Cultivate rice to consume intambon • Produce good rice seed for selling
	2.3experimental plantation on the way cultivation method		-	Not being implemented	No specific activities are planned.	
	2.4 Rice drying yard	-	Agricultural Land Reform Office	• There have been supports from Agricultural Land Reform Office for budget and activities. • Activities are conducted at Moo.4 (Ban Pakbungluam)	No specific activities are planned.	
	2.5 Vegetable seed production group formation	1. form a group(same with floating veg.) 2. study tour 3. conduct activity	JICA/TAO/ farmers group enterprise group			
	2.6Fix and repair refrigerator		JICA/TAO/ farmers group	Air-conditioner was installed to replace the old one which was damaged by the flood in 2011.	Continue to utilize the cool room for the group	
	2.7 Repair water purifier		JICA/TAO/ farmers group	Not being implemented	The group expects to use their profit for the procurement of these to achieve GMP Standard in the future.	
	2.8Repair herbal steamer		JICA/TAO/ farmers group	Not being implemented		
	2.9Build a small plant nursery		JICA/TAO/ farmers group	Not being implemented		
3 Promotion project of livestock	3.1 Chicken raising promotion	1. Form members 2. Develop potential knowledge for	JICA/KMITL Professors/ Ayutthaya	Not being implemented	No specific activities are planned.	
	3.2 Cow raising			• Plant feed housing for livestockwas	Increase number of cows for breeding and improvement of	

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5.Tambon Disaster Resilient Plan, T. Singhanat, Ayutthaya						
Project (by priority)	Planned Activity	Procedure detail	Related Agencies	Progress Problems/constraints	Countermeasures Actions to be taken	
					Short-term	Long-term
raising for extra income	promotion	members –study tour 3. Procure equipment 4. Sharing Workshop 5. Implementation and evaluation	Agriculture Provincial Office	constructed(cows and goats) • Training on livestock raising was conducted by KMITL Professors • A Brahman male breed provided by the project. • Procurement of : lawnmower/grass cutting in pieces machine/tanks for fermenting grass/ventilator/gas stove/ gas Tank	breeding	
	3.3 Goat raising promotion			• Goat house was constructed. • 2 male meat goat breeds, 2 male milk goat breeds and 15 female milk goat breeds were provided by the project. • Procurement of: -20 Celsius degree freezer/ tanks for goat milk/ tanks for freezing goat milk/ tanks for milking goats/pots for boiling goat milk /bags for containing goat milk	• Improve breeds of meat and milk goats • Develop goat milk to dairy products; milk, yogurt • Produce feed for selling • Become a Learning Center for goat raising	
	3.4 Duck raising promotion			Not being implemented	No specific activities are planned.	
	3.5Processing of fish duck goat and eggs product			Not being implemented	No specific activities are planned.	
	Additional issue	-Process of goat milk -Plant feed reserve -Bio-Gas	JICA/KMITL Professors	• Training was conducted and yogurt machine was procured. • Training on plant feed reserve was conducted for urgent situation • Training on household Bio-Gas was conducted to decrease the cost of liquid propane gas	• Apply the knowledge and equipment to be useful in the future • Sell goat milk yogurt • Support farmers to reserve plant feed for urgent situation such as flood • Promote livestock raising and household bio-gas production by using their manure as materials for reducing the cost of liquid propane gas • Become a demonstration center of household bio-gas	
4. Alternative vegetable growing project(on	4.1 Alternative vegetable growing project(on floating material)	1. Form members 2. Develop potential knowledge for members –study tour	Village chief/TAO	Not being implemented	• Consider the introduction of Aquaponic to the community in the future	

5.Tambon Disaster Resilient Plan, T. Singhanat, Ayutthaya						
Project (by priority)	Planned Activity	Procedure detail	Related Agencies	Progress Problems/constraints	Countermeasures Actions to be taken	
					Short-term	Long-term
floating material)		3. Procure equipment 4. Sharing Workshop				
5. Participatory water management project	5.1Flood protection dike	-		Flood protection dyke is under construction (responsibility of Department of Water Resources, Ministry of Natural Resources and Environment)	No specific activities are planned.	
	5.2Development of effective water management system for agricultural irrigation	1. Form members 2. Develop knowledge for members 3. Develop database 4. Develop information dissemination system	RID/TAO/ other TAO/ Volunteers/ Department of Water Resource			
	5.3 Set up wired speakers	-	-	Not being implemented	No specific activities are planned.	

Development of Flood Disaster Risk Management Plan and Practice of Evacuation Drill at Tambon Singhanat, Ayutthaya

1. Workshop on the Development of Flood Disaster Management Plan

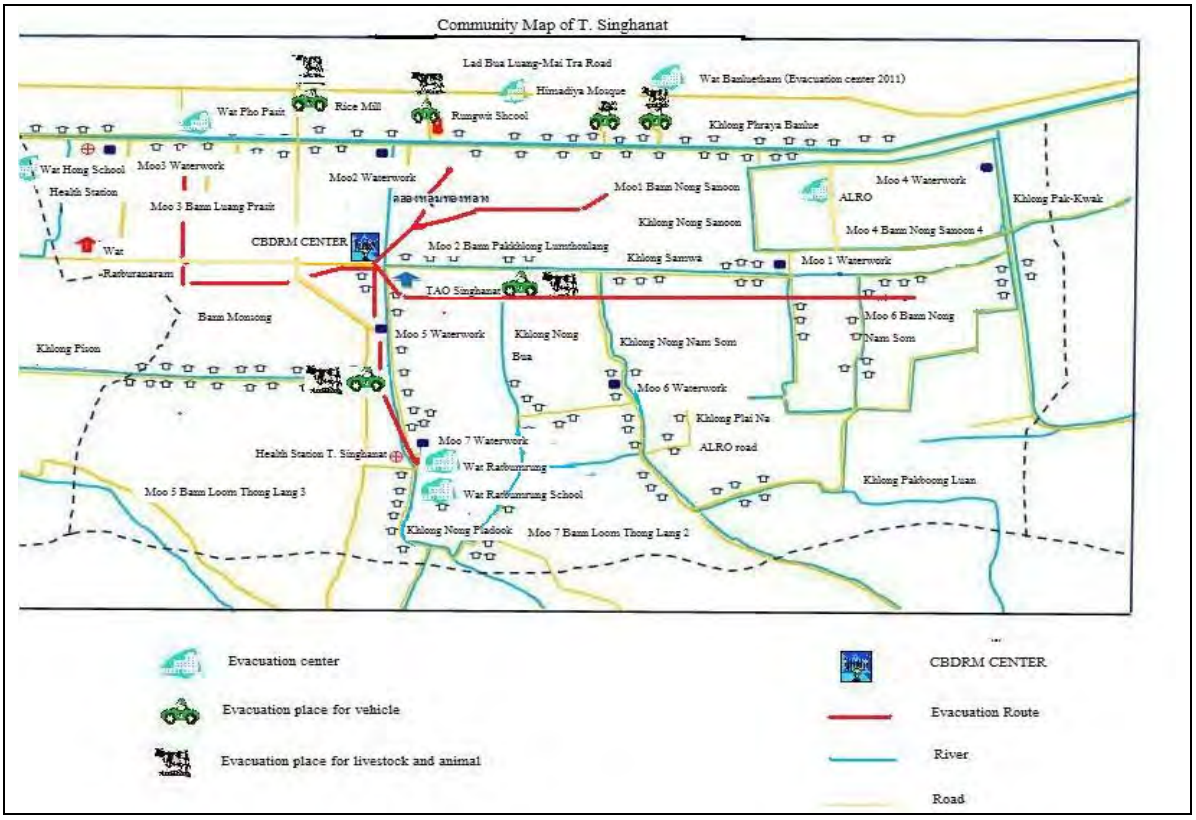
Date:	7-8 February, 2013
Place:	Meeting room of TAO, Singhanat
Objective of the meeting:	To prepare action plans for Community Based-Flood Disaster Risk Management with the community
Number of attendants:	About 50 persons from the community, DDPM Ayutthaya, JICA study team, etc.
Participants from the project:	Iwaki, Bubpachart, Thita

<Process of the workshop>

1) Introduction
Background of the pilot project and objective of the workshop were briefly explained by the study team member.

2) Explanation of the CBDRM process
The resource person from DDPM Ayuttaya explained the process of CBDRM.

3) Development of Hazard/ Evacuation Map
Participants jointly developed Community Hazard/ Evacuation Map with the guidance of DDPM Ayutthaya staff as below.



4) Set-up of a management committee to implement the Flood Disaster Risk Management Plan
Committees to implement the Flood Disaster Risk Management Plan for the community of T. Singhanat were formed tentatively as below by the participants with the facilitation of the resource person from DDPM. However the draft of the committees needs approval from village authorities.

1. Community Flood Disaster Risk Management Committee		
	1. Plan and approve actions for disaster prevention with other committees 2. Give directions and approval to any actions concerning flood management 3. Collaborate with both internal and external organizations during flood period	
		1. Mr. Chod Pungsawas (Chairperson)
		2. Mr. Chan Surawattanaprasert (Deputy)
		3. Mr. Aree Panpruk
		4. Mr. Danai Reungprach
		5. Mr. Traipop Sengarun
		6. Mr. Panya Peungsawas
		7. Mr. Manop Chantana
		8. Mr. Athid Yindeesid
2. Warning and Preparation Committee		
	1. Hold community meetings to inform preparation process and warning signal for flood 2. Keep records of the Tambon's demographical data, e.g. number of elders, animals, vehicle in community household 3. Identify evacuation places e.g. safety zone, hazard zone 4. Prepare sand bag and other necessary items (boat, floating toilet) for flood risk management 5. Prepare consumption supplies for evacuees during evacuation period.	
		1. Tambon Headman)to be elected (Chairperson)
		2. Assistant of Tambon Headman (Deputy)
		3. Mr. Somsak Sengsuwaan
		4. Ms. Sansiee Suksamlee
		5. Mr. Trirad Sengarun
		6. Ms. Chamnong Komonwanich
		7. Ms. Cheunkwan Saiduang
		8. Mr. Wilai Duangkeaw
		9. Mr. Suporn Niworn
		10. Mr. Pairung Keawkeng
		11. Mr. Wichian Yindeepop
		12. Mr. Chod Kankeng
		13. Mr. Preecha Chantana
		14. Mr. Sonchai Boonsanong
		15. Ms. Anusara Toadam
3. Public Relations Committee		
	1. Receive information from internal and external organizations 2. Distribute information to public 3. Accumulate the information, cross-check, analyze the information 4. Report water measurement situation for further collaboration with the flood committee	
		1. TAO chief deputy (Chairperson)
		2. Ms. Natniyada Plongyoo (Deputy)
		3. Mr. Narin Nakaram
4. Disaster Prevention and Mitigation Committee		
	1. Coordinate with volunteers to set up flood protection system 2. Mobilize community people to put up water protection sandbags 3. Appoint assemble points in case of emergency 4. Take responsibility for security and safety during evacuation 5. Support places and equipments for evacuation center	
		1. Mr. Wiroj Reungprad (Chairperson)
		2. Mr.Sommai Charoenpol (Deputy)
		3. Mr.Somsak Khunsaman
		4. Mr. Charoon Neungsonthi
		5. Mr. Mavin Mookdadung
		6. Mr. Amnaj Pantoon
		7. Mr. Pichat Tananet
		8. Mr. Pradit Plongyoo
		9. Mr. Mod Kamchoon
		10. Mr. Charuay Amwong

		11. Mr. Manop Pookern
		12. Mr. Suthep Trapboriboon
		13. Mr. Domrong Triupok
		14. Ms. Chamnong Komolwanich
		15. Mr. Ayudthaya Kankeng
5. Rescue and First Aid Committee		
	1. Provide medical care to all group of patients 2. Coordinate with hospital in the area when emergency case happens 3. Provide information on disease and danger caused by flood to community people	
		1. Ms. Benja Polmatad (Chairperson)
		2. Mr. Boonrit Paksard (Deputy)
		3. Mr. Tiang Chantana
		4. Ms. Tongdee Khunwan
		5. Ms. Orapan Keawkeng
		6. Mr. Manop Chantana
		7. Ms.Sara chankeaw
		8. Ms. Sonthorn Karnkeng
		9. Ms. Sawai Saiduang
		10. Ms. Wanna Thongsamrit
		11. Ms. Kwanmeung Yindeesit
		12. Mr. Suporn Niworn
		13. Ms. Sali Saothongyai
		14. Ms. Sanguan Wittaya
		15. Mr. Amorn Wittaya
6. Security Guard Committee		
	1. Set up security guard team to patrol in the evacuation centers and around the community 2. Report situation to DDPM committee	
		1. Mr. Bancha Pungsawas (Chairpersons)
		2. Mr. Akom Promchai (Deputy)
		3. Mr. Chamreing Kulabsri
		4. Mr. Prasit Kulabsri
		5. Mr. Sonsak Kongpeng
		6. Mr. Amnaj Paantoon
		7. Mr. Charuay Amwong
		8. Mr. Chod Karnkeng
		9. Mr. Panya Tippratum
		10. Mr. Surasak Kongpeng
		11. Mr. Ari Sengsuwann
		12. Mr. Anad Asekthong
7. Support Committee		
	1. Procure all necessary supplies for evacuation center 2. Plan and manage distribution system for donation items 3. Provide moral support to evacuees	
		1. Ms. Cheunkwan Saiduang (Chairperson)
		2. Mr. Chamreng Panpruk (Deputy)
		3. Ms. Mali Duangkeaw
		4. Ms. Ratiah Prachasri
		5. Ms. Nanprach Rungkitsupop
		6. Ms. Pattamawadee Suppon
		7. Ms. Bangorn Suksupol
		8. Mr. Thongdee Kumwan
		9. Ms. Kanchana Tohadam
		10. Ms. Cha Toadam
		11. Ms. For Sengsuwan
		12. Ms. Somchit Preanrasri
		13. Ms. Wanna Payakrut
8. Service and Support Committee		
	1. Support every relevant committees for any activities that may be conducted	

		1. Mr. Somsak Reungprad (Chairperson)
		2. Mr. Somboon Jittripoch (Deputy)
		3. Mr. Sommai Charoenpon
		4. Mr. Sanid Kamchoon
		5. Mr. Somsak Khunsaman
		6. Mr. Charoon Neungsonthi
		7. Mr. Wiset Neungsawak
		8. Mr. Navin Mookdaduang
		9. Mr. Amnaj Pantoon
		10. Mr.Boonrit Paksard
		11. Mr. Wichet Tananet
		12. Mr. Phun Tamthanta
		13. Mr. Pradit Pongyoo
		14. Ms. Benja Ponmatad

5) Development of Actions Plans on Flood Disaster Risk Management

Drafts of action plans on Flood Disaster Risk Management were developed for community based on the discussion among participants as provided below.

Issue/ Problem	Countermeasures and Actions
1. Flood Information and Water measurement	• Set up a warning system concerning water measurement • Set up a working team that can coordinate with relevant agencies (Prayabanlue project, Jaojed, Bangyeehon, the Tambon's water gate, RID, TMD) • Coordinate with RID to receive trainings • Systemize a message transfer system for better consistency and effectiveness • Publicize water level information through Tambon's wired speakers and roles of the leaders.
2. Internal and Inter-Tambon coordination	• Set up a warning system concerning water measurement and for inter Tambon information center • Replace telephone by a communication radio (walky talky) to make communication more effective-public relation • Set up a coordinators working team (by public relations committee) • Hold informative session on "Effective information transfer" in collaboration with Ayutthaya DDPM (by management committee)
3. Transportation System	• Supply adequate amount of necessary vehicles to be used during the flood (by service and support committee) • Develop community map including hazard and evacuation map (by rescue and first aid Committee) • Set up a transportation working team (by service and support committee) • Develop a transportation system for public use including the service system, the schedule, responsible person, procurement of material and the maintenance (by service and support committee) • Frequently hold a committee meeting among committees • Register all materials necessary to use and always keep clean and ready to use
4. Evacuation (Location, Route, pattern, and safety)	• Identify evacuation points in Tambon (temple, mosque, schools, and bridge) • Survey the evacuation route and put up a sign to indicate evacuation route, spot and the hazard and safety zone (by rescue and first aid committee) • Develop a service and management plan for the evacuation center (Preparation of food, water, fuels, first aid kit and security measure (by all committees) • Survey to indicate the number of possible evacuees (by all committees) • Disseminate the evacuation plan to villages members thoroughly (by all committees) • Plan and practice an evacuation drill (by all committees)

5. Storage of essential consumption items for both people and animals	• Have the community agree on the storage spot and distribution spot for donation supplies • Survey materials and their amount necessary for the evacuation • Keep records of the donation items and always keep some supply for Muslim people • Survey needs of drinking water • Prepare some mobile toilet • Store some necessary animal feeds, medicines and safe house (by service & support committee) • Survey for the needs of animals feed needed for support • Prepare the evacuation for livestock to ALRO
6. Security	• Develop a systemized security system in the Tambon (by security guard committee) • Set up a Tambon patrol team • Coordinate with the police station for further support • Report the progress of the actions to the community in timely manners
7. Other Relevant Service	• Prepare adequate amount of medicine and first aid kits to match the number of household (by rescue and first aid committee) • Survey the number of vulnerable people by health volunteers and share the information with local health station • Set up a medical center that is equipped with medical tolls and personals (by rescue and first aid committee) • Share the information with local health station and hospital for appropriate aid action. • Dispatch health volunteer to give information about proper action during flood concerning hygiene. • Supply adequate amount of rescue equipment, enough for every villages (by rescue and first aid committee and support and service committee) • Provide information about the first aid practice by patrolling the village by the health station • Provide basic security and recue information (by security guard committee) • Prepare rescue and first aid equipment (cradle, aspirator etc.) • Coordinate with other medical agents to transfer serious cases • Coordinate with health station and hospitals in the emergencies (by rescue and first aid committee)

<Comments/Follow-up Issues>

- Committee of T. Singhanat was tentatively set-up with the support of from DDPM team. The committee needs formal approval from the concerned agencies.
- Action plans for both community and school was developed during the workshop. However, the plan needs further examination and sharing with the community members.
- At the end of the workshop, the participants agreed to have an evacuation drill in March. The detail of the drill and preparation will be discussed in the late February with the support of JICA study team and DDPM Ayutthaya.

Development of hazard/evacuation map

Discussion during the workshop

2. Planning Workshop for Evacuation Drill

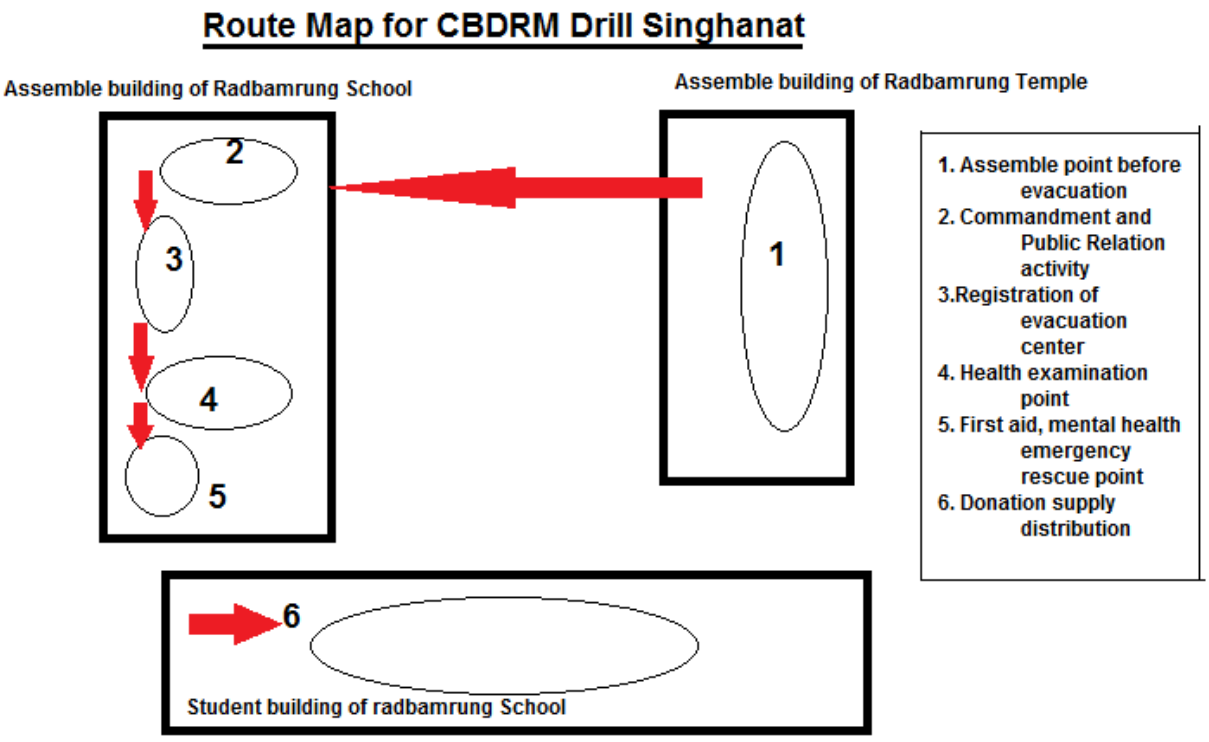
Date:	22 February 2013 (0900 – 1200)
Place:	TAO, T. Singhanat
Objective of the meeting:	To plan and prepare for flood evacuation drill
Number of attendants:	About 50 persons from community, DDPM Ayuttaya, and JICA study team
Participants from the project:	Iwaki, Bubphachart, Thita

<Discussion issues before the drill>

1) The committee and community members including village chiefs and TAO members gathered with other agencies e.g. the health station, school, and DDPM Ayutthaya to discuss for the drill. There were many agencies participate in the event e.g. TAO, Wat Mai school, DDPM, Tambon health station, Volunteers and policeman.

2) The venue of the drill was set at Rajbamrung School utilizing vacant space under the school building and the school yards. The drill will be on Monday, 11 March 2013 at 2.00 – 4.00PM. Final meeting will be held to conclude all the arrangement at 1.00 PM of the day.

3) The school will prepare tentative location of the simulation of the drill utilizing facilities of Watradbamrung school and Watradbamrung temple as planned as below.



4) Tentative actions of the drill are set as follow;

Simulations*:* The news about the danger of the flood water breaks to warn community members to evacuate to safer places or provided evacuation center by the community. The warning simulation being;
"The water from Praya Banleau canal has risen 30cm from the shore. The announcement from Tambon Borngern, Ladlumkeaw, added that water level has now reached the shore and the RID also suggested that people should lift their belongings to higher places, higher than last year 50cm"

Act 1: After the committee is informed about the water situation, a committee meeting is held to set roles of each responsible team. The public relation team will announce the situation to community

about the water situation and preparation process to move belongings to high place. The announcement will include information about the safety of animals.

Act 2: After 5 minutes of the first announcement, the public relation team will announce emergency evacuation to community including the opening of the evacuation centers.

"The water barrier had been broken down and started to fill Moo.1,2,3 consecutively. The stream of flood water is flows relatively fast at 1 meter/hour. Please evacuate to Radbamrung school playground and bring important items"

Act 3: To recreate the real situation of the evacuation center to learn about proper management, after people move from their houses to the spot (with their necessary belonging), evacuee will first make a registration at the set up point, then to medical screening process before being sent to appropriate spots.

Act 4: Two rescue practice concerning health rescue and defense rescue will be performed while participants lined up for registrations.

1. Rescue team will help rescue people who with heart attack. In this case, Emergency Medical Service team will take part in the role to show the good way of practice.

2. Defense volunteer team help catch thieve who snatch a bag from a lady and send the thieve to the police.

Act 5: From the assembly point, the public relation team will announce the rooms and other facilities prepared for them. Then they move into the prepared room.

Act 6: The public relation team will make an announcement to inform the evacuee to pick up all necessary supply at the donation point. At this point the donation items will be prepared by JICA and the items are for them to keep.

6). There are 200 participants expected to join the drill. There are 20 students from Rasbamrung and 50 students from Wat Hong School There should be 20 from each village that include village chief, volunteer, and ordinary people.

7). The emergency bag will be prepared by the community with the support of JICA study team. as an imitation of the actual disaster management situation. Each emergency bag contains; 1kg of refined sugar, 1 bottle of vegetable oil, 1 bottle of fish source, 1 bottle of water, 1 canned fish, 1 bag of biscuit, 1 carton of milk, 1 set of pain killer medicine, 1 toothbrush, 1 toothpaste, 1 bar of soap, and 1 bottle of dish detergent. Each emergency bag is estimated to cost THB150.

Scene of the workshop

3. Evacuation Drill

Date: 11 March, 2013 (1300-1500)
Place: Rajbamrung School, T. Singhanat
Objective of the meeting: To exercise the evaluation drill
Number of attendants: About 200 persons from community, primary school, TAO, health stations, DDPM Ayutthaya, and JICA study team, etc

<Process of the Drill>

1) Introduction of the drill and preparation (1300-1400)
   - Introduction of the objective and process of the drill
   - Clarification of setting and function of each station and responsible persons


Participants of the drill


Explanation by DDPM Ayutthaya staff


Explanation on health and sanitary by a health staff


Participated health volunteers

2) Preparation of each station (1400 – 1420)


Preparation by health volunteers

Preparation of sign board

3) Practice of evaluation drill and wrap-up (1420 -1500)

- Practice of the drill based on the planned acts, i.e., committee meeting to discuss/decide evaluation, announcement of the evaluation, registration, and necessary support to evacuees.

Committee meeting to assess water situation

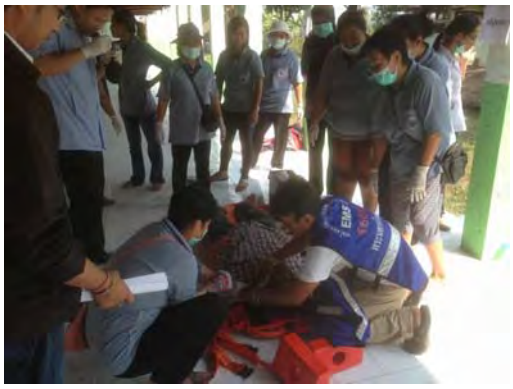
Evacuation to the evacuation center

Registration of evacuees

Registration of evacuees

Medical check-up by health volunteers

First aid for the injured by health volunteers



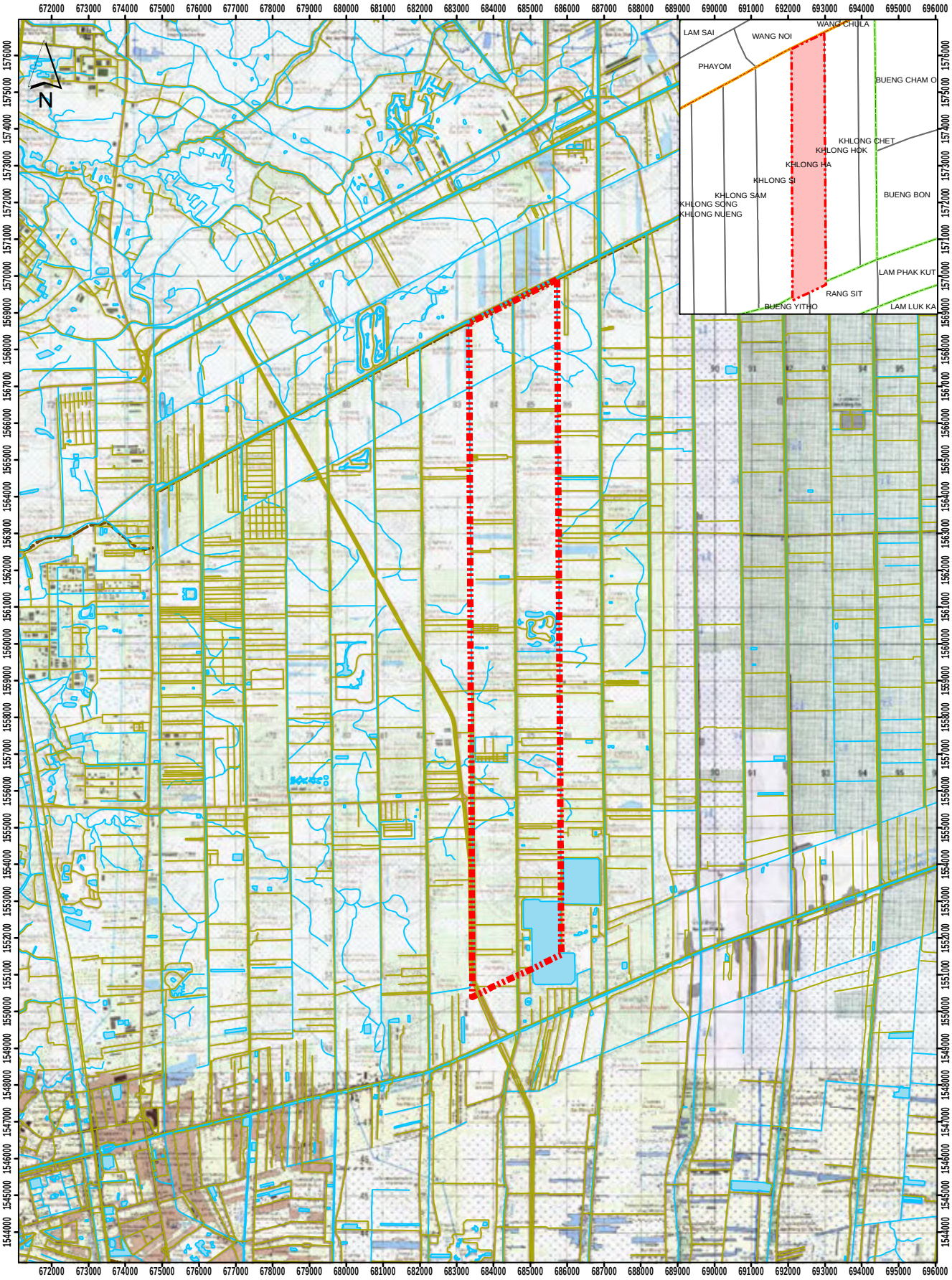
Put a patient on the medical stretcher

Distribution of emergency bags

Community Case Study

Tambon Khlong Ha, Khlong Luang District
Pathumthani Province

Content



Legend

- Provincial Boundary
- Tambon Khlong Ha
- Water body
- River
- Road

Note

Data Source:
Neibouring Tambon Boundary: GISTDA
Other data: RID

Scale 1:100,000 (1 0.5 0 1 2 3 4 km)

Date July 2013

Project for
Flood Countermeasures
for
Thailand Agricultural Sector

JICA

Topographic Map of Tambon Khlong Ha, Amphoe Khlong Luang, Pathumthani Province

1. Introduction

1.1 Overview of the Project

Flood of 2011 demonstrated that people and their properties in floodplains of Chao Phraya River basin were at risk. Excessive rainfall and related runoff caused major damages to agricultural land and communities along the river. Not only in the rural areas that were affected by flood inundation, the extensive inundation considerably was also hit the urban areas located further downstream, like Bangkok and its municipalities. Overall damages gave a large impact both directly and indirectly to variety business and agricultural sectors. Thus, Government of Thailand established two committees to deal with long-term measures, namely; "the Strategic Committee for Reconstruction and Future Development: SCRF" and "the Strategic Committee for Water Resources Management : SCWRM" to construct basic infrastructure during the coming decade.

To relieve suffering of agricultural sector, JICA has so far dispatched experts to advise SCWRM as well it's carrying out an emergency development study "Chao Phraya River Basin Flood Measures Project" as an antecedent survey of this Study. Also JICA is studying "Integrated Study Project on Hydro-meteorological Prediction and Adaptation to climate changes in Thailand" (IMPAC-T) as scientific technology cooperation before the occurrence of flood in which substantial linkages as well as explicit role sharing of each sector are requested.

1.2 Objective of the Project

The objectives of this Study are 1) support to recover the productivity of pastures, 2) rehabilitation and reinforcement of damaged irrigation/ drainage facilities and 3) support on the creation of the farming and rural community resistant to disasters. Thus, JICA cooperates with these measures so that it can assist short-term as well as long-term approaches by the Government of Thailand in agricultural sector.

1.3 Objective of the PRA

Within the framework of supporting on the creation of the farming and rural community resistant to disasters, information on community situation, the availability of resources, impacts, problems and countermeasures during flood and post-flooding period is required to understand the situation and the availability of resources in the community. This PRA was conducted collect information on these issues. After the PRA, the community will plan and implement needed activities to improve the problem situation with the support of the study team.

1.4 Site selection for PRA

The target areas for the PRA were jointly selected by MOAC, Provincial Agricultural Cooperative Office (PACO), the organization at the provincial level of MOAC, other related provincial agencies, and Study Team. Maximum of 2 sub-districts were selected from one target province with the criteria of; 1) suffering from serious flood damages, 2) having co-operative attitude toward public studies/ projects. There were 8 Sub-district selected as following;

1. Pathum Thani – Tambon Khlong Ha, Amphoe Khlong Luang
2. Nakhon Pathom – Tambon Naraphirom, Amphoe Bang Len
3. Chainat – Tambon Wang Man, Amphoe Wat Sing
4. Chainat – Tambon Khao Kaeo, Amphoe Sapphaya
5. Phra Nakhon Si Ayutthaya – Tambon Gop Chao, Amphoe Bang Ban
6. Phra Nakhon Si Ayutthaya – Tambon Singhanat, Amphoe Lat Bua Luang
7. Phisanulok – Tambon Chum Saeng Songkhram, Amphoe Bang Rakam
8. Phisanulok – Tambon Nakhon Pa Mak, Amphoe Bang Kratum.

1.5 Methodology of the PRA

In order to cover all information required, the data sheets and questionnaires required for the village-based activities were prepared (See annex 1). Information was collected by the following 4 tools.

i). Key informant interview
ii). Participatory mapping
iii). Site interview and observation
iv). Focus group discussions (FGD) and scoring exercise

1.6 Schedule of the PRA

Date	Place	Activity
18-23/5/2012	Tambon Khlong Ha, Pathum Thani	FGD
1-7/6/2012	Tambon Gop Chao, Phra Nakhon Sri Ayutthaya	FGD
8-13/6/2012	Tambon Wang Man, Chainat	FGD
15-20/6/2012	Tambon Naraphirom, Nakhon Pathom	FGD

2. Socio-economic Situation in Tambon Khlong Ha

1. Geographical Character

Tambon Khlong Ha is located in the low alluvial flats of the Chao Phraya river where its soil type is argillaceouswith moderate to high in acidity in the pH scale. The land slope from north to south is 0.1%. Khlong Ha sub-district extend over a land area of approximately 25,500 Rais which is subdivided into 16 villages (Muban) (Muban 1-16).

The northern border is connected to Amphoe Wang Noi, Ayudthaya.
The southern border is connected to Tambon Bang Yi To, Amphoe Tanyaburi, Pratumthani.
The eastern border is close to Tambon Khlong Hok, Amphoe Khlong Luang, Pratumthani, and
The west border is connected to Tambon Khlong Si, Amphoe Khlong Luang, Pratumthani.

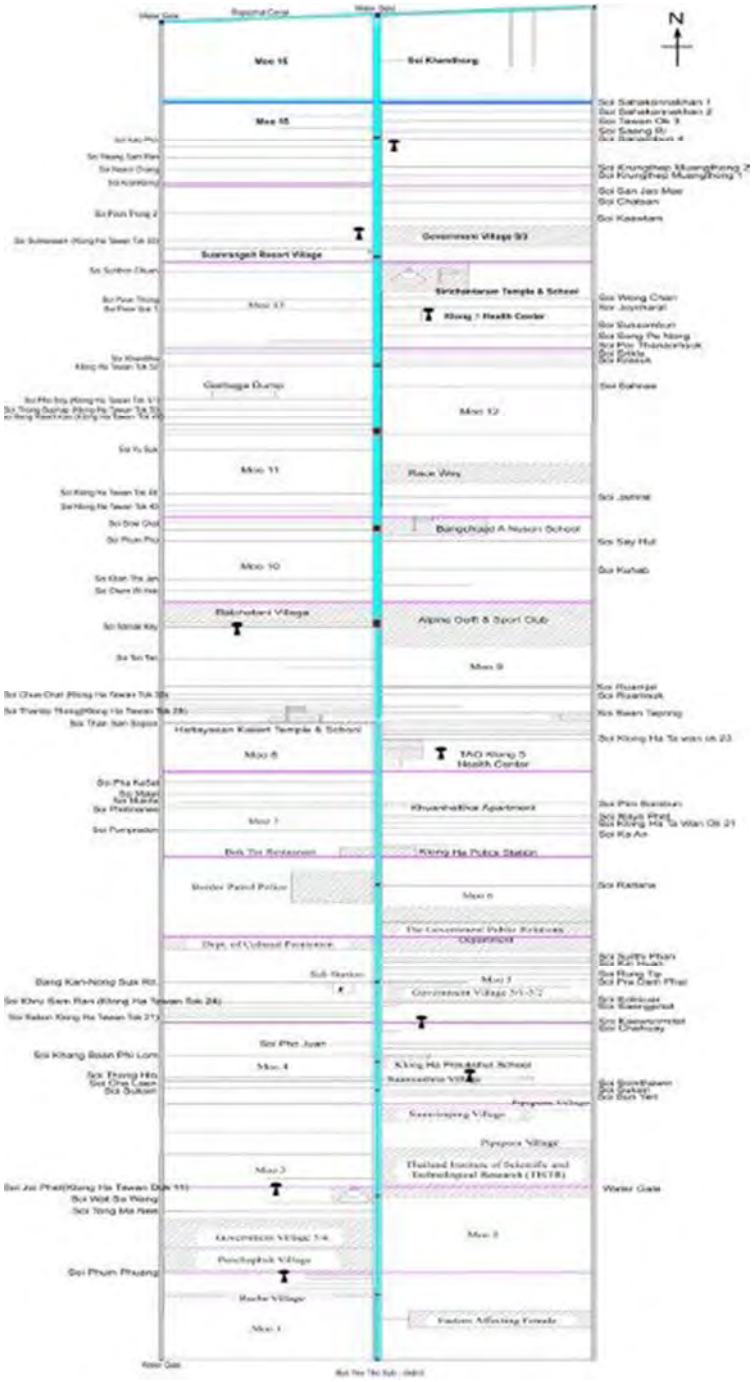
There are two road routes for the main community and transportation, one is Bang Kan- Nong Sua that runs through the central of Tambon Khlong Ha from the west to the east to connect with Rangsit-Nakornnayok road, the other is the Tambon's internal road called the Rim-Khlong Ha road which runs from the north to the south; the northern side is close to Rim Kan Ra Phee Pat road; the southern side is close to Rangsit-Nakornnayok road.

There are 4 main canals which people use for household consumption and for agricultural purposes:

1. The 5th Collector drainage which separate the Tambon along the linear from 1-16 villages, marking the east and west side of the Tambon.
2. Rapeepat canal interposes between Tambon Khlong Ha, 16 village and Wang Noi district, Ayudthaya.
3. The 5th Distributory canal (The L 5-6) interpose between the Khlong 6 area.
4. The 6th Distributory canal (The L4-5) interpose between the Khlong 4 area.

The housing character of Tambon Khlong Ha is that people preferably build their houses in their farm area and close to canals to easily utilize the canals for agricultural purposes. There are houses which are Central Thai type with elevated first floor, and the contemporary one without the elevated first-floor with the proportion of 50-50%.People tend to have their houses built without elevated first floor rather than the original elevated one in Khlong Ha since the start of the irrigation system that diminish flood problem and the trend of modern housing also has an influence.

Since the housing characteristic of Tambon Khlong Ha is that the houses lines along both sides of the water-distribution canal, it's necessary that people build bridges to assist the community of the people. Nowadays, there are roughly 50 bridges built by Khlong Ha's TAO's budget or other government agencies whereas there are a number of others that were built by the private's expense.



Map 1 : Community Map

2. Socio-Economic characteristic

Population

The population number of Khlong Ha is 12,398 which make 4,962 household, In this number there are 5,991 males and 6,407 females. The most populated villages is Muban.5; 1,893 people, Muban.14; 1,546 people, and Muban.8; 946 people consecutively. The least populated village is Muban.10 339 people.

The population in Khlong Ha consists of 1. Native people who are mostly farmer 2. the new comers. As the area is gradually urbanized and the trend of more housing development projects constructed throughout the area, it results in the rising of the new comers number. The housing development projects are such as Raja Village Muban.1, the government public housing (Ban Eur Ar Thorn 5/4) Muban.2, Benjapruk Muban.2, Suan Thida Village, Suan Rim Beung Village, Pipaporn Village, government public housing (Ban Eur Ar Thorn 5/1-5/2) Muban.5, government public housing (Ban Eur Ar Thorn 5/3), Suan Rangsit Resort Village Muban.14. The average asset price is around 1-2 million Bath.

Khlong Ha population is classified into two major groups 1. Permanent residents 2. Temporary residents who migrate due to the career source which are majorly industrial labors, SML size factory, and construction sites and some agricultural sectors. This can be noticed by the vase expansion of cheap rent-apartment throughout Khlong Ha.

Income

The income source of Khlong Ha is classified into 4 major parts being; 1.agricultural products 2. Wage and salary of the household members (both registered and non-registered in the labor system) 3. Private merchandising 4. Public welfare (divides from fund groups, government welfare, elderly allowance).

Occupations in Khlong Ha are majorly employee of all sectors, following by farmers. By considering the rising number of construction site and SML size factory, private service sector (restaurant), government places dispersed throughout Khlong Ha, the high number of employment of such manner can be estimated. Whereas the agricultural sectors in Khlong Ha, there's a number of involvement in agricultural technologies and professional employment in business manner. Professional workers with appropriate equipment from nearby or within the area are hired on a job basis to, for example, plough, sow, spray insecticide, and harvest. There're high tendency that this kind of faming will continue and the farm owners don't take their own farming action.

Place of business	No.
1. Service based business	21
2. Furniture related business	1
3. Petroleum Coal Chemical related substances business	3
4. Metal and mineral related business	3
5. Fuel business	23
6.Used product related business	3
7.Agricultural product related business	2
8. Vehicle and machinery related business	7
9. Flee market	2
10. grocery	94
11. Food business	11
12.Golf course	1
13. Car racing course	1
14. Herbal medical business	1
15.National science Museum Muban.3	1

Place of business	No.
16.National archives in commemoration of H.M. the king. Muban.5	1
17. The great Artist Museum	1
18.Kanchanaphisek national museum	1
19. Government places; prison Muban.1, police station, border patrol station Muban.5, electronic sub-station Muban,6	4

Sources: Basic Minimum Needs survey for Tambon Khlong Ha, Amphoe Khlong Luang, Pathum Thani province year 2011.

Household expense

The household expense of people in Khlong Ha is caused by their production cost, children education, and extravagant goods such as mobile phones, motorcycles and electronic devices, in the consecutive order.

Debt

Khlong Ha's debt situation regarding agricultural household is caused by the cost of production and to by production input equipment and tools, followed by extravagant cost (mobile phone, motorcycle). Most people get loan from Bank of agriculture and agricultural cooperative, followed by commercial bank and loan outside the banking system consecutively. People outside the agricultural sectors usually get quick loan from outside the banking system. The government's one million one village project also provided villagers with loan that help people of the particular village with any expense in the household.

Saving

Important saving source of Khlong Ha people are the Bank of agricultural and agricultural cooperative for famers and commercial bank for non-farmer members. Moreover, to promote the good saving habit to people in Khlong Ha, community leaders have set up the Tambon's Sudjasasomsap saving group. As a small group, there're 375 members with 600,000 Bath in revolving fund. The profit of the operation would be for members welfare 65%, divided among the members 25% and operation cost 10%.

Labor

Tambon Khlong Ha is located close to the industrial zone and Bangkok's service sector. Resident who age over 15 year old and finish compulsory education would tend to move to the capital cities and other major cities rather than continuing their family's farming business. To group the type of labor in Khlong Ha, there are three types as follow.

1. Labors in small industry, factories, business and construction sites or agricultural business. There are cases that workers who work for small operations or work in a day-by-day basis would not be registered in the government data base and cannot be tracked for the existence. The workers in such work character are usually migrants from the north-eastern part of Thailand or Burmese.
2. Labors in big industry, factories in the nearby industrial park. As such work place is more systematic in payment and welfares, labors in such work places are registered in the government data base system therefore their existence can be tracked, therefore the Burmese in this sectors would be formally registered. And as the bigger industries require more advanced knowledge, it is more likely that workers from central Thai would be employed.
3. As Khlong Ha is more urbanized and easy to commute to the nearby work place, Khlong Ha resident whose work place is in Bangkok or downtown Pathum Thani can stay in Khlong Ha and commute to the work place, but those from the north-east and the alien worker would rent cheap apartment as stated earlier.

Tambon Administration Organisation.

Khlong Ha's Tambon Administration Organisation is located at Muban 15, Khlong Ha sub-district, Khlong Luang District, Pratumthani. The organisation was established in 1995. It currently holds the following number of manpower and budget.

Table 3: The number of TAO's executive and officers

TAO Council Board	Amount	Executive board TAO	Amount
1. Chairman of TAO council board	1	Chairman of TAO Executive board	1
2. Vice Chairman of TAO council board	2	Vice Chairman of the TAO	2
3. TAO council members	32	Secretary of the TAO	1
		Chief Administrator of the TAO	1
		Administrator of the TAO	22
		Finance Division	13
		Public Works Division	13
		Civil Defense Volunteers	70

Source: Khlong HaTAO

Table 4: Budget, Number of TAO's project from the 3 years development plan from 2011-2013

Strategy	2011 Budget		2012 Budget		2013 Budget		Total 3 year	
	No. Project	Amount (Baht)	No. Project	Amount (Baht)	No. Project	Amount (Baht)	No. Project	Amount (Baht)
1. Promotion of the development of Public Utility.	27	57,430,000	20	36,500,000	15	29,940,000	62	123,870,000
2.Promotion of Good living standard and social welfare	40	18,287,000	43	19,085,000	44	19,525,000	127	56,897,000
3.Promotion of good governance	28	15,406,300	18	9,901,000	19	8,947,500	65	34,254,800
4.Promotion of good living environment	5	490,000	5	490,000	5	490,000	15	1,470,000
5.Promotion of Development of local economy	6	493,500	5	450,000	5	450,000	16	1,393,500
6.Promotion of Local art culture and wisdom	7	1,085,000	7	1,085,000	7	1,085,000	21	3,255,000
7.Promotion of tourism	-	-	1	50,000	1	50,000	2	100,000
Total	113	93,191,800	99	67,561,000	96	60,487,500	308	221,240,300

Source: 3 year strategy plan Khlong HaTAO

Education

Khlong Ha's Education Institutes consist of 4 primary schools and 1 secondary-high school which names are as follow:

- Primary Education :Khlong Ha School, Chumchon Wat Hattasarn School, Bang Chord Anusorn School (Autistic students can enroll)
- Secondary-High Education : Teepangkorn Vittayapat School (bang chord Anusorn)

PRA shows that more people prefer to support their children's education further than the compulsory level. In case of having finished their education in the area's high school (Teepangkorn Vittayapat

School), the student can make two choices which are ; 1. Enrolling in one of the vocational schools located in downtown Pratumthani or 2.Continuing bachelor degree in Rajamongkol University, Pratumthani.

Health Situation

Health stations in Khlong Ha are located at Muban7 and 13. In addition there is 1 conventional pharmacy in the Tambon. The condition which people receive medication from the Health Stations the most are respiratory disease, blood circulation related disease consecutively. And the chronicle patients who receive monthly medical prescription are those with diabetes and high blood pressure which is around 7-10 per village. The health station receives assistance from the health volunteer from each village who always keep records of chronicle, immobilized and patience.

Relationship of people in Tambon Khlong Ha

Khlong Ha people are agricultural based society. As a characteristic, there're deeply connected to nature. Almost all of the residents are Buddhists therefore the Buddhist rituals people have in common are; rite of passage involving ceremonies of birth, death, ordain; ceremonies related to nature such as the praying of the river and forest. Despite the modernization around the area, originally people consider kinship very seriously and the modern facilities don't cover all the area, therefore people are still socially oriented. It became apparent when the time of crisis, or some important public activities that the community leaders or authorities get full participation.

Land Use

People in Khlong Ha are mostly farmers, as the result, the location of the house are close by the water for agricultural purposes. But recently, there is a rapid expansion of town that marks changes of the land use. There is an increasing number of constructions, business location and housing development which are distributed mostly among Muban1 and 2. The significant location is such as national science museum and other technological transfer centers.

Table 6 : Land Use in Khlong Ha (Rais)

Total Land	Residential Area	Paddy Land	Perennial plant	Vegetable and ornamental plants	Factory	Government Place	Water Source	Golf Course	Others
28,528	3,256	10,907	25	321	53	1,356	1,572	729	7,281

Source: Land Development Department

Land Right

There are two types of land right 1.owned by the owner the land by possessing the land deed. 2. Royal property- this is considered governmental asset that government places were built on or rent to people for a curtain period of time.

Civil Defense Volunteers and One Tambon One Security team (OTOS)

The Civil Defense Volunteer are responsible for making sure of public peace that can varies from traffic work, security work emergency call and many others. It works under supervision of TAO. There are 75 Civil Defense Volunteers in Khlong Ha, 10 of the number had participated in the OTOS training. The volunteers take turn to attend the revision training that held annually and taught by defense authorities.

Although the volunteers work under TAO, the supportive expense is given only partially such as some necessary equipment, and training allowance, that is to say, the volunteers use their own expense or donation support. At present, the tools and equipment which consist of 2 tank trucks, 11 radio communications, are kept at the Tao office. In case of the Emergency Health Service, Volunteer would be given allowance by the count of patience they serviced.

Social Group

The enterprise group are for example; wrath group, flower arrangement group, auspicial flower making group, Thai sweet, hydrated banana group, Thai cereal snack group all together makes 16 groups. Their product is internally consumed majorly. There are occasions that they promote their products in important events but still not largely consumed by people from outside because of the lack of mass production materials.

In addition, Tambon Khlong Ha Agriculture Department initiates the establishment of Tambon's Technological Transfer Center, Production Seed Center that located at Muban 13 and 14 consecutively. These centers are targeted to transfer agricultural technology and to strengthening farmer groups, as well as the capital that can provide cheaper production seed to cut farmer's production cost.

Communication System

For communication system, Khlong Ha's information was distributed by the head of the villages to their residents, and make use of the amplifier vehicles that run throughout every villages. Khlong Ha TAO is considering some budgets to additionally set up the wired amplifiers that situated in each village for more effective information distribution system.

Electricity

Khlong Ha's residents can access to electricity throughout under AmphoeKhlong Luang Provincial Electricity Authority (PEA). Even in time of flood, the local PEA can still energize normal level of electricity with assistant of skilled technicians to elevate electricity transformers above the water level.

Water work

Water for consumption in Khlong Ha is to systemize ground water (wells) into filtered quality and distribute among each villages in Khlong Ha that sum up to 9 wells, 7 of which are under the care of TAO whereas other 2 are under private's responsibilities, 1 of the 2 is 180-200 in depth located in front of Raja village, the other is 200-250 in dept and located in front of Hattasarn School. The well in in front of Hattasarn School could be filtered into drinking water for the students.

3. Agriculture Situation in Tambon Khlong Ha

Geographic and agricultural character

Tambon Khlong Ha, Amphoe Khlong Luang , Pathum Thani Provinceis a flat basin. Soil type is clay. Water source for agricultural use are adequate which supply from drainage ditch no. 5 and irrigation canal (Khlong Ann). Previously, farmers at Tambon Khlong Ha grew broadcast rice as main crop but after restructuring agricultural area, all farmers grew riceusing water scattering method. Rice varieties are RD 31 and Suphan Buri 1 etc.

After flooding crisis, outbreak of plant disease and insect pest occurred in concurrent with the low price of rice. Farmers transformed rice crop to orchard, fruit tree and vegetables.Some farmers utilize cultivating area from only rice plant to be more integrated varieties of crop. There is high potential of such transformation as well as vegetables i.e., Galangal, Lemongrass, Zucchini and Chinese Bitter

Gourd. Growing pattern is Chinese Raised bed. Farmers buy input i.e., seeds, chemical fertilizers and pesticides from local agro-chemical shop and from Khlong Luang Cooperatives.

Fig. 1 – 3 Agricultural character

Table1 Agricultural area of Tambon Khlong Ha

No.	Area	Number of farmers (Household)	Number (Rai)
1.	Dry Season	445	10,907
2.	Vegetables	102	321
3.	Perennial crops	15	25
Total		562	11,235

Source: Agricultural Extension Office, Amphoe Khlong Luang

Report from Agricultural Extension Office, Amphoe Khlong Luang on general profile and information of agricultural at Tambon level Year 2554/2555, total population of 562 households and total agricultural land of 11,235 Rai are categorized to land use as follows (Table 1);

- Dry Season rice : 445 households, total area: 10,907 Rai.
- Vegetables: 102 households, total area 321 Rai, namely lemongrass, pandanus, yard long bean, eggplant, chinese bitter gourd , zucchini, bird chilli and sweet corn
- Perennial crops: 15 households, total area 25 Rai such as coconut.

Contribution of Agricultural land Use

Land registering for agricultural use at Tambon Khlong Ha has total area of 11,253 Rai. Significant Economic crops are rice, vegetables and fruit tree.

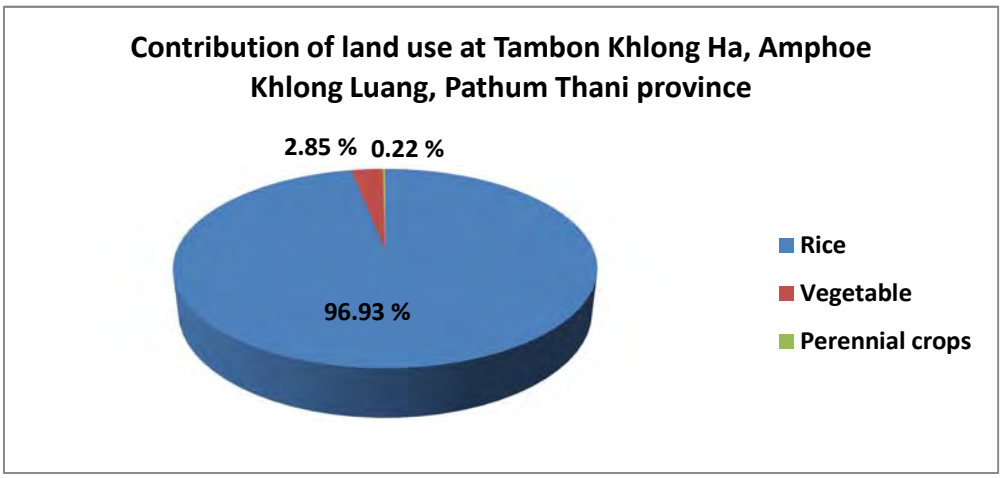


Fig. 4Contribution of agricultural land use of Tambon Khlong Ha

Table 1 and Figure 4 showed that rice growing area is 10,907 Raior 96.93 % of total agricultural area. Rice crops run all year, both dry season rice and wet season rice. According to plenty of water resource, rice crop can be harvesting 5 crops in 2 years. Growing Rice of Wet season rice (Na Pee) begins from May to August whereas Dry season rice (Na Prang) begins from November to April. Most of rice seed stocks purchasedfrom Khlong Luang Agricultural Cooperatives, those varieties are RD 31, RD 41, RD 47 and PSL 2 etc., average yield are in the range of 800-850 Kg./Rai. After harvesting, farmers sale rice grain mostly at the price of 12 baht per kilogram. Farmers are growing rice for trade not for their household consumption. They do not eat rice from their own farm according to the unsatisfied quality (not soft texture). In addition, heavily use of herbicide and insecticide will increase investment cost. Estimation from expense of chemical fertilizers and pesticide, farmers paid for one crop in one rai ca. 5900 Bht, however, this figure varied based on the amount of fertilizers, agrochemical used and land lease for rice farming.

Vegetable production area covers 321 Rai which contributes 2.85%. Those are Lemongrass, Greater galangal, gourd, Yard Long Bean,Sweet Corn, eggplant,Bird chilli and Pandanus etc. Orhard production area is25 Rai contributes to 0.22%. Those are coconut plantation, mangofarm, jackfruit etc. Livestock is scarcecompared to other type of farming such as poultry raising (chicken and duck raising) and fish pond. Most of them was raised for household consumption. Cattle is raised in village Muban 11 in order to feed as raised cattle

Table 2 Land damaged by flooding at Tambon Khlong Ha

Muban	Farmer	Rice (Rai)	Agronomycrop (Rai)	Orchard and others (Rai)	Assistance in cash (Bath)
1	23	20	-	137.5	745,415.00
2	7	73	-	72.75	533,085.50
3	17	264	-	13.25	654,156.50
4	8	138	-	18.25	399,674.50
5	6	112	-	22.75	364,843.50
6	9	92	-	20.75	310,207.50
7	22	418	-	48.25	1,174,774.50
8	11	142	-	50.75	574,247.50

Muban	Farmer	Rice (Rai)	Agronomycrop (Rai)	Orchard and others (Rai)	Assistance in cash (Bath)
9	7	88	-	33.5	366,319.00
10	10	296	-	11.5	716,339.00
11	24	322.75	-	94.25	1,197,637.00
12	31	255	-	90	1,025,430.00
13	39	716	-	72	1,958,008.00
14	24	479	-	6.5	1,097,475.00
15	30	562	-	40.5	1,455,233.00
16	36	561.75	85	374.75	3,426,434.00
Total	**304**	**4,539.50**	**85.00**	**1,107.25**	**15,999,279.50**

Source: Department of Agriculture.

Table 2 Showed the damaged agricultural areas from flooding (data received from Department of Agriculture Extension). Information gathered from both pre-registered farmers and non-registered farmers. Total affected farmers are 304 with total area of 5,731.75 Rai were damaged.

According to crops, rice planting area was damaged ca. 4,539.5 Rai,agronomy crop area i.e., taro, sweet potato were damage 85 Rai, others i.e., lemongrass, pandanus, yard long bean, eggplant, chinese bitter gourd, zucchini, bird chili, and sweet corn were damaged in total of 1,107.25 Rai

Subsidy and support by government is estimated as 55 % of investment cost per rai per year in 2554 BE. This subsidy is paid 100 % of actual damage area.

- Rice growing area subsidy for 2,222 Bht /Rai
- Agronomycrop area subsidy for3,150 Bht/Rai
- Orchard and others subsidy for 5,098 Bht/Rai

Government assistance to farmers, Tambon Khlong Ha in cash 15,999,279.50 baht

Learning Center of Farmers at Tambon Khlong Ha

There are places of learning centers located in Tambon Khlong Ha., i.e., Agriculture Technology transfer Center of Tambon Khlong Ha, Learning Center of Land Development following Sufficiency Economics, Learning Center of Sufficiency Agriculture, Learning point of Bio-fermented Juice etc. All Centers located at Muban 4, Tambon Khlong Ha. In the land owner namely, Mr. Wimol Nontanakorn, volunteers of Soil Doctor Tambon Khlong Ha (Fig. 5-6).

Fig. 5-6 Learning Center of Tambon Khlong Ha

Results from interviewing farmers, we found that farmers lack of knowledge and skill in farm management and good agriculture practice as well.

Supporting Organization

Ministry of Agriculture and Cooperatives allocated vacuum insect light trap (Fig. 7) to eliminate brown plant hopper and thrips etc.According to the project of BPH quarantine and control following the resolution of cabinet on 3 May 2554 B.E.The main objectives are to attract insect pest and decrease severity of infestation as well as to reduce agrochemical usage. However, this village received only two traps which still not sufficient for sharing among farm owners.

Fig. 7 Vacuum Insect Light Trap

Crop Season/type	Varieties	Month												Product (Kg./Rai)
		Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec	
Raining period						X	X	X	X	X	X			
Flooding period										X	X			
Drought period				X	X									
Dry SeasonRice (5 Crops in 2 years)	RD 31, RD 41,RD 47 and PSL2	1st Paddy Cropping			2nd Paddy Cropping				3rd Paddy Cropping					800 - 900
		4th Paddy Cropping				5th Paddy Cropping								
Lemongrass	Kaset													2,000

Table 3 shows the cropping season in the area. In the normal situation (not flooded), farmers grow dry season rice or planting rice 5 crops in 2 years. The first round of broadcasting begins on December which will be harvesting on March. Secondround begins on April to July and third round begins on August to November.

In case of flooding, the time of broadcasting will shift to January to April and the second round begins on May to August. Farmers will harvest earlier and finish harvesting in September according that there is a risk of flooding between September to October.

For vegetables, lemongrass is a economic crop which returns good income to growers. In normal situation, lemongrass can be planted all year round. However, farmers prefer starting new stocks during July to November. Because during this period, price of lemongrass is always high ca. 14 Bht/Kg. of this season, price is only 5 Bht/Kg.

Table 4 Trend analysis of Crop/Livestock Farming

Type of Commodities	History	Present	Future
1. Wet Season Rice	RD 31, RD 41,RD 47 and PSL2	RD 31 and RD 41	RD 31 and RD 41
2. Dry SeasonRice	RD 31, RD 41,RD 47 and PSL2	RD 31, and RD 41	RD 31 and RD 41
3.Vegetables	-	Lemongrass, Gourd and Galangal	Lemongrass, Gourd, Galangaland Sweet Corn
4. Orchard	Mango	Papaya	Lemongrass, Gourd, Galangaland Sweet Corn
5. Ornamental Plant	Red Palm	Red Palm and Yellow Palm	Sweet corn
6. Animal	Chicken, Duck, Pig and Cattle	Chicken, Duck and Pig (household consumption)	Cattle (For feeding cattle)

Table 4 Shows that at present and near future, farmerscontinue growing rice and vegetables as vegetable is the short season crop, easy to manage of growing and harvesting and reduce risk from flood damage.

Table 5Production cost of rice / Rai

No.	Items	Value (Bht)
1.	Land lease	1,000
2.	Soil preparation	700
3.	Rice seed including broadcasting	600
4.	Herbicide	300
5.	Chemical fertilizer including application	1,300
6.	Pesticide including application	500
7.	Fuel	600
8.	Labor fee for wild rice picking	150
9.	Harvesting including transportation	750
Total production cost		5,900
Yields (Tang/Rai)		90
Income in average (Bht)		10,800
Net income (Bht/Rai)		4,900

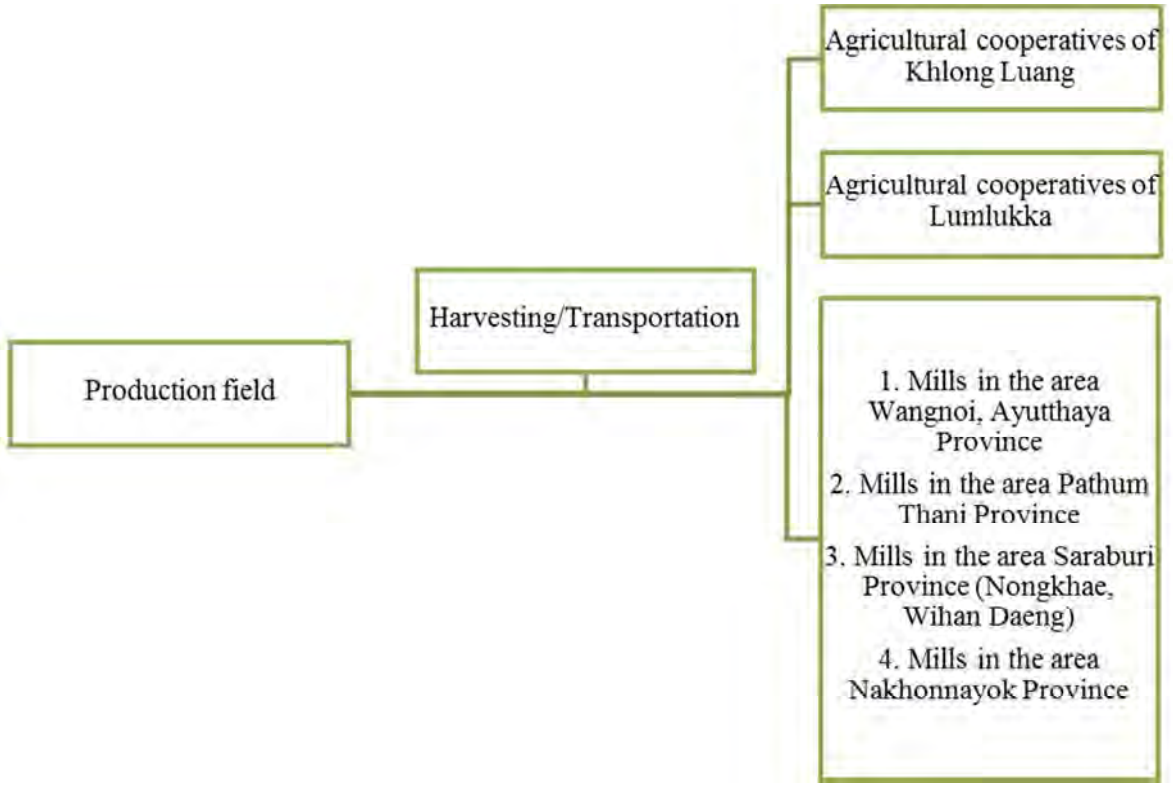
Table 5Shows that production cost of rice in average per rai is 5,900 Bht. Government subsidy and guarantee rice price at average 5900 Bht/Rai. In year 2554/2555 B.E. price guarantee for rice in the amount of Kwien (1,000 Kg) at 12,000-15,000 Bht (depends on quality of rice). Farmers will receive net income 4,800 Bht/Rai. When Compare this income to previous year, this net income is higher according that the guarantee price last year was lower (ca. 8,000-9,000 Bht) .

Table 6 Production cost of lemongrass / Rai

No.	Items	Value (Bht)
1.	Lemongrass stocks	200
2.	Chemical fertilizer	400
3.	Compost	500
4.	Pesticide	300
5.	Fuel	200
6.	Plastic rope	50
Total Production Cost		1,650
Yields (Kg/Rai)		2,000
Income in average (Bht)		28,000
Net income (Bht/Rai)		26,350

Table 6Shows production cost of lemongrass in average 1,650 Bht/Rai. Average income per rai is 26,350 Bht depends on market price and cropping season.

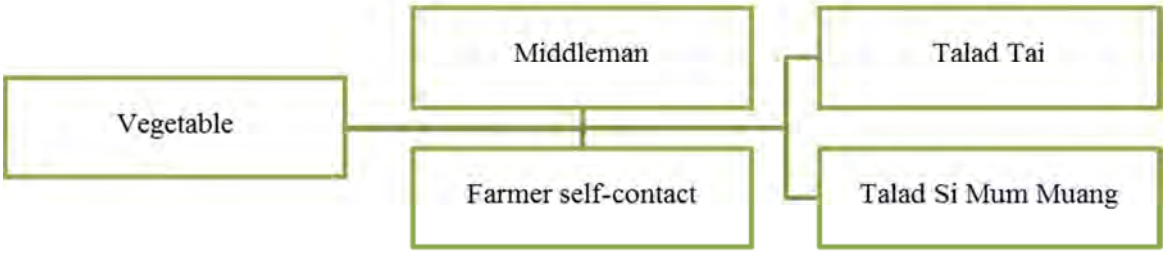
Transportation and Market



Farmers hire harvestor at harvesting season. This service is provided locally in Tambon Khlong Ha. Paddy rice will be transported to rice Mill at the service charge of transportation 200 Bht/ton. Paddy rice will be sale to Rice mills; i.e., Agricultural cooperatives, Khlong Luang, Muban 7 (receiving capacity is 200-300 ton/day), Agricultural cooperatives, Lumlukka (receiving capacity is 40 ton/day)

and Kaset Tavorn Rice Mill, private sector (receiving capacity is 200-300 ton/day). Surplus Paddy rice (over capacity of local Rice Mill) will be sold in the neighboring province i.e.,

1. Rice Mills at Wangnoi, Ayutthaya Province
2. Rice Mills at Pathum ThaniProvince
3. Rice Mills at Saraburi Province (Nongkhae, Wihan Daeng)
4. Rice Mills at Nakhonnayok Province



Farmers grow various type of vegetables i.e.,galangal, lemongrass, zucchini and gourd etc. Production area of those vegetables are in Muban 11 and 12. Middleman who live in the same village will collect and give pricing. Middleman take responsibility to transport and supply produce to Talad Tai and Talad Si Mum Muang which both places are closed to production area.

Constraints

- Over use of chemical fertilizers
- Price of produce is low but input for production cost is high
- Brown plant hopper outbreaks
- Most farmers has no own land tenure, resulting land lease is included for investment. There are 2 types of land lease.
  - No own land at all
  - Bit owned land and require more land for production

Response Program and Plan of the Community

1. Should adopt technology or any innovations to grow plants while flooding ,i.e. aquatic floating plant and air floating.
2. Establishment Seed Bank
3. Provide training course on Agricultural technology and promote to implement on farm.
4. Planting trees and select tolerant varieties such as Mahogani, banana and coconut etc.
5. Change from perennial plants to annual plants. Modified growing plan for instance plants with short cycle such as cucumber, lemongrass, zucchini, bitter gourd, yard long bean etc.
6. Promotion and extension to grow food crop for self-consumption in both situation of flooding and normal life.
7. Select resistant varieties of rice to disease and insect pest
8. Planning for cropping production
9. Begin broadcasting early and harvesting not later than September
10. Construct small rice mill for community (for own consumption)

Annex

Rice field and lemongrass field of Mr. Wimol Nontanakorn

Process of Aids the victims of natural disasters

Damaged agricultural areas means area where farmers cultivate crops or rice crops or livestock and fisheries. Those area was damaged by natural disasters i.e., floods or drought which affected to cultivated crops, feed animals or fisheries are damaged, not able to harvesting.

Farmers are able to request aids when face the natural disasters. First step, farmers need to apply for registration (TBK. 01) with the agriculture extension staff in that Tambon or can apply at District Agriculture Office. To register, farmer must go to relevant office to their damage agriculture i.e., crops must register at crop farming district office, livestock must register at livestock district office. While register of fishery at District Fisheries Office.

*"It is noted that the valid registration must register before the disaster

Farmers who suffer from natural disasters should proceed as follows.

1. Agricultural land (arable land) was affected by a disaster or damage. Victims should notify their damage to the village headman, village chief or Center of agricultural technology transfer. According to crop; reported will be directed to District Agricultural Office. For livestock, farmer must report to the livestock district office. For fisheries, farmer must report to local district fisheries office at the site of affected disaster area immediately.

Documents required for aids are as follow;

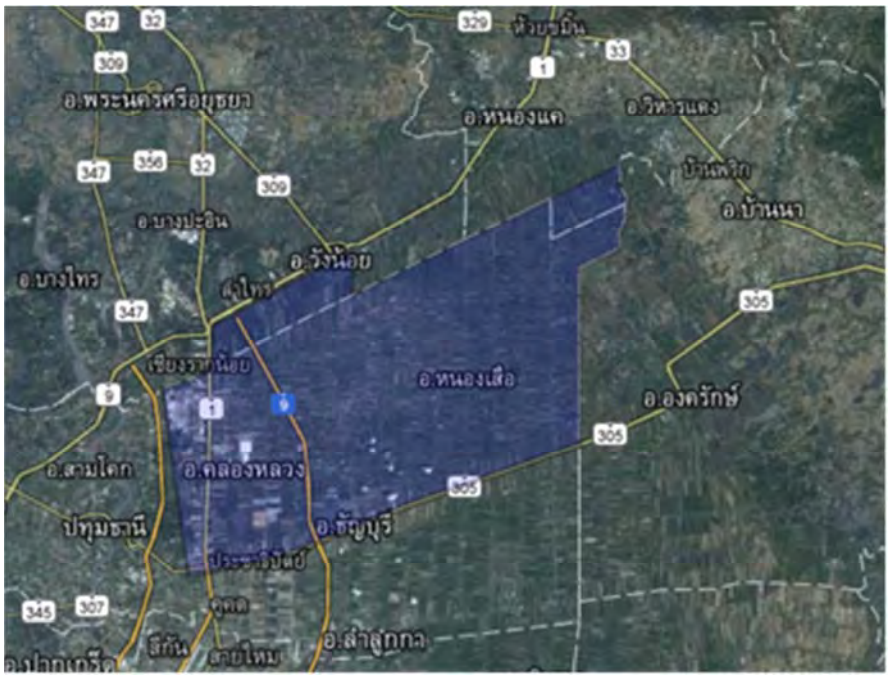
1) Copy of identification card or house register
2) Copy of the document of right (N.S. 3 land lease, tax receipt or otherwise to verify actual owner of the damaged area
3) Photos of damaged area.
4) Copy of bank statement Bank for Agriculture and Agricultural Cooperatives of victims or their spouses.

2. Fill out the information of damage into Aid Request Form (KS01) to complete and verify the correctness of the document. Damage to the crops, livestock and fisheries can notify at the district agricultural office, Livestock district office and Fisheries district office, respectively.

3.Victims should verify the accuracy of the information, including name, surname, address and identity card numbers, or as stated according to form KS 02 at the district agricultural office. Announcement will be posted to public at least 3 days at the village chief or headman of the village community in the arena. If found false information or fraud, The responsible officer i.e., District Agriculture and Fisheries district office immediately action upon to verify and correct information within designated duration. If no objection occurred, it is concluded that whole community approve and ensure the accuracy of the information.

4.Once approved aids, victims should contact to obtain the certificate of payment (KS 04) issued by the agricultural district or officer in charge. Then bring KS 04 and ID card to get money from Bank for Agriculture and Agricultural Cooperatives. Designated branch and time for contact to bank will be considered and assigned by Branch offices of Bank for Agriculture and Agricultural Cooperatives and Agricultural office district.

4. Water Management Situation in Tambon Khlong Ha



Map 2: Boundary of RansitNua O&M Irrigation Project

Tambon Khlong Ha is under the responsibility of the irrigation and maintenance project in Rangsit Nue, of which the water source is from the Chaophraya Dam via Anusartnant Canal (Chainat Pasak Canal). This project is extended from the Pasak Tai project, divided to two main canal, i.e. West Rapeepat Canal and South Rapeepat Canal. The area in Tambon Khlong Ha receives water from West Rapeepat Canal and Phrasrisilp Floodgate, located at the begin of the canal. Its capacity is 80.715 m3 per second and It distributes water to the areas in Pathum Thani Province; Amphoe Nongseau, AmphoeKhlong laung, Amhur Tanyaburi, Amphoe Meung and some parts of Amphoe Samkhok, and in Ayudhaya Province; Amphoe Bangnoi, Amphoe Bangpa-in and some parts of Amphoe Bangsai.

The length of the canal is 36.600km with nine sub-canals and 10 lateral canals. Tambon Klon 5 is located between the 5th lateral canal and the 6th lateral canal.

Important Water Sources

1. The 5th Collector Drain: This collector drain cuts vertically through the middle of the Tambon and separates the area into 2 sides i.e. the east and the west. Additionally, it also acts as the water supplier for the use of people in Khlong 5.
2. Rapeepat Canal: The canal lies in the north of TambonKhlong 5 and act as the borderline of Muban 16, TambonKhlong 5 and Wang Noi District of Ayutthaya.
3. The 5thDistributory Canal (Khlong Ann 5,6): This is the border line of TambonKhlong 5 and TambonKhlong 6
4. The 6thDistributory Canal (Khlong Ann 4,5): This is the border line of TambonKhlong 5 and TambonKhlong 4

Note: In TambonKhlong 5, the collector drain is vertically paralleled by the distributary canals. The distance between the drain and the canal is approximately 1 kilometer apart. Water is reserved in all water sources throughout the year for the use of general public.

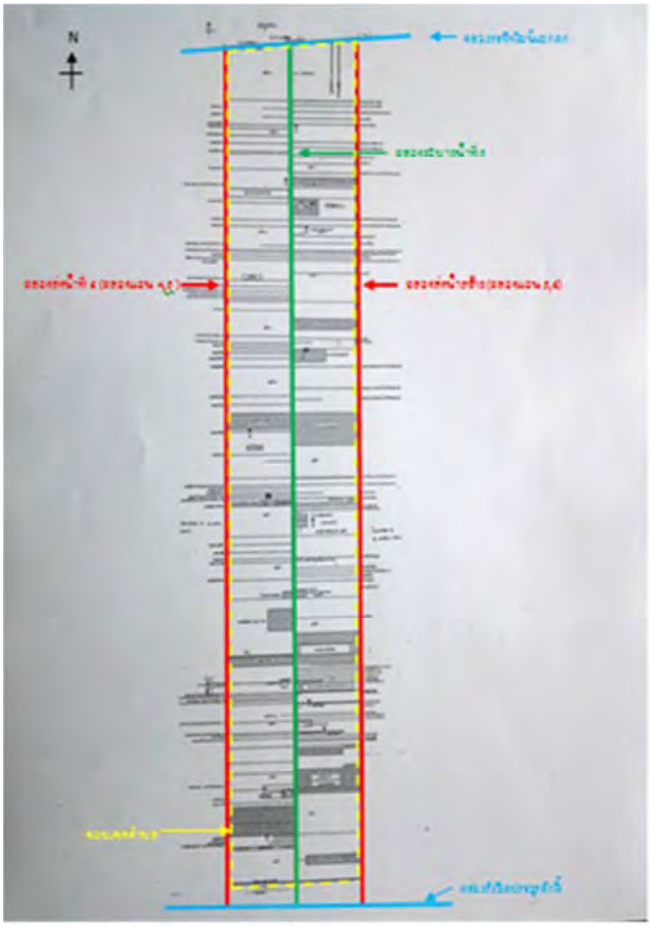


Fig: Water sources in TambonKhlong Ha

The Diversion System

Water used in Khlong 5 is mainly diverged from Rapeepat Canal through the water gate into the 5th Collector Drain, the 5th Distributary Canal and the 6th Distributary Canal. The water flows from the north heading southward. The level of water in these three sources depends on the water level of Rapeepat Canal. However, water users of Khlong 5 can adjust the water level in the three sources by themselves via the water gate at the beginning of each canal and the drain.

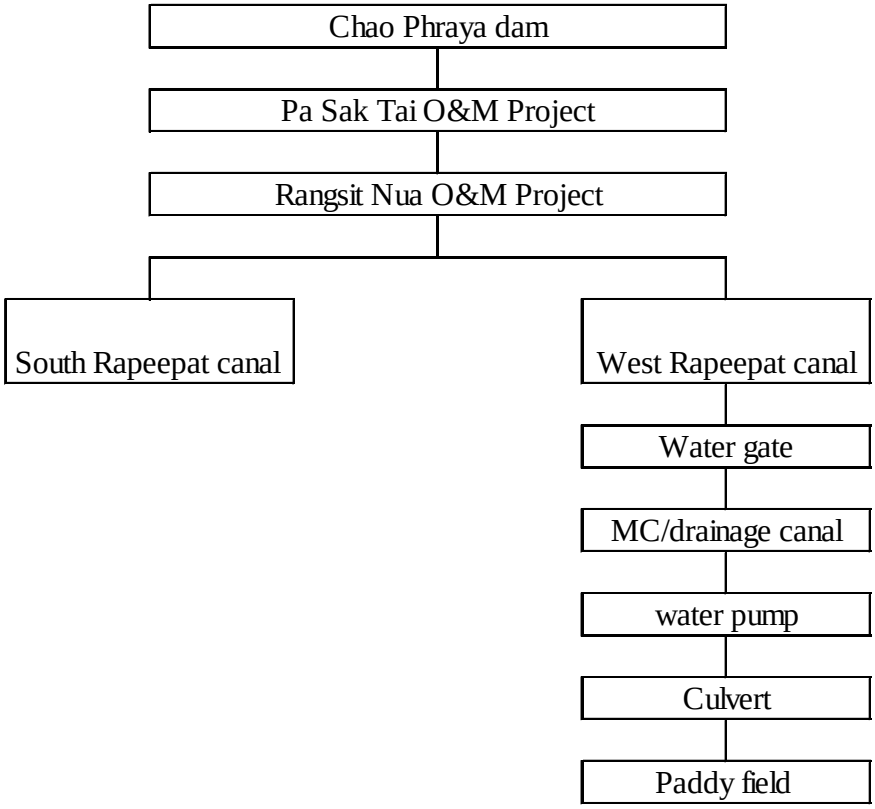


Fig: Diversion system from river to paddy field

Fig: The Water Gate of the 5th Collector Drain

Water Management for Agriculture

The water from Rapeepat Canal would flow into the two distributary canals and the collector drain from the north at Muban 16 to the south at Muban 1. Throughout the year, water is maintained in the canals and the drain for the use in household consumption and agriculture and the level of water

depends on the tides. Since there has not been any formation of water user group in Khlong 5, farmers can freely pump water up from the distributary canals or the collector drain into their farmland. Farmers choose the source of their water supply that is close to their agriculture land. Waste water is then released from the farmland back to the distributary canals or the collector drain via pipe culvert. Additional cost is incurred when the level of water in the collector drain or the distributary canal is higher than the paddy field as farmers must use the water pump to get rid of their used water.

Fig: Water pump used to released waste water from the farmland

Fig: Pipe Culvert

1. Water gate

Water gates in Khlong 5 are located in all three canals;

1. The 5th collector drain: there are two man-powered water gates in this canal, one at the beginning to the canal connected to Rapeepat Canal and another at the end, where the 5th collector drain meets Rangsit Canal. One electronic gate is located at (Rama 9 swamp?)
2. The 5th Distributary Canal (Khlong Ann 4-5): There are two gates, one at the beginning of the canal which is connected to Rapeepat Canal and another at the end of the canal which is connected to Rangsit Canal.
3. The 6th Distributary Canal (Khlong Ann 5-6): There are two gates, one is in the north, connected to Rapeepat Canal and another is in the south, connected to the Rama IX reservoir.

2. Dike Road

Dike roads in Khlong 5 are made of concrete. The dike road along the 5th Collector Drain is under the supervision of the Department of Rural Road (DRR) while the ones along the 5th Distributary Canal (Khlong Ann 4-5) and the 6th Distributary Canal (Khlong Ann 5-6) are under the Khlong 5 Tambon Administration.

1. Canal
   Canals in Khlong 5 are artificial dug canal. Most of the maintenance budget is received from the Royal Irrigation Department (RID), while the rest is from Department of Water Resources (DWR) and Khlong 5 Tambon Administration.

2. Rama IX Reservoir
   The Rama IX Reservoir project covers the total area of approximately 2,580 rais. The project is separated into two reservoirs. One is located in the area of Khlong 5 for 1790 rais, with the

capacity of 11.1 million m³. Another is covering 790 rais in TambonKhlong 6, with the capacity of 6 million m³. The main source of water for the reservoir is from Rangsit 5 Canal (Khlong Rangsit 5).

There are 3 water gates used in the project:

- Electronic; One gate is located in Khlong 5 and another is located in Khlong 6
- Man-powered; located at the end of the 6th Distributary Canal (Khlong L 5-6)

Normal Flood Situation

In the area of Tambon Khlong Ha, flood happens from October to November, yearly. It is caused by exceeding rainfall and floods only in agricultural areas. If there are too much rainfall in the rainy season, flood always damages all agricultural area. In the other hand, if the rainfall is short, flood is found in only southern part of Tambon due to the lower geographical character compared to other parts of Tambon. Flood is measured as 50 - 70 cm from the paddy land.

Flooding situation in 2011

General situation of Thailand's 2011 flood started getting to a critical stage in the beginning of October. On October 8th 2011, people of Khlong 5, including village committee, community leaders and villagers gathered around to examine all embankments along Rapeepat canal, which lied horizontally on the top of Khlong 5. As informed by the government, the level of water could be approximately one meter higher than the embankment. The people of Khlong 5 then extended the height of the embankment along Rapeepat canal for another meter by using sandbags. The elevation started from the 5th distributary canal (Khlong L 4-5) to the 6th distributary canal (Khlong L 5-6).

However, as flood water approached tambonKhlong 5, the level of water was actually 1.20 meter higher than the original embankment. Therefore, the elevated embankments were not able to hold such an amount of water. The embankment of the 5th distributary canal was the first to collapse and water started pouring into the area from the east of tambon.

After the embankment was broken down, flood spread to the area of Khlong 6 and Khlong 7 because the level of plain in Khlong 5 is higher than its east side. The water was then blocked by the embankment that TambonKhlong 7 had built earlier. As a result, the tide moved back to the TambonKhlong 5 and spread to the west of the Tambon. Later on, it covered the whole area.

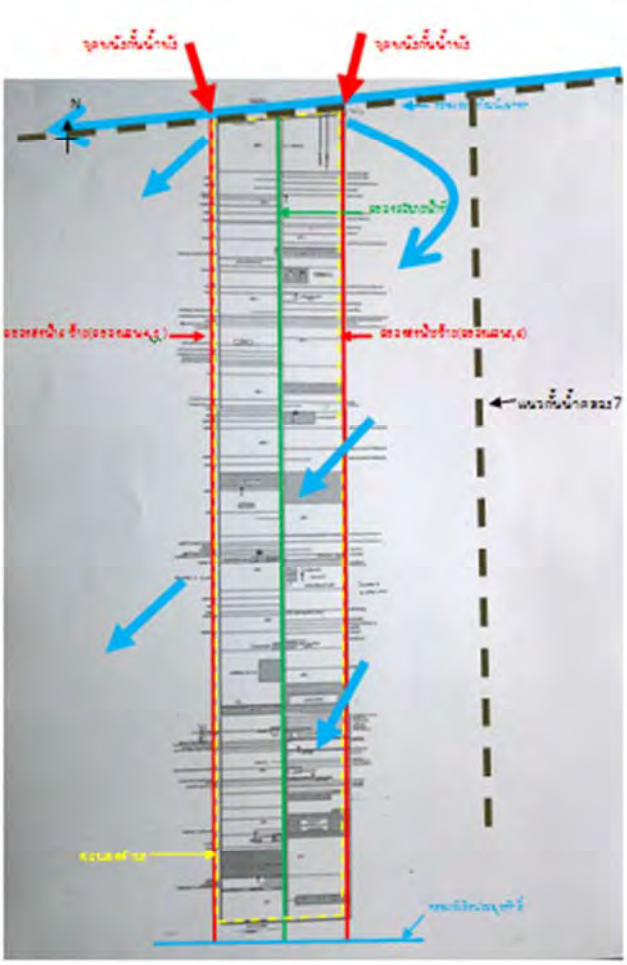


Fig: Direction of flooding

Flood water was drained out of the area by 2 ways;

1. The water was drained into the 5th Collector Drain which is the main drainage canal of the area. The flow headed southward to Rangsit canal through the water gate at the end of the canal which is located between BuengYitho Municipality and Thanyaburi District.
2. The water was drained to the Rama IX reservoir via the water gate in Khlong 5 and the Rama IX reservoir's water gate. During the critical period, the reservoir acted as a monkey cheek that received and stored water. However, due to the large amount of water and the limited capacity of the reservoir, water could not be effectively drained out of the area. Moreover, the lack of understanding from the villagers worsened the situation. The water gate of the Rama IX reservoir was opened up by hoping that water level of the heavily-flooded area could be lowered. It resulted to a damage of water gate and an increase in flooded area.

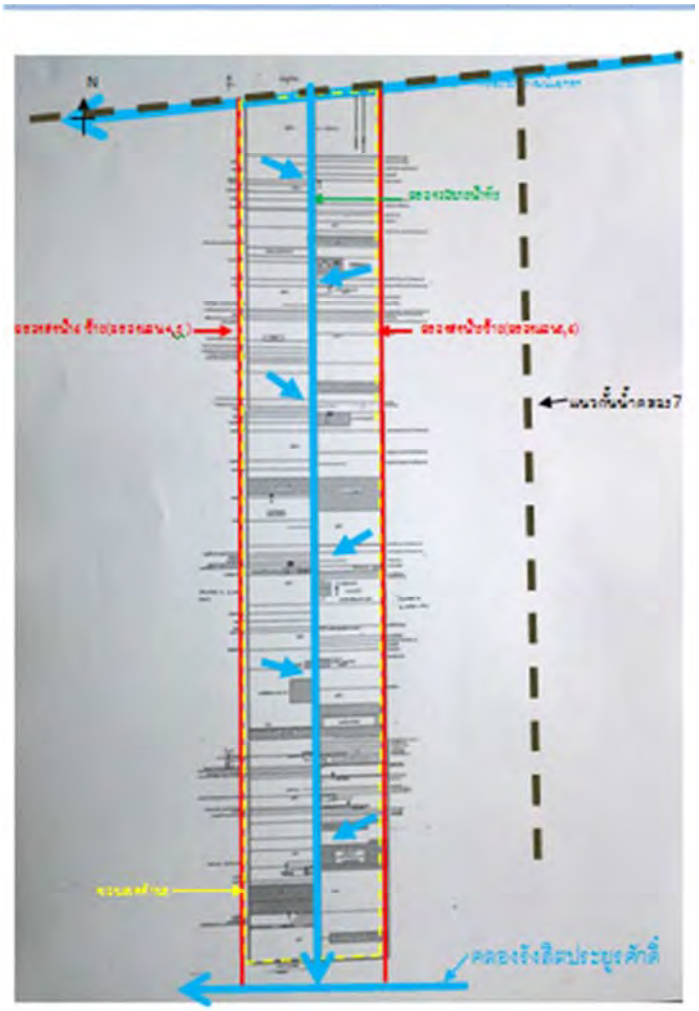


Fig: Direction of water draining

Flood damage

Items	Problems caused by flood
House and housing area Filled land for buildings and boundary walls, either soil or concrete	Houses were damaged from the wave of water when boats or military trucks are driven by. Filled land and walls such as housing estate, golf course and racing stadium etc obstruct the flow of water, resulting to still and polluted water.
Electronic device	All devices were damaged as the water level had not been expected to be this high (1-2 meters) because the area never experienced such a critical flood.
Furniture	Plywood furniture were severely damaged which resulted to a huge pile of waste
Agricultural tools	Large tools were heavily damaged as they could not be evacuated in time.
Car and Motorcycle	All cars and motorcycles were moved to safe area at Rangsit Science Center before flood because people were alarmed 10 days prior to flood.
Agricultural machines such as tractor and combine harvester	Since they were large and heavy and cannot be evacuated in time, all were damaged.
Water Gate	Soil dike of the water gate were wrecked by villagers because they wanted to open the gate by hoping that water can be drained into the RamaIX

	reservoir (monkey cheek)
Road	Roads within Khlong 5 were partly damaged due to the soil erosion
Bridge	During flood, bridges became the obstacle for transportation because the water level was so high that the bridges could not be observed. A large amount of garbage got stuck with the bridges.
Tap Water	Since tap water was derived from the underground source, village tap system could be operated during flood. However, a large amount of dregs was found in the well after the incident due to the contamination of flood water during flooding period.
Drainage ditch	Due to the poor design of drainage ditch and water management, each farmer must use one's water pump to drain water from one's farmland. The size of drainage ditch was not suitable in practice.

Flood damage compensation for Tambon Khlong ha

Duration: October – November 2011

Damage types	Number of households	Number of people	Number of houses	Value
Damaged houses	4,417	1,4374	0	149,040,050.35
Lightening gear	1,877	0	0	371,390.5
Kitchen ware	3,667	0	0	10,901,493
Entire damage of housing material	0	0	5	150,000
Partly damage of housing material	0	0	3715	40,760,901
Bedding	0	3,027	0	4,330,700
Clothes	0	2,959	0	5,599,410
Animal ranch/entire building	0	0	0	0
Animal ranch/partly damaged	0	0	227	511,000
Student uniform	0	1,315	0	1,460,188
Assets/ working equipment	0	0	2086	13,560,989
Other	0	0	0	0
Total	0	0	0	77,646,071.5

5. Impact Analysis for Tambon Khlong Ha

Tambon Khlong Ha has geographical character that is suitable for agriculture especially for rice farming. Though the agriculture area has covered the most part of land use in the Tambon, this PRA found that ratio of people working in industrial and services sectors are larger than people working in agriculture. This is because of development of infrastructure e.g. transportation, and communication, so that Tambon Khlong Ha is rapidly urbanized. New styled houses and buildings have been built in the area. As a result of this character change, job creations have been increased and more people turn their interest into working in industrial sectors than working in the farm as their ancestor.

Flood incident in 2011 caused a tremendous effects on people's socio-economic in Tambon Khlong Ha due to the disruption of infrastructure e.g. transportation and communication system, in Tambon Khlong Ha as the following details.

5.1 Negative Impacts of flood and Countermeasures for Future

Socio-economic Impact

Negative Impacts	Problems	Community Solution during flooding	Community Solution after flooding	Community response program and plan
1. Community people's health was affected by flood.	1. People suffered from athlete's food and diseased caused by moist and contaminated flood water.	1. TAO set up a medical unit at evacuation point where sick people could receive medical attention. 2. Mobile health unit was set up to visit people who got stuck in their house and provide medication to whom infected by disease.	1. There was a Big Cleaning Day activity promoted in the community after flood.	1. Prepare boat and vehicle to support rescue activity when flooding.
	2. People suffered from stress due to damage of infrastructures in Tambon Khlong Ha.	1. Health volunteers visited people who got stuck in the houses. 2. People could release their stress by visiting their relatives who lived in the same village by commuting to their house on a boat.	1. People can adapt themselves quickly to get back to its former condition.	2. Eliminate all factors that cause stress especially economic factors.
2. Lack of consumption products	1. Road was cut off so transportation of consumption goods was disrupted during flood.	1.Farm Tractor, truck, boat, raft were used for transportation during flood.	1. Restore roads and other infrastructures in the community.	1. Improve road surface and aggregate level in pavement (same level in all over the road) to repair shrinkage. 2. Change material for the road surface to water-durable material e.g. concrete, asphalt.
3. Lack of Income	1. The temporary or permanent shutdown of factories or SMLs shops during flood caused economic lost to all labor in those sectors.	1. People used local wisdom to catch fish and preserve food throughout flooding time.	1. New job was created. People who had skills in fixing house and mechanic could make a fortune from this opportunity after flood. 2. Labor who lost their job during flood might leave the village to find jobs in another location even if they had to relocate to another province.	1. Promote suitable agricultural techniques or innovations to mitigate flood impact to production. i.e. increase crop diversification, promotion of crop rotation, assurance of the availability of seeds (seed bank), stock food for consumption during flood, etc.

Negative Impacts	Problems	Community Solution during flooding	Community Solution after flooding	Community response program and plan
			3. After flood, farmers had a lesson learned about risk factors caused by flood. So many of them started to be aware of this factors and tried to change their practice on crop planning, and type of crop to avoid damage that might recurred.	
4. Community's scenery was damaged.	1. Fruit trees and perennial plants were withered and dead from flood.	-	1. Removed the dead plants.	1. Replace the dead plants with new species plants that are durable to water.
	2. Pile of sewage from household scattered over the community. 3. People burnt waste remaining after flood causing air pollution all over the community.	1. Sewage collection and disposal during flood is not practical because of insufficient equipment and place for collection and disposal.	1. Sewage collection from each household was treated by 1) collected from households and dumped at marked areas in the community where TAO or other related agencies can easily treat. 2) Some households burnt their waste come with flood water. 3)Screen out the objects that can be recycled from a pile of waste before disposal. 4) Hire a truck to collect sewage and delivered it to the state disposal factory.	1. Promote the use of water proof materials for furniture, house structure and composition. 2.Prepare a future plan for sewage collection and disposal both at during, and after flood incident. 3. Educate people how to collect and dispose sewage in their household properly.
5.School semester was delayed.	1. School was temporarily shut down because children and teacher could not commute to the school.	1. School was closed.	-	1. For children who have to stay in the evacuation center, there should be a well-designed child care activity planned to respond toflood situation. Trained personal and venue should be prepared.
6. Flood posed risk to children health such as accident,	1. Children were not aware of danger come with flood.	-	-	1. For children who stay with their in the house, their

Negative Impacts	Problems	Community Solution during flooding	Community Solution after flooding	Community response program and plan
sickness.				caregivers should be educated about danger that may come with flood water.
7. Cultural ritual could not be processed normally.	1. There was a case of people died during flood. Thus, their family had to keep the dead body in the house until it could be moved to the temple nearby their house after flood.	1.To cope with the situation, people used tea leave with chemical preservation substance to keep the body from decay.	1. After flood gone, they moved the body to the temple for ritual process.	1. Prepare a future plan to deal with the problem.
8. People who got stuck in their houses could not access to appropriate health care services and other assistances from rescue team.	1. During flood, there was not an effective way to communicate with the people who got stuck in the house.	1. During flood, broadcasting system was unable. If there was a call for help from people who got stuck in the house, they used mobile phone to communicate with leaders. If any emergency occurred, TAO chief officer would leave a message with leaders of all villages via mobile phone.	-	1. Prepare a future plan to improve communication system both at the normal and flooding time.
9. Report of theft was increased.	1. Some houses reported that they got thing stolen. So that people were afraid of theft and denied to leave their house.	1. People stayed in the house to take care of their thing. 2. Community safeguards patrol around the Tambon during the night time.	-	1.Develop a plan to set up OTOS unit in the community.
10. People had negative attitude toward government official and local administration official because they feel that contribution of donated items were not justify.	1. Because Khlong 5 was quite remote and it was not possible to access the area on land, assistance from government agency could hardly access to people in Khlong 5. 2. Khlong 5 was announced by the government to be an evacuated area. So there was no sufficient equipment and personnel prepared for	-	-	-

Negative Impacts	Problems	Community Solution during flooding	Community Solution after flooding	Community response program and plan
	responding the situation when it appeared that most people denied obeying the announcement. 3.People reported that donated item was distributed unfair. People who were closed to the official received more items than the other.			
12. Household expenditure was increased.	1.During flood, people had experienced that price for consumption product was increased due to its cost of transportation.	1. Every household tried to reduce their expenditure by catching fish.	1. Every household tried to reduce their expenditure by growing vegetable for consumption in the household.	1. Preparation for food stock and other necessary consumption products should be planned. 2. Promotion of vegetable gardening in every household should be actively carried on.
	2.People had to spend their household saving on water protection facility and necessary item for survival during flood e.g dyke, boat, etc.	-	-	1.Change strategy from prioritizing importance of flood protection to flood mitigation for the future flood incident.
13. Thailand's economic was recessed.	3Government had to allocate budget for infrastructure restoration.	-	-	1. Government plan to strengthen and heighten up dike at Khlong Rapipat and Khlong Rangsit 2. Government plan to clean ditches and drainage in T. Khlong Ha.

Agriculture Impact

Negative Impacts	Problems	Community Solution during flooding	Community Solution after flooding	Community response program and plan
1.Production cost is increasing. More risk to health of farmers and consumers	1. Brown plant hopper was outbreak.	-	1.Farmers used chemical insecticide and herbicide to control and eliminate it.	1. Provide training on proper method to control insect pest for farmers.
2. Farmer felt insecure about their rice production which affect to their annual income.	1. Delay cycle of rice broadcasting. Usually begins from November to January (2 months delay)	-	1.People plan to selection the short life-cycle of rice varieties to manage time of appropriate planting	1. Appropriate technology and rice varieties should be recommended to farmers
3. Livestock farmers felt insecure about their production and income. Some of them decided not to continue doing livestock if the situation recurred.	1.There was no dried shelter for cattle during flood. So some of them had to spend money on transporting their cattle to other high land to save it. 2. There was no dried straw or animal food to feed their cattle during flood. So they had to struggle to find food by paying more for it. 3. There was no medication to cure their animal during flood. So they have to pay more for it.	1. Farmers had to move their cows with trucks to high land in other province(Saraburi)	1. Farmers had to move their cattle back to its former place.	1. Mapping out location of dried land in the community to build a temporary cattle ranch during flood. 2. Stock animal food, and vaccine to feed the cattle.

5.2 Positive Impacts of flood and Measures

Positive Impact	Promotion Factors	Promoting Future Plan for Community
1. Farmers plan to change their cropping period and rice species to cope with the new flood pattern. 2. For horticulture farmers, people plan to change from perennial plants to short life plants e.g. vegetable.	1. People were aware of risk factors that might come with flood.	1. Enhance capacity of the community agricultural technology center to transfer knowledge to cope with flood. 2. Provide training to children who are interested in agriculture with the expectation that they will continue working for agriculture sectors.
2. Soil nutrient was improved.	1. Soil nutrient was improved due to decomposition of organic waste and discharging of chemical substance from soil surface. With this promotion factors, nutrient and acid in the soil was flourished and balanced respectively.	1.Provide training for farmers on soil improvement in their daily routine.
3. Fishery during flood was nourished and diversified fish were found. This	1. Fishes were free from fish farm or natural pond/ river.	1. Develop local product e.g. processed fish and marketing strategy to enhance people capacity and household income

Positive Impact	Promotion Factors	Promoting Future Plan for Community
promotion factor was a good opportunity to create new job/source of income from fishery during flood.		from the product.
4. Projects on road restoration, cleaning ditches and drainage facilities, from related government agencies were speeded up.	1. The restoration project on damage infrastructures was put in a high priority of state policy.	-
5. The community was aware of land use planning. Constructions e.g. bridge, walls to disrupt water flow would be more carefully to give permission.	1. People learned problems through the experience occurring during flood period.	1. Due to the invisibility of infrastructure during flood, map making and marked area where walls and bridges located should be prepared.
6. Sharing resources and exchange assistance were commonly seen during flood. Relationship among community member got back to its former supportive system and lifestyle.	1. People trust and obey to the community leaders. 2. The existences of cultural legacy in Thai traditional way; sharing and giving. 3. It was a forced situation.	1.Create activity to promote assembling opportunity for people to share, exchange resources and risk taking together.
7. New innovation in flood mitigation was created e.g. raft making from recycle bottle.	1. Because of the forced situation, people were stimulated to use their local wisdom in compliance with existing resources in the community to invent survival instrument necessary for daily basis activity.	1. Develop a database to collect necessary information such as knowledge and skill of local people, technology or innovation etc.
8. Social working groups in the community had a role to support disaster relief activities.	1. During flood, several existing working groups in the community played important role in assembling people, resources and communication throughout their network. 2. Information technology also play important role in sending and receiving information to request for assistance from people in the society.	1. Nurture a new generation leaders who are willing to volunteer themselves to work for the community. 2. Procure equipment (internet cord) to make use of the computers received from Science Center assistance. 3. Maintain relationship with existing networking groups. 4. Recruit trained IT personnel to take care of the IT system of the community.
9. Making out description of systematic flood protection and mitigation plan.	1.Because public hearing activity from community members was regularly held, people got used to the system and had good participation in community development activities.	1. Provide training for community leaders and set up monitoring and evaluation system for it. 2. Decentralize meeting administration to village level but the policy will come from the central administration. 3. Village and Community meeting should be held regularly.
10. It was good thing that electricity and water supply was not cut off during flood period.	1. Because it was difficult to access service from EGAT, people in the community had to resolve the problem themselves. They use electrical technician in the community to take care of transformer lift up to avoid damage from flood.	1. Provide training for technician in the community to obtain certified knowledge and skills in setting up electrical system/transformers.

2. SWOT Analysis

Strenght		Weakness		Opportunity		Threat	
There is a promotion on planting vegetable in households	**The people's ability to adapt the way of life after flood**	The ineffectivenness of the permanent employees in TAO	**The incapability of internal organization during the natural disaster**	People got compensations from government	**The infrastructure restoration after flood project**	The limitation of law and regulation of government agencies	**The limitation in the public administration of central agencies**
Some farmers adjust their crop calendar		The incapability in survival kits provision and distribution		There are budgets to repair water gates/ water ways		No organization to support a budget	
Crop rotation is increased in the community		The problem in internal communication		The heighten roads along the canal project		Schools got an insufficient budget to restore the damages from flood	
The vegetable farmers adapt and restore their lands after the flood				The canal maintenance project		Unreliable aids from the external organizations	
The farmers in ornamental plant sector have prepared their sites for future flood by leveling their pallettes		The low quality of water work system	**The raw water resource in community is unappropriate to consume**	Bank for agriculture and agricultural co-operatives provide financial resource for the member 100,000 Baht	**The financial aids for community to restore after the flood from government agencies and private sectors**	The red-tape of bureaucracy	
An organic agriculure is increased		Water from water work is undrinkable		The financial resource from private sector to repair the damaged properties		The aids were not relevant to the needs of the farmers	
Most of the cultivated land are SPK Documents. The land owners can only use the land on agricultural purpose.	**The sustainability in agricultural sector**	The underground water is contaminated after the flood		Government provides financial resources for community development		Royal Irrigation Department is the only agency who manage water	**Lack of the integration in water management in community**
There is a saving group	**the financial resource in community**	No water filter in water work system to purify underground water for drinking water		There is a research and development in rice species	**Government's helps for agricultural sector after the flood**	No precise and accurate information about flood from government agencies	
The strong role of the community leader	**The capacity of human resource in the community**	The raw maerials for processing products were lost due to the flood	**The limited potentials of community enterprises in production and marketing**	The new rice species are promoted and advertised by government		There were obstacles in water way	
The volunteers in community is increased		The community enterprises hava limited marketing channel and public relation		The ministry of Agriculture provides the vegetable species		The price of raw materials is increased	**The cost of production is increased and the market is not dependable**
An increase in harmony of people in community		No stock for food and drinking water	**No flood preparation for daily life during the flood**	The department of Fishery promote aquaculture in community by providing fish, equipment and technology		Market for the processing products is unreliable	
The members of Civil Defense volunteer are increased		No preparation plan to move assets, properties or machines		The golf club helped community during the flood	**The aids from private sectors**	Insecticides is more costly and the farmers depend dramatically on them	**The high cost of production in agricultural sector**
TAO have a plan to maintain the canals in the community's area	**The community's management after the flood for flood prevention and resilience**	No boats for transportation and logistics during the flood		There is a network o evacuation centers		Seed is more expensive	
Installation of drain tubes after the flood		No pflood prepartion for the households in community		Community's leader has a network for aiding during disaster		the labor wage is likely to be higher	
The communication system in the community has been improved		The civil volunteers have never been trained	**The insufficiency in community disaster management**	The rice price guarantee scheme guarantees 15000 baht per 1 ton	**The opportunity of agricultural products**	The drop of vegetable price	**The risk in market system of vegetable**
TAO organized the lesson learned after the flood		Lacking the efficient equipments		The stablility of ornamental plant market		Farmers cannot control or anticipate market price	
Every households prepare for flood		The obstacles from the water way during the flood	**Geographical weakness in Klongha**	There is a plenty of fish after the flood	**The opportunity on natural resource after the flood**	There is an outbreak of natural enemies after flood	**the risk of diseases and natural enemies of agriculture due to the flood**
There is a fish-processing group	**the potential of community enterprises in production and marketing**	No high and dry place in community during the flood		The quality of soil is increased after the flood. Farmers use less fertilizers		The diseases from flood	
Skills and capacity in cooking Thai desserts		Some farmers rent lands for agricultural purposes	**The limitation of potentials of the farmers in production and marketing planing**	There are aiding and promotion on community enterprise program	**The enhanced capacity of community enterprises**	The rice price guarantee scheme accept only two-round rice products	**The risk in market system of rice**
The strong market in community for Thai desserts		Most of the farmers do not have a crop calendar for rice plantation				Rice mills are close before the due date of the price scheme	
The effective and reliable health system	**The public facilities providing public services during the flood**	ornamental plant requires the long duration beyond 3 years	**The farmers in ornamental plant sector have a high cost of production**			If the rice is not sold in the price scheme , it will be sold around 7,000 - 8,000 Baht per ton	
5 schools in community can be used as evecuation centers		Ornamental plant require many chemicals and insecticides					
		The schools in community need to be improved and renovated for evacuation center	**The limitation of public facilities for evecuation centers in community**				
		No guard in evacuation center					

Strategic Option Table

Opportunity	Strategic Option	Threat
1 The infrastructure restoration after flood project	1. To improve the quality of water from the raw water resources in the community for household consumption (O1,T1) - To reduce expenses in the households in	1 The limitation in the public administration of central agencies
2 The financial aids for community to restore after the flood from government agencies and private	2. To promote an education and to raise awareness in community (T1)	2 Lack of the integration in water management in community
3 Government's helps for agricultural sector after the flood	3. To develop the capacity of farmers in both productivity and marketing (O2,O3,O5,O6,O7,T4,T5,T6,T7)	3 The cost of production is increased and the market is not dependable
4 The aids from private sectors	4.To promote value-added activitiies for agricultural products and To promote community enterprises in processing product development. (O2,O3,O7,T3)	4 The high cost of production in agricultural sector
5 The opportunity of agricultural products	5.To promote the community's safety in life and property - To develop human's capacity in community to prepare for natural disasters - To promoter public health in community (O4,T1)	5 The risk in market system of vegetable
The opportunity on natural resource after the flood 6	6. To improve and restore environment, landscape and natural resource in community and to promote the waste management in community. (O1,T2)	6 the risk of diseases and natural enemies of agriculture due to the flood
The enhanced capacity of community 7 enterprises		7 The risk in market system of rice

KH-2-2

3. Strategic Plan

<Selected Pilot Activities>

Strategy	Justification (Why Selected?)	Activity	Organization/ person in charge	Schedule time	Necessary inputs		Issues to be further discussed/confirmed by the community	Issues to be confirmed with Japanese experts
					JICA	Thai		
1. To improve the quality of water from the raw water resources in the community for household consumption - To reduce expenses in the households in community		1.The surface water work system from Rama IX pool 2.The improvement of old wells in community 3. The household account promotion program 4 . ปลูกผักครัวเรือนกินได้ เลี้ยงปลา	1.1 Tambon Administration Office 1.2 Province Administration Office 1.3 JICA 1.4 Chaipattana Foundation 1.5 Underground Water Department 1.6 People in coummunity 1.7 Community Development Department 1.2 Department of Provincial Administration 1.3 Department of Natural Resource 1.4 Rural Road Deprtment 1.5 Related Sub-district Administration Organization 1.6 Water Management Network in Ayuddhaya and Neighboring areas	After October 2012				- The survey and study on the community's water consumption to analyze how to use and exploit the water resoucres near community for the feasibility of water work system - The promotion on cultivating hydroponic vegetable
2. To promote an education and to raise awareness in community		1. The education project for volunteer youths in community						- The knowledge support on community disaster plan
3. To develop the capacity of farmers in both productivity and marketing		1. The cost-reduction projects - Voluntary soil experts - Organic fertilizer (Organic agriculture) - Seed bank - Food bank - Crop calendar						- The development and support on agricultural knowledge and technology for farmers and sgriculture center in community - The knowledge and technology support on water quality in natural resource management
4.To promote value-added activitiies for agricultural products and To promote community enterprises in processing product development.		1. The processing products promotion from banana and rice						- The development and promotion for local processing products in quality, packaging and marketing
5.To promote the community's safety in life and property - To develop human's capacity in community to prepare for natural disasters - To promoter public health in community		1.OTOS (One Tambol One Security)						Equipment and training in disaster rescue
6. To improve and restore environment, landscape and natural resource in community and to promote the waste management in community.		1. The green area in community by planting flood-resistant plant project 2. The wastewater management project 3. The municipal solid waste project						- The promotion on the equipment and machine for separation and processing of solid waste - The support on knowledge and technology for separation, processing and disposal of solid waste

<Pilot Activities which were discussed but not selected>

Activities	Reason for not selected	Remarks

*As some of the pilot activities should be started as soon as possible, thewe tables should be submitted by the Planning Team very soon (within 4 days) after the workshop.

Stratrgic Orientation Matrix

Items	1. To improve the quality of water from the raw water resources in the community for household consumption - To reduce expenses in the households in community	2. To promote an education and to raise awareness in community	3. To develop the capacity of farmers in both productivity and marketing	4.To promote value-added activitiies for agricultural products and To promote community enterprises in processing product development.	5.To promote the community's safety in life and property - To develop human's capacity in community to prepare for natural disasters - To promoter public health in community	6. To improve and restore environment, landscape and natural resource in community and to promote the waste management in community.
Strenght						
The people's ability to adapt the way of life after flood						
The sustainability in agricultural sector						
the financial resource in community						
The capacity of human resource in the community						
The community's management after the flood for flood prevention and resilience						
the potential of community enterprises in production and marketing						
The public facilities providing public services during the flood						
Weakness						
The incapability of internal organization during the natural disaster						
The raw water resource in community is unappropriate to consume						
The limited potentials of community enterprises in production and marketing						
No flood preparation for daily life during the flood						
The insufficiency in community disaster management						
Geographical weakness in Klongha						
The limitation of potentials of the farmers in production and marketing planing						
The farmers in ornamental plant sector have a high cost of production						
The limitation of public facilities for evecuation centers in community						

Participants' Response

=Strongly Relevant

=Fairly Relevant

=Barely or Not Relevant

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4. Pilot Project Sheets

Tambon Klong Ha, Klong Luang District, Pathum Thani Province

Sector	Model Area / Program	Pathumthani Province (PT)	
		T.Klong Ha, A.Klong Luang	Project Code Number
Community-based Disaster Risk Management Against Big Flood (CDRM)	Community Flood Disaster Management Plan (CDRMP)	(1) Community-based Disaster Risk Management Plan	KH-CDRM-CDRMP-1
	Drinking Water Supply during Flood Period (DWS)	(1) Drinking Water Supply System	KH-CDRM-DWS-1
	Youth Activities to Transfer Knowledge and Lessons Learned (YALL)	(1) Disaster Management at School (2) Improve Solid Waste Management and Water Quality	KH-CDRM-YALL-1 KH-CDRM-YALL-2
Flood Damage Reduction in Agriculture and Livestock Sector (AGRI)	Crop Diversification and Food Security (CRDV)	(1) Safe Vegetable Promotion	KH-AGRI-CRDV-1
	Logistics and Market for Agro-produce (MKT)	(1) Green Market to promote safe food promotion	KH-AGRI-MKT-1
Income Generation Activities towards Recovery of Rural Livelihood (iGEN)	Income Diversification by Agro-processing (AGPR)	(1) Recovery and Improvement of Agro-Processing	KH-iGEN-AGPR-1

PILOT PROJECT SHEET

Project Code	Sector	Community-based Disaster Risk Management Against Big Flood
CDRM-CDRMP-1	Program	Community Flood Disaster Risk Management Plan (CDRMP)
Title	Community Flood Disaster Risk Management Plan	
Purpose	To improve/ develop community disaster rick management plan with the participation of the community people	
Location	T. Klong Ha, A. Klong Luang, Pathumthani Province	
Beneficiaries	Community people andhigh school students of Dipangkorn Wittayapat School	
Implementing Agency	Committee for the Community-based Flood Disaster Risk Management, which is to be set-up during the pilot project, with the support of TAO and Provincial Department of Disaster Prevention and Mitigation (DDPM). Dipangkorn Wittayapat School	

Background/Concept

It was understood through the PRA survey conducted at the early stage of the studythat impacts/damagesin the community by the flood disaster in 2011 was severed due to the lack of appropriate disaster risk management plan/method, such as communication line, evaluation plan, supply system of necessities. Accordingly, development and implementation of the Flood Disaster Risk Management Plan was identified and selected as a pilot project by the community people. The JICA study supports the development of the plan as well as the implementation of some of activities to be conducted based on the plan during the project period.

The pilot project will be implemented with the support of JICA/DDPM 'Project on Capacity Development in Disaster Management in Thailand (Phase II)' and Provincial DDPM. DDPM's guideline for Community-Based Disaster Risk Management will be utilized for making the Flood Disaster Risk Management Plan. However, the plan to be developed by the community will focus on the flood disaster and impacts on the community will be addressed more comprehensively.

Expected Outcome

- Development of Community Flood Disaster Risk Management Plan, including hazard map, action plan, and committee members to implement the plan.
- Implementation of activities based on the plan.
- Enhancement of the awareness and preparedness of the community against the future flood disaster risk.

Component(Input/ Activities)

- Analysis of problems and impacts caused by the flood in 2011 (as a part of PRA)
- Study tour to the advanced site implementing community-baseddisaster risk management activities
- Workshop to develop Community Flood Disaster Risk Management Plan, including hazard map, action plan, and committee members to implement the plan
- Implementation of the planned activities by the community, with the technical and financial support from JICA study team for some of activities.

Related Program, if any	Disaster Management at School	Code:KH-CDRM-YALL-1

Cost (w/ Source)

THB 150,000 (JICA Study Team) (combined with KH-CDRM-YALL-1 and KH-CDRM-YALL-2)

Implementing Schedule

Analysis of problems and impacts caused by the flood in 2011 (as a part of PRA)	May 2012
Study tour to the advanced site implementing community-based disaster risk management activities	Jan 2013
Workshop to develop Community Flood Disaster Risk Management Plan, including hazard map, action plan, and committee members to implement the plan	Jan 2013
Implementation of the planned activities by the community, with the technical and financial support from JICA study team for some of activities.	Feb-Mar 2013

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Dec. 2012	● Study tour to the advanced site was designed with the support of JICA/DDPM 'Project on Capacity Development in Disaster Management in Thailand (Phase II)' and through the discussion with the community leaders. Li District in Lamphun Province was selected as a visiting site by the recommendation and coordination of JICA/DDPM project. ● Discussion on the selection of participants was started in the community. ● The JICA study team contacted Pathumthani Provincial DDPM for possible support/collaboration.
Jan. 2013	● Pre-study tour session was conducted with the expected participants of the study tour on 14 January. Outline of the community-based flood disaster risk management plan was introduced as well as the detail of the study tour. Some learning materials, such as 'Guideline for Community-based Disaster Risk Management', which was provided by the JICA/DDPM project, were distributed to the participants. Staff of Pathumthani Provincial DDPM also joined the session. ● Study tour to Li District at Lamphun Province was conducted during 23-26 January as planned (see the detail in the study tour report). 15 participants (6 from the community and 9 from Dipangkorn Wittayapat School) participated from T. Klong Ha. ● Workshop to develop the Community FloodDisaster Risk Management Plan was conducted on 28-29 January at the tambon. The plan was developed by both community and school during the workshop. Committee for the flood risk management was also tentatively set-up, however, it needs the approval by the village heads and other key stakeholders. ● Community and the school agreed to conduct an evacuation drill sometime in February.
Feb. 2013	
Mar. 2013	

*Describe main findings about the project, including progress, problem, issues raised.

PHOTOS

Learning steps to make disaster management plan during the study tour

Interviewing community people on disaster (flood) impacts and countermeasures during the study tour

Learning water management from DDPM staff during the study tour

Summarizing the leaning and considering possible application in the tambon during the study tour

PILOT PROJECT SHEET

Project Code	Sector	Community-based Disaster Risk Management against Big Flood
KH-CDRM-DWS-01	Program	Drinking Water Supply during Flood Period
Title	Drinking Water Supply System	
Purpose	To secure and keep safety drinking water during flood period	
Location	T. Klong Ha (KH), A,KlongLuang, Pathumthani Province (AT)	
Beneficiaries	1,400 Households, 16 Villages	
Implementing Agency	T. Klong Ha and Water Supply Management Committee	

Background/Concept

Flood is common during October to November. When there is excessive rainfall, agricultural areas are flooded with damaged on agricultural products. Normally, flood is measured as 50-70 cm high from the paddy land. With the approach of flooding water in the early October 2011, people in the area tried to heighten of embankment along the Rapeepat Canal and other distributor canals by one meter from the original height of embankment to prevent inundation with sandbags. However, as the level of the flood reached as high as 1.2m, the area was inundated by the water overflowing the embankment. The inundation lasted 1.5-2 months in the area depending on the location. Due to geographical character, domestic wastewater, residual agrichemicals and insecticide are flowing into canals, water quality in canals and grand water become worse and worse and notenough for drinking. Under these situation, People in the Tambon proposed and decided to introduce a water purified system in cooperation with JICA Study Team when the Participatory Disaster Resilient Planning Workshop held in September 2012.

Expected Outcome

- *To secure safety drinking water during flood period.*
- *To keep safety drinking water always for flood period.*
- *To create income for Operation & Maintenance (O&M) cost by installing the vending machine*
- *Through O&M with vending system, solidarity in communal area will be enhanced*

Component(Input/ Activities)

The Drinking Water Purifying System comprises of a water purifying system house dimension 5 x 5 m. and its equipment as follows,

1. Raw Water Tank
2. Raw Water Pump
3. Color and Odor Filter Column
4. Hardness Filter Column
5. Reverses Osmosis System Equipment
6. Purified Water Tank
7. Ultra Violet Light Set
8. Purified Water Outlet for bottles and tank
9. Drinking Water Vender Machine

Related Program, if any		**Code**

Cost (w/ Source)

462,000Bt

Implementing Schedule

Component	Dec	Jan	Feb	Mar
Contract between JICA ST & Supplier	▲			
Explanation to the TAO,etc. (components, establish. of water supply management committee, WSMC)		▬		
Implementation		▬	▬	▬
Final Inspection				▲
Support to strengthening the WSMC by JICA ST			▬	▬
Training to the WSMT				▲

Note: ST, Study Team

PILOT PROJECT SHEET

Project Code	Sector	Community-based Disaster Risk Management Against Big Flood
CDRM-YALL-1	Program	Youth Activities to Transfer Knowledge and Lessons Learned (YALL)
Title	Disaster Management at School	
Purpose	To enhance the awareness of the youth on disaster risk management	
Location	Dipangkorn Wittayapat School, T. Klong Ha, A. Klong Luang, Pathumthani Province	
Beneficiaries	High school students	
Implementing Agency	Dipangkorn Wittayapat School, supported by community people and Pathumthani Provincial DDPM	

Background/Concept

During the PRA survey conducted at the early stage of the project, participants from T. Klong Ha identified the importance on enhancing the awareness and knowledge on disaster risk management of students to prevent /mitigate impacts of future flood disaster. Accordingly, in collaboration with the teachers at Dipangkorn Wittayapat School, the community decided to have a pilot project to enhancing the awareness/ knowledge on disaster management of the students, including the transfer of experience gained through 2011 flood. It is expected that the pilot project also contribute to awareness raising on flood disaster risk management in the community through their guardians.

JICA study team supports the designing of the disaster management plan as well as implementation of some of activities based on the plan.

Expected Outcome

- Increase in awareness and knowledge by the high school students on flood disaster risk management.

Component(Input/ Activities)

- Study tour to the advanced school implementing community-based flood disaster risk management activities (by teachers)
- Workshop to develop school flood disaster risk management plan
- Implementation of the planned activities by the community and school, with the technical and financial support from JICA study team for some of activities.

Related Program, if any	Community-based Disaster Risk Management Plan	Code:KH-CDRM-CDRMP-1

Cost (w/ Source)

THB 250,000 (JICA Study Team)(integrated with KH-CDRM-CDRM-1 and KH-CDRM-YALL-2)

Implementing Schedule

Study tour to the advanced site implementing community-based flood disaster risk management activities (by teachers)	Jan 2013
Workshop to develop school flood disaster risk management plan	Jan 2013
Implementation of the planned activities by the community and school, with the technical and financial support from JICA study team for some of activities.	Feb-Mar 2013

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Jan. 2013	● Teachers from Dipangkorn Wittayapat School attended pre-study session for community-based flood disaster risk management on 14 January. Outline of the community-based flood disaster risk management was introduced as well as the detail of the study tour. Some learning materials, such as 'Guideline for Community-based Disaster Risk Management', which was provided by the JICA/DDPM project, were distributed to the participants. Staff of Provincial DDPM also joined the session. ● Study tour to Li District at Lamphun Province was conducted during 23-26 January as planned.9 teachers from Dipangkorn Wittayapat School, including school principal, participated(see the detail in the study tour report). ● Workshop to develop the school flooddisaster risk management plan was conducted on 28-29 January at the tambon (see the detail in the workshop report). Community and the school agreed to conduct an evacuation drill sometime in February.
Feb. 2013	
Mar. 2013	

*Describe main findings about the project, including progress, problem, issues raised.

PILOT PROJECT SHEET

Project Code	Sector	Community-based Disaster Risk Management Against Big Flood
CDRM-YALL-2	Program	Community Flood Disaster Risk Management Plan (CDRMP)
Title	Improve Solid Waste Management and Water Quality	
Purpose	To enhance the knowledge and awareness of environment in the community, including garbage and water, which may reduce the impact of the flood in the community	
Location	T. Klong Ha, A. Klong Luang, Pathumthani Province	
Beneficiaries	Community people andhigh school students of Dipangkorn Wittayapat School	
Implementing Agency	TAO, villages heads, volunteers, and Dipangkorn Wittayapat School	

Background/Concept

During the massive flood 2011, T. Klong Ha faced months of inundation in the community. During the long-term inundation, garbage was left in the community and water quality was deteriorated. These negative impacts of the flood resulted in the lowering of the quality of life of the community people through sanitation, mental health, and other problems. From this experience, the community decided to take actions to improve garbage management and water quality with the support of JICA Study Team. The improvement in garbage management and water quality will improve the quality of life of the community people during the normal time and will also mitigate the negative impacts of the future flood. It is also noted this kind of participatory activities will strengthen the capacity of the community, which would make the community more disaster resilient.

Expected Outcome

- Introduction/improvement of garbage management mechanism at the community and school through the enhancement of knowledge and awareness
- Introduction of water quality improvement measures by the community and school enhancement of knowledge and awareness

Component(Input/ Activities)

- Study tour to advanced site implementing community-based garbage management
- Study tour to advanced site implementing community-based water quality improvement
- Development of strategy and action plans to introduce/improve garbage management and water quality
- Implementation of the planned activities by the community, with the technical and financial support from JICA study team for some of activities.

Related Program, if any		

Cost (w/ Source)

THB 250,000 (JICA Study Team) (integrated with KH-CDRM-CDRM-1 and KH-CDRM-YALL-1)

Implementing Schedule

Study tour to advanced site implementing community-based garbage management	Dec 2012
Study tour to advanced site implementing community-based water quality improvement	Feb 2013
Development of strategy and action plans to introduce/improve garbage management and water quality	Feb 2013
Implementation of the planned activities by the community, with the technical and financial support from JICA study team for some of activities	Feb-Mar 2013

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Dec. 2012	● Tambon Don Kaewof Chiang Mai Province and Koh Kha Municipality of Lampang Province were selected as study tour sites thanks to the information from the Japanese Expert of JICA/DoLA 'Project on Enhancing the Capacity on Local Public Services Provision through Local Management Cooperation Supported by Provincial Administrative Organization'. Ko Kha Municipality used to be a pilot site of the project on garbage management. ● Pre-study tour session was conducted on 14 Dec., 2012 to explain the framework of the study tour and to discuss the observation issues among the participants. ● Study tour was conducted during 16-19 Dec, 2012 as planned with 30 participants from T. Klong Ha, including 9 teachers from Dipangkorn Wittayapat School (see the detail in the study tour report). ● A workshop to develop strategy and action plan on garbage management was conducted on 27 Dec. with the study tour participants. However, due to lack of time, the plan was still not at the level of actual implementation. The plan will be further discussed during the study tour to observe water quality improvement project scheduled in February. ● JICA Study Team has communicated with the Laem Phak Bia Environmental Research and Development Project for study tour on water quality improvement.
Jan. 2013	● JICA Study Team has consulted with the Laem Phak Bia Environmental Research and Development Project as well as T. Klong Ha to design the detail of the study tour for water quality improvement. The team has decided to visit the site at Petchaburi Province on 16-17 Feb, 2013. About 50 participants from T. Klong Ha, including teachers and students of Dipangkorn Wittayapat School are expected to join the study tour.
Feb. 2013	●
Mar. 2013	

*Describe main findings about the project, including progress, problem, issues raised.

PHOTOS

Learning experience of garbage management at T. Don Kaew during the study tour

Separation of garbage at a primary school during the study tour

Learning about recycle and garbage bank during the study tour

Learning about earthworm culture for composting during the study tour

PILOT PROJECT SHEET

Project Code	Sector	Flood Damage Reduction Measures in Agriculture and Livestock Sector
AGRI-CRDV	**Program**	Crop Diversification and Food Security
Title	Safe Vegetable Production and Marketing	
Purpose	*Overall*: Diversify the types of crops to reduce the risk of complete loss under mono culture especially paddy; and introduce short-cycle crops, which enable generating quick cash or securing foods for home consumption. *Project*: Promote safe vegetable production for home consumption and for marketing.	
Location	T. Khlong Ha, A. KhlongLuang, PT	
Beneficiaries	Farmers' group(4 model farmers)	
Implementing Agency	Tambon Administration Office (TAO), Department of Agricultural Extension (DOAE)	

Background/Concept

As a means to reduce the risk of flood damage, it is recommended to diversify the farming portfolio of farmer household. It is well known that mono-cropping entails a certain level of risks, which may be incurred by a price fluctuation, outbreak of pest and disease, or natural calamities like flood. Diversification of crops is therefore recommended. In this program, some types of crops that can be cultivated in relatively short period are introduced.

After a flood, recovery process should be commenced as soon as possible. Although it is desirable to restart paddy cultivation for paddy farmers, it is not always possible due to a lack of funding, remained inundation in lowland, and lack of seeds and inputs. In this context, short-cycle crops such as vegetable, which also require relatively lower investment cost, can provide farmers with an opportunity to earn quick cash. By revolving such small but quick cash, farmers can strengthen their capital for re-cultivation of paddy thereafter. Introduction of vegetables can be a good source of income and home consumption even during ordinal years.If marketing channel is established, restart of vegetable production after flood can be smoothly facilitated.

Expected Outcome

- Farmers gain new skill on safe vegetable cultivation
- Farming portfolio of individual farmer household is diversified
- Household income is increased
- Marketing channel is established (MKT)

Component(Input/ Activities)

1) Identification of participants
2) Workshop for planning of safe vegetable production and marketing
3) Study tour to an existing vegetable-farmers' group near the area
4) Training on safe vegetable cultivation such as compose cow dung making, bio-insect repellent
5) Field visit and discussion for learning and exchanging opinions to improve production
6) Technical assistances by DOAE, LDD (use of soil improvement agents)
7) Establishment of green market in the community (using existing common market)
8) Preparation of guideline

Related Program	Logistic and Market for Agro-produce	**Code:**	MKT

Cost (w/ Source): *Family labor cost for ordinal maintenance of the field is born by the participants*

- Workshops:	5,000Bt	(JICA)	
- Study tour	5,000Bt	(JICA)	
- Farm input and material	30,000Bt	(JICA)	(materials for net houses included)
- Public relations	10,000Bt	(JICA)	
- Total (approx.):	50,000Bt	(JICA)	

Implementing Schedule: *November 2012 to April 2013*

- Dec. 2012: Planning workshop, construction of net houses, training on seedling preparation
- Jan. 2013: Construction of net houses, training on seedling preparation and soil improvement, establishment of green market in the community
- Feb. 2013 Continued cultivation of vegetables and marketing, revision of cultivation plan (types of vegetables)
- Mar. 2013 Lesson learned workshop, preparation of media
- Apr. 2013 Final workshop

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Dec. 2012	- Conducted production planning of safety vegetable production. There were 10 farmers from 5 villages involved in the workshop conducted on November 30, 2012. - 10 members visited a learning center to learn on seedling preparation for selected type of vegetable to grow in each village and seedling preparation methods (transplanting or direct seed) on December 4, 2012. - It was found that the quality of media was not so good because it could not keep moisture well. After the farmers have changed to other media, the seedlings grew up better. - Net houses were established at village no.2 and 8 as learning centers and other two net houses were constructed in their own plot at village no.6 and 14. For village no.10,net house was not constructed as the farmer selected to cultivate hot pepper. - Transplanting has been done in learning center of village no.2 and farmer's individual plot at village no.6.
Jan. 2013	- Continue to construct net house in village no.8 and 14 which are finished. - Problem; for first crop found the growth rate of vegetable are slow. Might be because of lack of fertilizer which in the beginning farmers have applied only cow dung and some of cultivation media. After that the farmers have applied compost pig dung found that growth rate is faster than. - Skill of preparing seedling in village no. has improved to get better and better seedling as well as the second and third rounds of growing vegetable becomes better. - The first was harvested on January 26, 2013 which small amount vegetable. For village no. 8 and 14 haven't harvest yet.
Feb. 2013	- Monitoring of green market's progress was carried out. - Workshop on making of insect repellent agents and compost activation by applyingPor Dor3 and Por Dor12 was organized on Feb. 26, 2013 Result; 1) Green market could continue the implementation, but there was a problem of insufficient vegetable quantity with customer needs. 2) Farmers were able to apply herbs that are available in local to make insect repellent agents and high-effective composting as well as Trichoderma activation (Por Dor3) for preventing diseases from fungi.
Mar. 2013	- Monitoring of activity on non-toxic vegetables growing and green market was conducted as usual. - Lesson learned on non-toxic vegetables growing and green market was organized on Mar. 16, 2013. - The project joined activity to present a lesson at Tambon Klong Ha level on Mar. 18, 2013. Result; 1) Overall safe vegetables growing and green market, farmers were able to continue to grow safe vegetables and learn on several techniques systematically. 2) In farmers' views, safe vegetables growing could be done in both before and after flood, and even during flood such as crops growing in the polystyrene boxes. 3) Lesson learned at tambon level, there was a clear direction in supporting of groups' activities such as development of land through support of materials and equipment for making bio fertilizer. Furthermore, as for livestock aspect, the project shall support a pitted pig raising for producing organic fertilizer as well.
Apr. 2013	- Monitoring of activity on non-toxic vegetable growing and green market was conducted as usual. - Coordination for vegetables preparation to demonstrate in the final workshop was carried out. - Farmers attended the final workshop of the project. Result; 1) Safe vegetable continued growing. However, the growth rate of vegetable was slow due to hot weather. 2) Green market was conducted every Sunday as usual. 3) Apart from selling in green market, vegetables were also sold at farmers' plot.

*Describe main findings about the project, including progress, problem, issues raised.

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	Lack of pig dung but DLD is proposing to support the group. Soil condition is very bad (pH.3.0) PACO will coordinate about GAP. He wants to connect with green market network (a bit far). Production is not enough so expansion to outside market is yet necessary. During exposure trip to Singhanat, they established some connection with the farmers and got some vision for the future. Having different markets is good. TAO has a plan to support: secretary mention. Animal feed chopper he owns. Other farmers showed interest during the LL workshop. (No. 7, 10, 11, 14 and 15) This group has a good connection with policy or government agencies. Easy for them to coordinate. Banana ponic was not successful. Morning glory can be…cannot. Size of the holes is too small. Diameter 1.5-2 inch (6-7cm in depth). First crop was not good but second one was good. Water application, fertilizer (only cow dung → also uses compost). Spinach was good due to pig dung. 1,000bt/transportation (1.5Bt/kg in Ratchaburi) 3Bt/kg in KhonKaen. No.2 and 8 continues seedling preparation in tray for fruits vegetables and a bit of leaf vege. Heaven mushroom Kale: Taladthai may have. Good point: produce many varieties in small amount; local production and local consumption, followed by safe vegetable. Started with study tour to Green market in hospital and university: motivated them. This is a good entry point to motivate.
Timing of Implementation (Pre-, During , Post- Flood)	Pre and Post Flood
Acceptance of technique by community (cost, benefit, easiness, relevance to current practice)	**<u>Learning Process</u>** - Safe vegetable production activity for green market is a process of knowledge transfer and exchange through actual trial and gradual development by using learning center as a venue for mutual or individual production. - Learning process consists of 1) work planning in order to achieve the goal of green market opening 2) seedling preparation along with construction of net houses 3) cultivation and taking care 4) high-efficiency organic fertilizer making 5) insect repellent making and 6) green market opening. - Learning by doing basis has created an acceptance of technology naturally, especially group members who have a few experiences in vegetable growing, but their perception will be faster. However, it doesn't mean that all farmers will accept and follow entire learned activities. Eventually, lesson learned shall be summarized through group. Sometimes, the project activity might be accepted later or sometimes, new knowledge may be created from denying the project activity. **<u>Development Approach (combination with green market)</u>** - One question is always asked by farmers is "where will the grown vegetables be sold?". In this process, production and marketing will be integrated in order to create farmers' motivation to benefit themselves and their family. A distinct process has created more confidence for farmers.

	Prior experience - Khlong Ha's farmers, who have a few experiences in vegetable cultivation, has adopted new technology easier than other areas where have longer experience. Therefore, adaptation and new creation can be generated easily. - There are 2 cases were found i.e. 1) Mrs. Sri Nuan, village head, tried to apply the soil that was sold in the market together with compost for seedling preparation, resulting in strong seedling. 2) Uncle Nong has tried to use compost and natural hormone to accelerate the vegetable growth. **Learning by Group** - Compost pig dung through bio-gas tank was acceptable by farmers and continued to use. Most farmers prefer to buy them from farm in Ratchaburi province. - Bio-extract **Investment Cost** - Required cost for initial investment is not much (the size for the budget of 2,500Bt is 6m x 10m), in which saran net alone costs about 1200-1600Bt/saran net (the size of constructed saran net houses is 6m x 40m), depending on the size of the house. - Even with a small investment cost, farmers can fetch a certain amount of income from vegetable cultivation. Usually, 1 sq.m can generate 40 Baht in one crop (equal to net house material in 1 sq.m). After only a few times of selling, initial cost can be easily returned. - Now, farmers have much confidence to start themselves. **Type of Vegetables** Fruits vegetables are not suitable under saran net as they require more sunshine as compared to leaf vegetables.
Replication and extension (role of stakeholder, cost share, etc.)	- Green market is farmers' one alternative for non-toxic production. Nowadays, agricultural production based on organic farming method is acceptable by the current social stream. Therefore, it is one channel of income generation and enable to be disseminated its knowledge to other farmers. - In Khlong Ha area, farmers from other villages have expressed interest in joining a group, so member expansion can be carried out via saving groups at tambon level.
Sustainability (incl. O&M, benefit during normal time)	- As for sustainability of activity, safe vegetable cultivation can respond to farmers at household level at least 2 issues i.e. 1) farmers have vegetables for home consumption and 2) farmers have a daily and weekly extra income. - This activity can be upgraded as a career, if the production expansion is carried on at least 1 job per household.

PHOTOS (1)

Seedlings of several types of vegetables were prepared in trays.
(Dec. 23, 2012)

Holes for the pillars of net houses were being dug; more than 50cm in depth is recommended
(Dec. 23, 2012)

Frame structure is being assembled mainly by men. A carpenter took care of the technical part at high place.
(Dec. 23, 2012)

Main structure is almost done.
(Dec. 23, 2012)

While men took charge of construction, women took care of knitting saran nets for roofing.
(Dec. 23, 2012)

Plastic pipes were set to fix the saran net.
(Dec. 23, 2012)

PHOTOS (2)

Now, putting the saran net on the roof; cooperation among people at each part is essential.
(Dec. 23, 2012)

It is hard to fix the saran net on the plastic pipe; more power is needed.
(Dec. 23, 2012)

About four weeks later, vegetables became ready to harvest.
(Jan. 26, 2013)

A trial of growing vegetable on banana tree, so-called "banana-ponics" is being done as a potential cultivation method during flood.
(Jan. 26, 2013)

Vegetables were sold at weekly market as a trial; securing market channel helps continue the activity even after flood.
(Jan. 26, 2013)

Nicely packed vegetables. Safe vegetable cultivation activity can complete always with the marketing activity.
(Jan. 26, 2013)

PILOT PROJECT SHEET

Project Code	Sector	Flood Damage Reduction in Agriculture and Livestock Sector
AGRI-MKT-1	Program	Logistics and Market for Agro-produce
Title	Green Market to promote safe food promotion	
Purpose	To provide opportunity for farmers to sell their farm products in the local community	
Location	Tambon Khlong Ha	
Beneficiaries	Farmers in Khlong Ha	
Implementing Agency	JICA Project Team	

Background/Concept

Lifestyles of farmers in Klong Ha Sub-district are not different from farmers' in the central region. They focus on rice production for commercial purpose. In consideration of food security, it is found that farmers have to buy all food from outsources. No matter rice, dried food, vegetables, or even meats. Approaches for the promotion of green market in this area will be the creation of safe food of farmers and food producers can distribute their products to others in the community through the green market or the green corner to get the fair prices as well as the income generating for farmers gradually. Moreover, the green market or the green corner is an another way of motivating farmers to produce food on a continuous basis, in accordance with the promotion of self-reliance in the community including during the suffering moments such as encountering with the flood.

Expected Outcome

- Farmers can produce their food and perform ongoing green market management
- Activation of the safe food distribution in the community
- Members earn extra income from selling their products at least twice a week
- Green market is a practical food distribution channel during the recovery from the flood

Component (Input/ Activities)

- Arrange the meeting for group of interest to define the goals, plan the launching of the green market, set the products and draft the community standards
- Support the vegetable plantation and food processing
- Provide equipment and facilities for the use in the green market such as the 8mm. mobile folding tables, umbrellas, aprons with hats and the inkjet labels
- Supervise the sales of each single member and overall sales of the group

Related Program, if any	**Crop Diversification and Food Security**	**Code: AGRI-CRDV-1**

Cost (w/ Source)

1) Equipment
- The JICA has distributed the equipment for the green market amounting to 7,700 baht
- Farmers has distributed the additional equipment amounting to 3,000 baht

TOTAL 10,770 BAHT

Implementing Schedule: *November 2012 to April 2013*

- Dec. 2012: Planning for the market launching
- Jan. 2013: Preparation of the products and equipment to be used in the marketing management
  The first grand opening is scheduled on 26 January, 2013
- Feb. 2013 Arrangement for the whole month sale at the green market
- Mar. 2013 Lesson learned workshop, preparation of media
- Apr. 2013 Final workshop

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Dec. 2012	- As per the meeting held for the group of interest on 30 November, 2012 to plan the production, the meeting agreed to schedule the launching of the green market on 19 January, 2013. For the work progress of this month was merely to follow-up the production of farmers.
Jan. 2013	- On 15th January, 2013, the meeting for the potential evaluation in activating the green market was arranged. It was found that the group was not yet ready due to the vegetable production was not as scheduled. It was therefore postponed the launching from 19 January, 2012 to 26 January, 2013. - Provided all equipment to be used for the green market. For example, labels displaying the name of the group, tables for setting the products, big umbrellas and aprons with hats. - On the job training for farmers on the preparation of vegetables. For instances, cutting vegetables before washing, washing through the use of plain water diluted with Sodium Bicarbonate and cold water with ice in order to get the safe, fresh and tasty vegetables. - First launching of the green market on 26 January, 2013 participated by 10 members from 5 villages bringing their products to sell: fresh vegetables, bananas, traditional sweets and local fruit juice, etc. - Problems found in the first launch were as follows: 1. Due to it was the first launching of the market, product quantity was still few as per their learning and trial of improving the production. It tends to have more volume of products in the future. 2. Type of market opened in the first time is the flea market. It was found that the market owner who is from the private sector had made the agreement with the sellers that no more additional vegetable stalls will be allowed. So, the market owner requested to sell just once a week. The market group agreed that next week the market will be moved to Sunday morning.
Feb. 2013	-
Mar. 2013	-

*Describe main findings about the project, including progress, problem, issues raised.

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	- Due to it is the first start of the project and first experience of market management, it is therefore no obvious lessons yet.
Timing of Implementation (Pre-, During , Post- Flood)	-
Acceptance of technique by community (cost, benefit, easiness, relevance to	
Replicati on and extension (role of stakehold	
Sustainability (incl. O&M, benefit during normal time)	

PHOTOS

Vegetable farm in the community supported by flood project

Grading and packing of vegetable for market

Private market place held on every Saturday

Sales of vegetable in the market

Safety vegetable product

Food processing item (juice made from fresh fruits)

PILOT PROJECT SHEET

Project Code	Sector	Income Generation Activities towards Recovery of Rural Livelihood (iGEN)
iGEN-IGLR-1	Program	Income Diversification by Agro-processing (AGPR)
Title	Recovery and Improvement of Agro-Processing	
Purpose	To improve productivity of traditional processed food in the community for additional income generation	
Location	Tambon Khlong Ha	
Beneficiaries	Food Processing group in Khlong Ha	
Implementing Agency	Kasesart University Institute of Food Research and Product Development (IFRPD)	

Background/Concept

Food processing group in Tambon Khlong ha has traditional products such as "rice cake", etc. JICA team is aiming at improving their productivity and quality of food processing and creating extra income for diversification of income sources in the community with support of JICA team and government agencies. Besides, linkage between food processing and green market in the local area as flood countermeasures will be tried through the activity.

Expected Outcome

- Farmers can improve productivity and quality of their processed food
- Activation of the food processing activity in the community
- Members earn extra income from selling their products in the local market

Component (Input/ Activities)

- Arrange the meeting for food processing group of interest to plan business model
- Technical support for improving productivity and quality by JICA team and IFRPD/KU
- Financial support for procurement of equipments for food processing
- Supervise the sales of each single member and overall sales of the group

Related Program, if any		**Code:**

Cost (w/ Source)

1) Equipment (Oven for drying products)
   - JICA team 40,000 Baht
   - Food processing group 40,000 Baht
   - TOTAL 80,000 Baht
2) Training IFRPD 80,000 Baht

Implementing Schedule: *November 2012 to April 2013*

- Jan-Mar. 2013: Meeting in the group
- Apr. 2013 Procurement of equipment and starting processing activity
- May-June. 2013 Training

PHOTOs

Process I. Rice sheet preparation		Process II. Final product preparation	
	Jasmine rice was cooked in rice cooking machine. The burn rice will be removed to prevent brown color in rice cracker.		Dry rice sheets were fired in vegetable oil with medium heat till rice sheets turned to yellow. Rice sheets were puffed during frying.
	Cooked rice was minced as starch paste to prepare rice sheet.		Spreaded fried rice sheets with sweet and spicy sauce then put topping on rice sheet (there are 2 topping flavors; cereal and pork flavor).
	Rice paste was spread to sheet on plastic with vegetable oil coated to prevent rice paste stick.		Let rice cracker cool down to room temperature.
	Rice sheet were cut in circle shape (picture in appendix) then dried by sunlight.		Rice crackers were packed in plastic bag as ready to eat product. (7 pieces for 1 pack will be sold for 35 Bath)
	Circle rice sheets were dried on stainless net by opened air sunlight condition. Rice sheets were dried for 3 days depending on temperature and light intensity of weather.		
 Fried rice cracker heated in hot air oven		 Hot air oven	 Dry rice sheet (square shape)

5.Tambon Disaster Resilient Plan, T. Khlong Ha, Pathumthani						
Project (by priority)	**Planned Activity**	**Procedure detail**	**Related Agencies**	**Progress Problems/constraints**	**Actions to be taken**	
					Short-term (1 year)	**Long term (5 years)**
1.Community water quality improvement	1.1Water purifier procurement	1. Location Inspection 2. Planning meeting 3. Procurement of necessary element 4. Installation 5. Follow up and evaluation	TAO/JICA/ community committee	Progress 1. A management committee was set up. 2. Location was selected and the Water Purification System was installed. 3. O&M training for 2 TAO techniciansw as completed. 4. MOU was signed among TAO Khlong Ha, JICA Study Team and contractor. Problems 1. People cannot access information on the project due to lack of public relations campaign. 2. Water pressure is low. 3. Depositing of sediment from ground water may cause a high expenditure on O&M.	1. Organize a committee meeting to set plans on management, marketing, etc. 2. Disseminate information on project in every village in T.Khlong Ha 3. Have a community hearing on the management plan to receive feedback for revision 4. Mobilize/ research source of funds to stabilize O&M procedure and maintain water quality to satisfy consumers	1. Get FDA standard for the water to expand its marketing strategy 2. Adjust marketing strategy from selling to market in T.Khlong Ha to market outside the tambon 3. Replicate the water purification project to other villages in T. Khlong Ha
	1.2Construction ofground surface water purification system from Rama 9 reservoir		HAII	Progress Informal talk with HAII was conductedregarding Rama 9 reservoir. The community is waiting for further discussion with an authorized person from HAII to set talk with the person in charge of Rama 9 reservoir.	No specific activities are planned.	No specific activities are planned.
2.Promotion project to increase the capacity of agricultural production in tambon	2.1Increase the potential of Tambon's Agricultural Technological Transfer Center(ATTC)	1. Accumulate interested members 2. Held a participatory WS 3. Follow up and evaluate the result.	Land Development Department/ DOAE	Progress No activity has been carried out. Problems 1. ATTClacks sufficient equipment such as soil tester. 2. Personnel in ATTC lack variety of knowledge in agricultural technology. 3. There is no consistent promotion on organic farming and insufficient incentive for people to practice it.	No specific activities are planned.	No specific activities are planned.
	2.2Workshop	1. Invite members	TAO/ Land	No activity has been carried out.	No specific activities are	No specific

5.Tambon Disaster Resilient Plan, T. Khlong Ha, Pathumthani						
Project (by priority)	**Planned Activity**	**Procedure detail**	**Related Agencies**	**Progress Problems/constraints**	**Actions to be taken**	
					Short-term (1 year)	**Long term (5 years)**
	by local experts to promote appropriate soil treatment action for farmers	2. Held participatory WS 3. Procure equipment 4. Follow up/ evaluation	Development Department/ DOAE/Rice Research Center		planned	activities are planned
	2.3 Cropping calendar		-	No activity has been carried out.	No specific activities are planned	No specific activities are planned
	2.4Public yard to dry the paddy		-	No activity has been carried out.	No specific activities are planned	No specific activities are planned
	Additional issue	Green Market	Green Market group	<u>Progress</u> 1. Several trainings, such as making organic pesticide substance and fertilizer, and crop calendar, were conducted to strengthen the capacity of the green market group. 2. Green market group produce products to sell at the market in T. Khlong Ha. <u>Problem</u> 1. As the number of group member is small, insufficient volume and variety of the products constrains to extend capacity of its marketing potential. 2. There is no sufficient public relations campaign to disseminate information on the green market project to people in T. Khlong Ha. 3. There is no sufficient market place if the activity is expanded.	1. Expand the production capacity to match the capacity of market place available in T. Khlong Ha 2. Further develop techniques in making organic fertilizer and pesticide 3. Improve public relations campaign on raising awareness of people in T. Khlong Ha to take organic food and live healthy	1. Expand the project activity and work in collaboration with Dipankorn School. 2. Expand number of green market members and market places to the markets outside T.Khlong Ha.
3.Processing project from rice and	3.1 Innovation research on the value-	1. Invite members 2. Hold a workshop 3. Procure equipment	TAO/Social Development Department/	<u>Progress</u> 1. Selection for members was completed. 2. Oven for baking rice cracker was procured	1. Develop internal and external market channels for product distribution in	1. Develop network for raw material and market with

KH-5-2

5.Tambon Disaster Resilient Plan, T. Khlong Ha, Pathumthani						
Project (by priority)	**Planned Activity**	**Procedure detail**	**Related Agencies**	**Progress Problems/constraints**	**Actions to be taken**	
					Short-term (1 year)	**Long term (5 years)**
banana	adding of the product +Packaging+ marketing.	4. Packaging and Marketing workshop 5. Follow up/ evaluation	enterprise group	with the support of the project (THB40,000 out of total cost of THB90,000). 3. IFRPD of KasersartUniversity contacted the group to provide demonstration of using equipment. Training for the group on making rice cracker and processed banana is in progress. 4. For making processed Madan and Makok, the group has requestedRajamongkon University for the training on food processing and packaging development. <u>Problems</u> 1. Lack of knowledge on wide variety of food processing techniques. 2. There is a constraint on network for raw material and market.	close collaboration with Dipangkorn School 2. Provide training by the community food processing group to school children who are interested in the group activity 3. Conduct meetings regularly to provide feedback and jointly revised the plan and implementation activity to keep update information and improve the group activity	another groups to procure quality raw material and to exchange goods 2. Develop and expand market channel to markets outside T. Khlong Ha
4. OTOS	4.1Develop an effective OTOS system	1. Invite members 2. Hold a workshop 3. Establish structural formation of OTOS 4. Procure equipment 5. Follow up and evaluate	TAO / DDPM of Pathum Thani/ Volunteers	<u>Progress</u> 1. Training for OTOS volunteers has been provided to 10 volunteers selected by TAO each year. 2. Some necessary equipment, i.e. walkie talkie,and set of first aid package and instruments, were provided to TAO. <u>Problems</u> 1. Lack of budget to procure necessary equipment. 2. Lack of actively devoted volunteers.	1. Procure necessary equipment, such as fire engine and first aid instrument, by TAO budget and provide regular training for OTOS volunteers 2. Increase number of volunteers who receive training on rescue and first aid techniques. 3. Extend OTOS training to Dipangkorn school (by working with TAO and DDPM Pathum Thani)	1. Increase number of active volunteers as well as strengthening their capacity to cover in all area of the tambon
5. Tambon Scenery Improvement	5.1Water quality improvement	1. Invite interested member 2. Inspect study tour site	TAO/ Provincial Environment	<u>Progress</u> *Community* 1. Study tours for community leaders and	*Community* 1. Propose the planned activity to the board of	1. There will be more than 50% of the

5.Tambon Disaster Resilient Plan, T. Khlong Ha, Pathumthani						
Project (by priority)	**Planned Activity**	**Procedure detail**	**Related Agencies**	**Progress Problems/constraints**	**Actions to be taken**	
					Short-term (1 year)	**Long term (5 years)**
Project		3. Study tour 4. Implement planning	Department/ Non-formal Education Center/ Community leaders/ Green market group/team member from Dipangkorn school.	team member from Dipangkorn schoolwere conducted to learn process for garbage management and waste water treatment. 2. A model group for garbage separation activity was set up. 3. Action plan was made in collaboration with the project for the community garbage management and waste water treatment. 4. Garbage separation activity was started by the model group (green market group). <u>Problems</u> 1. Lack of support from TAO due to the lack of interest on the garbage management. 2. Lack of containers especially for wet garbage, toxic waste and grease trap. 3. Lack of economic incentive to persuade people's participation in garbage separation and waste water treatment activity. <u>Progress</u> *Dipangkorn School* 1. Study tours for community leaders and team member from Dipangkornschoolwere conducted to learn process for garbage management and waste water treatment. 2. 182,000 THB budget was approved for the garbage management and waste water treatment activity initiated by Dipangkorn school member. 3. TAO has supported some equipment for the planned activity; making wood vinegar and bio-gas.	TAO to explain the rationale and importance of the project 2. Collate information on problems incurred from current waste management, e.g. high cost for treatment, lack of dumped site, etc. to convince board of TAO to take action 3. Coordinate with all level of organizations within tambon to request for support and participation in the planned activity *Dipangkorn school* 1. Select work committee/ members 2. Implement theapproved activity 3. Broadcast the information on the planned activity through media channel available in the school e.g. website, booklet, meeting with parent association	households in T. Khlong Ha participate in the project activity
	5.2 waste separation	1. Invite members 2. Find places for study tour 3. Study tour 4. Conclusion meeting				

Report on
the Development of Flood Disaster Risk Management Plan and Practice of Evacuation Drill at Tambon Klong Ha, Pathumthani

1. Workshop on the Development of Flood Disaster Management Plan

Date:	27-28/01/2013
Time:	10:00-17:00
Place:	Dipangkornwittayapat School, T. Klong Ha, Pathumthani
Objective of the meeting:	To prepare action plans for Community Based-Flood Disaster Risk Management with the community and Dipangkornwittayapat School
Number of attendants:	About 50 persons from the community, Dopankorn School, DDPM Pathumthani, and JICA study team.
Participants from the project:	Iwaki, Bubpachart, Thita

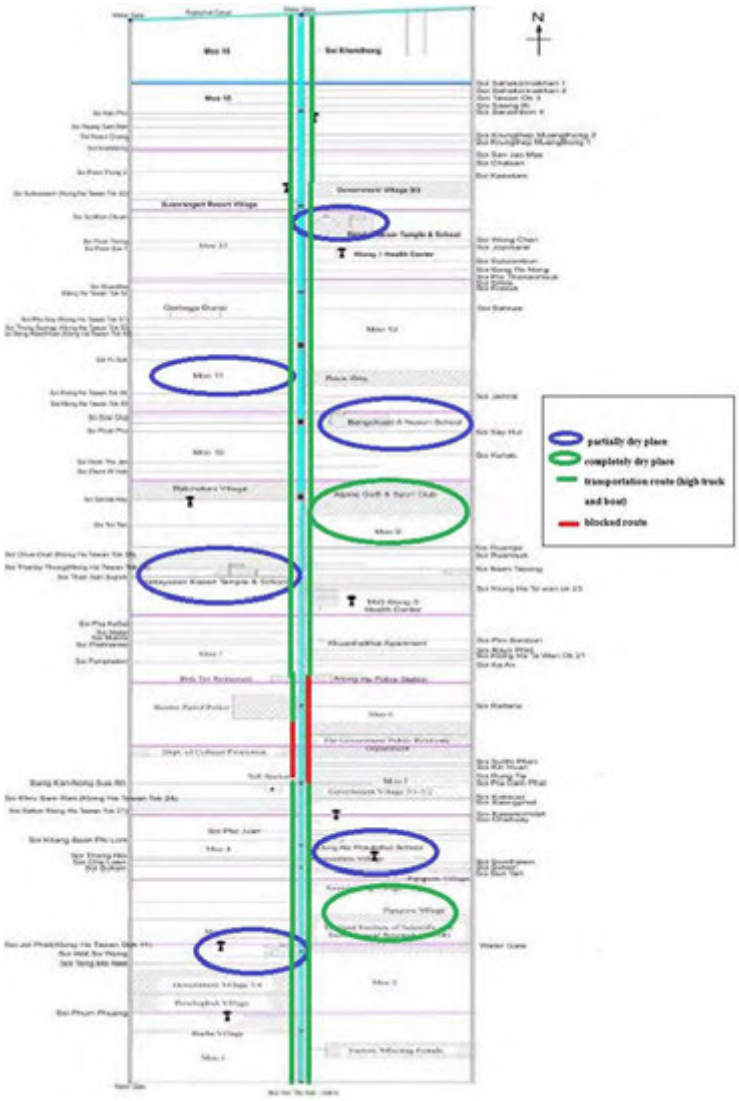
<Process of the workshop>

1) Introduction
Background of the pilot project and objective of the workshop were briefly explained by JICA study team member.

2) Review of the Study Tour to Lampoon Province
Participants of the study tour to Bann Muang Sampee, Ali District, Lampoon Province during 23-26 January shared their experience, particularly five steps of the CBDRM process learnt during the tour, i.e., 1) Knowing community 2) Risk analysis 3) Risk Management 4) Set up committee and 5) Preparing for a drill.

3) Explanation of the CBDRM process
The resource person from DDPM Pathumthani explained the process of CBDRM.

4) Development of a Community Hazard/ Evacuation map
Participants jointly made a hazard/evacuation map as below facilitated by the resource person from DDPM.



Descriptions

a) Fully dry places act as the existing evacuation centers in the past and for any activities may happen during the flood. The places are as follow:
   (According to the map)
   No.1. Alpine Golf Club Moo.9,
   No 2. Thailand Institute of Scientific and *Technological* Research Moo. 3

b) Partially dry places can hold some number of people, but they haven't been used as official evacuation centers in the past but they are potential spots that can be considered using. The places are as follow:
   No 3. Sirichantraram Temple and school, Moo 13
   No.4. Village headman's house, Moo 11
   No.5. Bangchuadanusorn School, Moo. 10
   No.6 Dipangkorn Wittayapat School, Moo.8
   No.7 Klong Ha Preuksachat School, Moo.4
   No.8 Watsawang Samakeethan, Moo.2

c) Elevated trucks or any four-wheel cars can travel on the both side of the roads along the rivers. Drivers should keep tracks of the electric posts to be on the even level of the roads as drawn in the brown lines on the map (No.9)

d) Boats can travel along the river on both sides of the villages except Moo.5 that the west side is blocked and Moo.6 that the east side is blocked. The purple lines indicates passable route (No.10) for boats and the red lines indicated blocked (No.11)

5) Set-up of a management committee to implement the Flood Disaster Risk Management Plan

Committees to implement the Flood Disaster Risk Management Plan for the community of T. Klong Ha and Dipangkornwittayapat School were formed tentatively as below by the participants with the facilitation of the resource person from DDPM. However the draft of the committees needs approval from village authorities.

Flood Disaster Risk Management Committee for T. Klong Ha community

1. Klong Ha commander team		
1.	Mr. Poj Rodcham	Chairman
2.	Mr. Pikul Jankrabuan	Vice chairman
3.	Mr. Charn Klinhuan	Vice chairman
4.	Mrs. Issarangkorn Srisombat	Secretariat
5.	Mrs. Srinuan Tippapongpakapan	Treasurer
2. Public relations team		
1.	Mr.Samchai Sattatham	Committee member
2.	Ms. Pakkinee Oparikkachart	Committee member
3.	Ms. Manachanok Sasiorn	Committee member
3. Coordination team		
1.	Mr. Ari Sangkapetch	Committee member
2.	Mr. Suchart Pokeaw	Committee member
4. Evacuation team		
1.	Mr. Narong Ruakwitee	Committee member
2.	Mr. Chatchai Luancharoen	Committee member
3.	Mr. Somchai Klabtong	Committee member
5. Relief and rescue team		
1.	Mr.Teanchai Sarakornchai	Committee member
2.	Mr. Panya Chulkleang	Committee member
3.	Mr. Anusorn Rungarun	Committee member
6. Service team		
1.	Mrs. Duangjai Pimthong	Committee member
2.	Mr. Chuan Kanpetch	Committee member
7. Medical and sanity team		
1.	Ms. Nipa Kochasamrong	Committee member
2.	Ms. Ampa Hemlak	Committee member
8. Security team		
1.	Mr. Saksit Asa	Committee member
2.	Mr. Prawit Preprame	Committee member
3.	Mr. Nongroj Sawaspoom	Committee member
9. Coordination center		
1.	Ms. Tipsuda Teanphumikij	Committee member
2.	Mr. Prasert Klamsua	Committee member
3.	Mr. Bajoong Niklota	Committee member

Flood Disaster Risk Management Committee for Dipangkorn Wittayapat School

1. Klong Ha commander team		
1.	Mr. Chayut Krueaim	Chairman
2.	Mr. Polporn Makeaw	Vice chairman
3.	Ms. Pakinee Oranrikkachart	Vice chairman
4.	Mr. Kasem Keawkanlaya	Secretariat
5.	Ms. Rattana Werusuwan	Treasurer
6.	Mr. Aramreung Suwannawapee	Committee member
7.	Ms. Manaschanok Sasithorn	Committee member
8.	Mr. Akekachai chimploy	Committee member
9.	Mr. Sathit Pongpiriyawanich	Committee member
10.	Ms. Rungrudee Keawpakdee	Committee member
2. Public relations team		
1.	Ms. Pakinee Oranrikkachart	Committee member
2.	Ms. Rungrudee Keawpakdee	Committee member
3.	Ms. Manaschanok Sasithorn	Committee member
3. system warning team		
1.	Mr. Chayut Krueaim	Committee member
2.	Mr. Kasem Keawkanlaya	Committee member
3.	Mr. Akekachai chimploy	Committee member
4. Evacuation team		
1.	Mr. Chayut Krueaim	Committee member
2.	Mr. Kasem Keawkanlaya	Committee member
3.	Mr. Aramreung Suwannawapee	Committee member
5. Relief and Rescue team		
1.	Mr. Chayut Krueaim	Committee member
2.	Mr. Kasem Keawkanlaya	Committee member
3.	Mr. Sathit Pongpiriyawanich	Committee member
4.	Ms. Rattana Werusuwan	Committee member
5.	Ms. Rungrudee Keawpakdee	Committee member
6. Sanitary and medical team		
1.	Ms. Pakinee Oranrikkachart	Committee member
2.	Ms. Manaschanok Sasithorn	Committee member
7. Security team		
1.	Mr. Chayut Krueaim	Committee member
2.	Mr. Kasem Keawkanlaya	Committee member
3.	Mr. Sathit Pongpiriyawanich	Committee member
8. Coordination team		
1.	Mr. Chayut Krueaim	Committee member
2.	Mr. Kasem Keawkanlaya	Committee member
3.	Ms. Rungrudee Keawpakdee	Committee member

6) Development of Actions Plans on Flood Disaster Risk Management

Drafts of action plans on Flood Disaster Risk Management were developed for community and Dipangkornwittayapat School based on the discussion among participants as provided from the page 6.

<Comments/Follow-up Issues>

- Committees of T. Klong Ha community and Dipangkorn Wittayapat School for the Flood Disaster Risk Management were set-up with the support of resource persons from DDPM. However, as the committee was drafted without the actual participation of nominated persons and some of key community members (such as village head persons), the formation of the committee, as well as members, have to be confirmed again in the village.
- Action plans for both community and school was developed during the workshop. However, the plans are still broad and should be focused to be actually implemented by the initiatives of the committee members, who are to be confirmed later.

- At the end of the workshop, the community and Dipangkorn Wittayapat School agreed to have a evacuation drill at the school with the participation of the community in late February. Both parties agreed to discuss the detail of the drill and preparation in early February with the support of the project and DDPM Pathumthani.

Development of evacuation map by the participants

Formation of disaster management committee facilitated by DDPM staff

Action plan of T. Klong Ha community for Flood Disaster Risk Management

Problems identified	Countermeasures	Actions	Responsible persons
Lack of accurate information (water situation) 1. Information is not accessible 2. Lack of effectiveness in communication 3. Lack of people participation	1. Set up information center for water management. 2. Improve communication system in the Tambon	1. Set up database management of water situation. 2. Survey route for evacuation 3. Set up a warning system and in charged officers to keep watching the situation. 4. Set-up communication system for community people through broadcasting tower, wire speaker, broadcasting news with a speaker carried by a van. 5. Constantly broadcasting the information throughout Tambon by the mentioned means.	Warning and surveillance team Public relation team
Lack of plan and coordination between Tambon and government agency.	Set up "Central Coordination Center" of Tambon to communicate with all involved agency; government, private, NGOs.etc.	1. Select community committee 2. Select location for permanent office 3. Set up working method and communication system among the team.	Coordination team
Lack of shelter and supply i.e. food, drinking water, medicine etc.	Improve supply and services provision system to cope with flood in Tambon.	1. Establish adequate number of evacuation center throughout Tambon for evacuation purposes. 2. Set up a central donation station of the community (Dipangkorn school) 3. Set-up community volunteers to give a hand on supply distribution, cooking and other necessary duty. 4. Set up a civil security team to keep watching on water situation and trivial crime as well as provide primary assistance for evacuated people. 5. Set up Women group team to take care of food cooking and distribution 6. Prepare necessary supply and material to cope with flood situation i.e. food, drinking water, medicine, boat, gas, truck etc.	Life safeguard and civil security team Coordination team Public relation team
Lack of water protection material	Improve system of water protection in Tambon.	1. Set-up system to for water protection volunteer at the vulnerability point (KhlongRapeepat) 2. Prepare adequate sandbags to protect the water (higher than water level in the past)	Warning and surveillance team

Problems identified	Countermeasures	Actions	Responsible persons
Lack of electricity technician in the community	Improve protection system of main utility and infrastructure i.e. electricity.	1. Make a registration for households that need services. 2. Make electricity technicians available in each village and schedule the service provision. 3. Add the information in the community database system.	(not identified)
Route for transportation is cut off.	Improve transportation system during flood.	1. Survey possible transportation route in T. Khlong Ha 2. Prepare sign to tell the direction and mark position of the route. 3. Prepare transportation gears; boat (including gas and engine), truck, raft, etc. 4. Set up the Tambon transportation plan during flood.	Evacuation team Public relation team
People's health condition are bad and stress	Improve medical services system during flood	1. Set up a medical team to take care of people at the evacuation centers 2. Set up a medical volunteer team to visit people who deny moving out of their house.	Life safeguard and civil security team Medical team
Risk to poisonous animal (snake, crocodile)	Improve community security system during flood.	1. Set-up life safeguard and civil security team patrol in each village 2. Coordinate with expert on catching poisonous animal. 3. Coordinate with nearby hospital for medical attention.	Life safeguard and civil security team Medical team
Children are lack of knowledge on danger come with flood.	1. Improve knowledge and skill for school children to cope with flood disaster.	1. Provide accurate information to public and children (by school teacher) 2. Enhance life skill for children to cope with flood situation.	Medical team
People do not evacuate	Improve evacuation plan for the community.	1. Prepare evacuation plan and drill for school and community.	Life safeguard and civil security team Medical team
Some ritual are unable to perform during flood i.e. funeral	Preparation for necessary ritual i.e. funeral during flood.	1. Prepare material necessary for preserving the dead body at the temple and vehicle mode to transport the body.	Life safeguard and civil security team
There is no dried place to keep livestock and stray dogs and cats during flood.	1. Preparation the evacuation plan for livestock stray dogs and cats (pets).	1. Survey a dried place and make plan to move livestock and stray dogs and cats to dried place. 2. Prepare supply for the animal i.e. food, water, medicine	Life safeguard and civil security team Coordination team

Action Plan of Dipangkorn School for Flood Disaster Risk Management

Problem Identified	Countermeasures
Students are lack of knowledge on danger come with flood.	1. Create learning activity for school children to enhance their knowledge, skill and awareness to cope with flood disaster. 2. Continually broadcasting the information to school children and their parents. 3. Increase knowledge, skill and awareness on danger come with flood water for people in T. Khlong Ha and school children through information board.
Students are lack of skill to protect themselves from the danger come with flood disaster.	1. Provide training on lifeguard and life skill by civil security volunteer and officer. 2. Set up a drill for evacuation with Tambon people.
Lack of constantly practice of the skill necessary for coping with the flood.	1. Integrate skills required into the mainstream school curriculum. ▪ Catching fish ▪ Floating plantation ▪ Making life jacket from recycled plastic bottle. ▪ Rowing boat ▪ Swimming
There are a lot of mosquitos in the school during the inundation	1. Provide training on making mosquitos repellent from herb and information dissemination.
School infrastructure and utility place are damaged by flood	1. Set up big cleaning day to clean up the place.

2. Planning Workshop for Evacuation Drill

Date:	13 February 2013 (0900 – 1200)
Place:	Dipangkorn Wittayapat, Klong Ha, Pratumthani
Objective of the meeting:	To plan and prepare for flood evacuation drill
Number of attendants:	About 50 persons from community, Dipnagkorn School, TAO, health station, police, etc

<Summary of discussion >

1) The meeting decided that the drill would focus on the school students while the villagers would partially take part in. The situation of the drill was set as the evacuation of villagers as well as nearby primary school students to the Dipankorn High School with the warning of the flood.

2) The date of the evaluation drill was set as Wednesday, 20 February. It was also decided to have a pre-drill meeting on Monday, 18 February among key members, including TAO, village leaders, Dipangkorn School, and JICA study team.

3) The meeting agreed to use the venue of the Dipangkorn School for the drill as shown in the next page.

4) Tentative actions of the drill were as follow

Act 1: Based on the information from RID on the increase of the water level, a committee meeting is held to decide the evacuation and roles of each responsible team.

Act 2: The public relation team announce the situation to community (the school area) about the water situation and preparation process to move belongings to high place.(In this case informative messages to the self-preparation process is being told)

Act 3: After a while, the public relation team announces the emergency evacuation to community (the school area) including the opening of the evacuation centers. At this point people will move to the evacuation spot where there're settings similar to the real evacuation center.

Act 4: To recreate the real situation of the evacuation center to learn about proper management, after people move from their houses to the spot (with their necessary belonging), evacuee first make a registration at the set up point (spot 3) , then to medical screening process (spot 6)before being sent to appropriate spots(Hall 4)

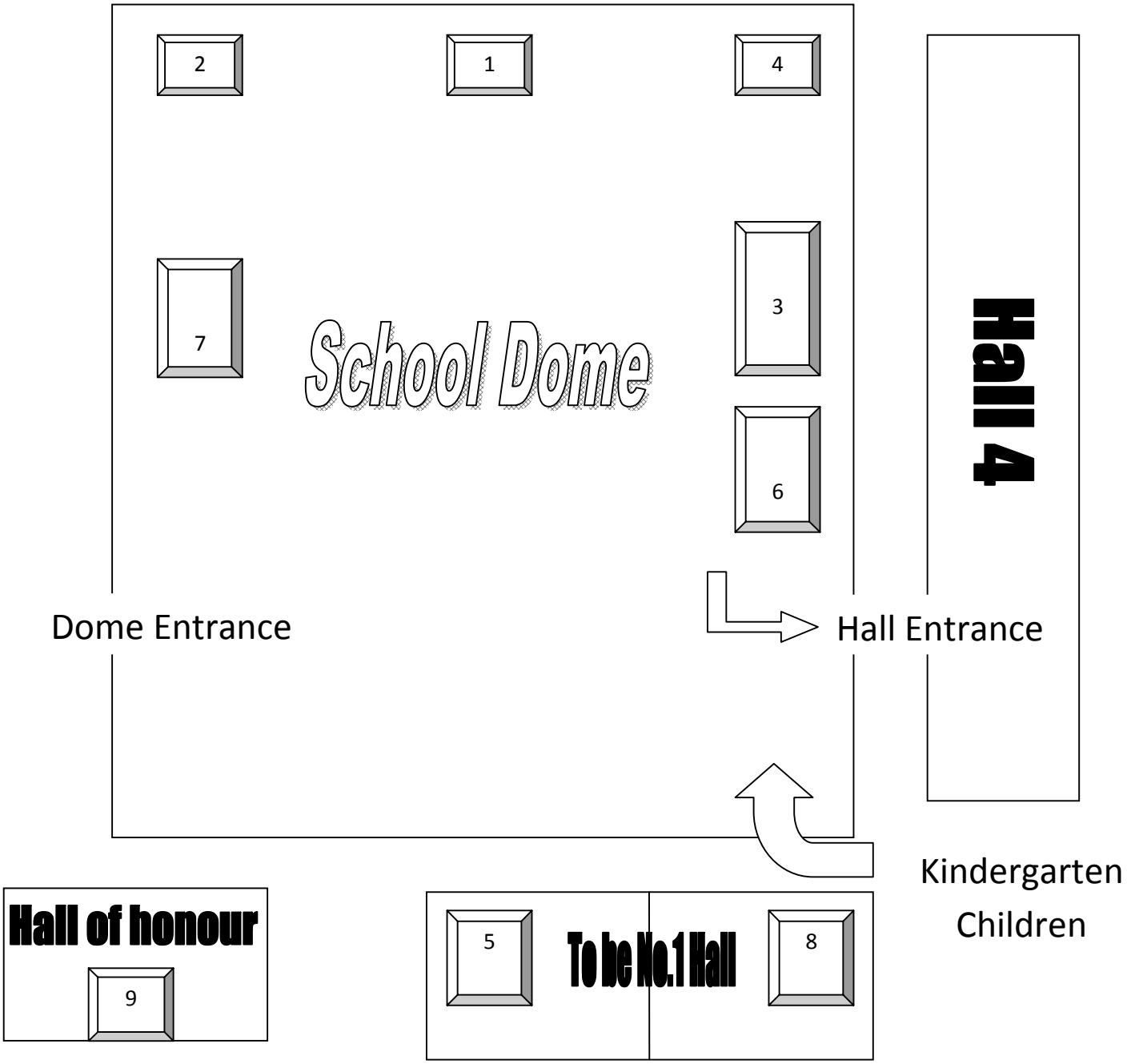
Act 5: Young school children are evacuated from the primary school nearby to Dipangkorn school to meet up with their parents at the assembly point. This act teaches small children to line up readily and obey their supervisor for evacuation safety.

Act 6: From the assembly point, the public relation team announces the rooms and other facilities prepared for them. Then they move into the prepared room.

Act 7: The public relation team will make an announcement to inform the evacuee to pick up all necessary supply at the donation point. At this point the donation items will be prepared by JICA and the items are for them to keep (spot 5).

Act 8: Two rescue practices would be perform by setting up a simulation of 1.Rescue team will help rescue people who with heart attack or electrocuted. 2. Volunteer team help with a crime scene Thief.

Evacuation map for Klong Ha, Dipangkorn Wittayapat School.



1. Information announcement
2. Warning Station
3. Registration
4. Rescue Station
5. Donation Station
6. Health Station
7. Security
8. Coordination Station
9. Administration station

5) There are about 200 participants expected to join the drill from the community and schools. Village leaders and TAO are responsible to inform and encourage villagers to join the activity.

6) Meeting participants agreed to prepare and distribute 200 emergency bags to the participants of the drill. The bags are to be prepared by the Dipangkorn school with the financial support of JICA study team. Contents of the emergency bag are;
   - Instant noodle x 3 packs
   - Canned fish x 2 cans
   - Drink water x 2 bottles
   - Snacks x 5 packs
   - Soy milk x 1 box
   - Vegetable oil x 1 bottle
   - Detergent x 1 pack
   - Tooth brush x 1 piece
   - Tooth paste x 1 piece
   - Bar soap x 1 piece

3. Preparation meeting for Evacuation Drill

Date:	18 February, 2013 (1000-1200)
Place:	Dipangkorn Wittayapat, Klong Ha, Pratumthani
Objective of the meeting:	To prepare for evacuation drill
Number of attendants:	About 15 key persons to prepare for the drill from community, Dipnagkorn School, TAO, and JICA study team

<Summary of discussion >

1) The participants reviewed the plan as well as drill actions step by step to clarify the management and responsible persons.

2) The participants also observed the venue and discussed about the management at the each facility.

3) Dipangkorn School started making emergency bags with students' volunteers.

4. Evacuation Drill

Date: 20 February, 2013 (0900-1130)
Place: Dipangkorn Wittayapat, Klong Ha, Pratumthani
Objective of the meeting: To exercise the evaluation drill
Number of attendants: About 200 persons from community, Dipnagkorn School, nearby primary school, TAO, health station and district hospital, DDPM Pathumthani, police, and JICA study team

<Process of the Drill>

1) Introduction of the drill and preparation (0900-0940)
   - Opening remarks (by school principal and TAO head)
   - Introduction of the objective and process of the drill
   - Presentation of a video for evacuation drill at Li District, Lampoon Province (taken by a study tour participant)
   - Clarification of setting and function of each station and responsible persons

Participants of the drill

Participants of the drill

2) Preparation of each station (0940 – 1000)

Preparation of evacuation rout

Preparation of a health station

3) Practice of evaluation drill and wrap-up (1000 -1100)

- Practice of the drill based on the planned acts, i.e., committee meeting to discuss/decide evaluation, announcement of the evaluation, registration, and necessary support to evacuees.

Committee meeting to assess water situation

Evacuation to the school by villagers

Registration of evacuees

Registration of evacuated small students with the support of elder students

Blood pressure check by a health volunteer at health station

Examination by a medical staff

Practice of the stretcher by a health volunteer

Ambulance from the district hospital

Role play for capturing thieves by OTOS

Role play for capturing thief by OTOS with the support of the police

- After the exercise, brief wrap-up session was held with all drill participants.
- Emergency bags were also distributed to the drill participants.

Distribution of emergency bags

Distribution of emergency bags

<Follow-up issues>

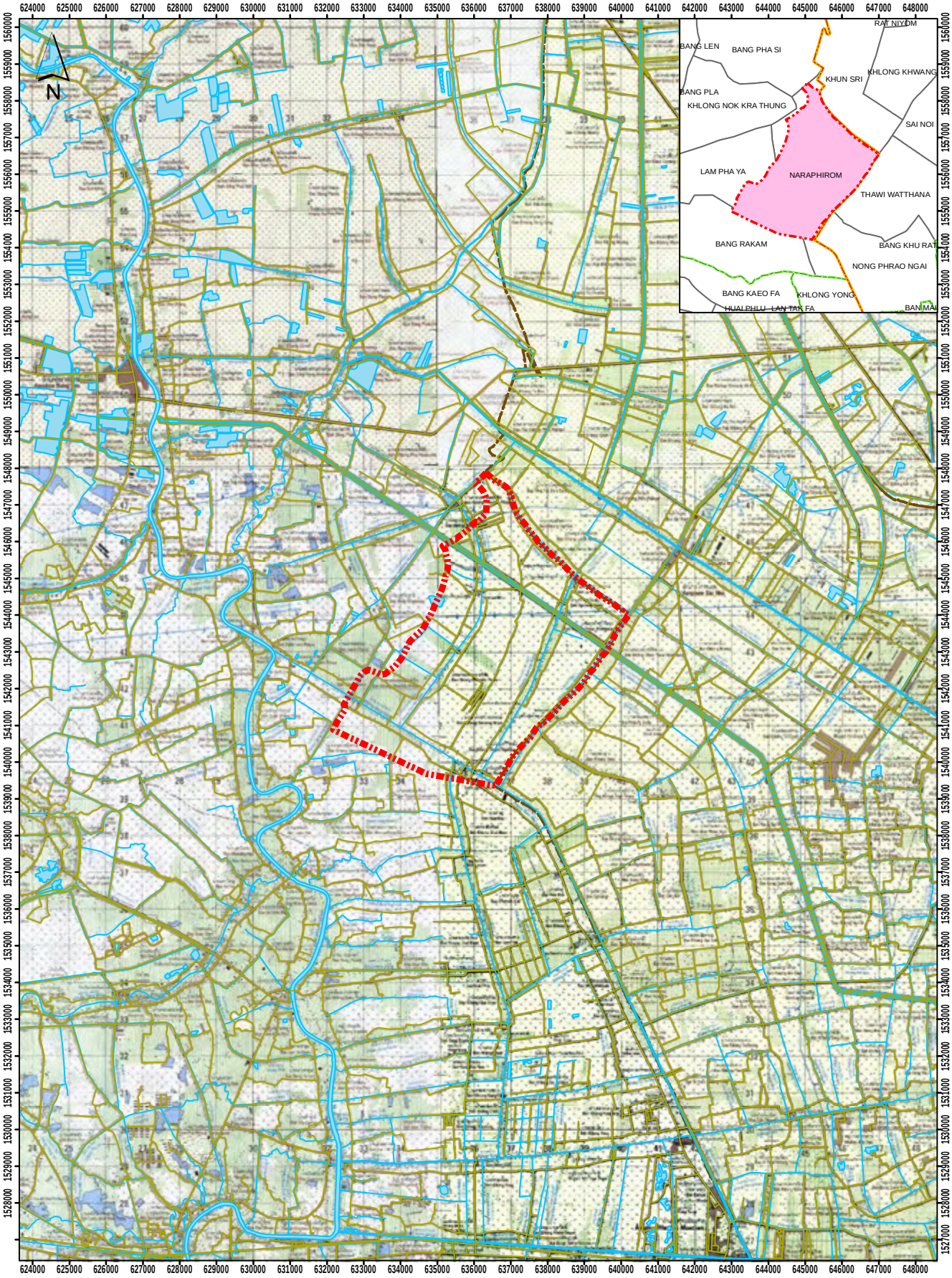
- Preparation of a video material of the drill by the Dipangkorn School for public relation as well as for the presentation at the wrap-up workshop of JICA study.
- Discussion on any other activities which can be supported by JICA study, such as sharing of experience with the school at T. Chum Saeng Songkram.

Community Case Study

Tambon Naraphirom, Ban Leng District

Nakhon Pathom Province

Content



Legend

- Provincial Boundary
- Tambon Naraphirom
- Water body
- River
- Road

Note

Data Source:
Neibouring Tambon Boundary: GISTDA
Other data: RID

Scale 1:100,000 (1 0.5 0 1 2 3 4 km)

Date July 2013

Project for
Flood Countermeasures
for
Thailand Agricultural Sector

JICA

Topographic Map of Tambon Naraphirom, Amphoe Bang Len, Nakhon Pathom Province

1. Socio-economic Situation in Tambon Naraphirom

Tambon Naraphirom is located in the low alluvial flats of the Tha Chin Tha Chin River; with approximate aland area of 23,450 Rai, or 37.52 Km2and connected to following areas:

- The northern border is connected to Tambon KhunSri, Amphoe Sai Noi, Nonthaburi
- The southern border is connected to Tambon Bang Ra Kam and Tambon KhlongYong , Amphoe Bang Lane and Amphoe Puttamonton, Nakhon Pathom .
- The eastern border is close to TambonPrae Ngai, Amphoe Sai Noi, Nonthaburi, and
- The west border is connected to TambonLamphaya and Bang Pasi, Amphoe Bang Lane, Nakhon Pathom

The soil character of Tambon Naraphirom is called Bang Lane type which is clay-like with dark-grey to black pigment with slight light brown dots, poor in water absorption. The acidity of the soil is slight to mild acidic, 6.5-7.0 in pH scale. There are five road routes for the main community and transportation as follow.

1. A 20 Km route from Amphoe Puttamonton, Nakhon Pathom via Tambon Khlong Yong.
2. A 25Km route fromAmphoe Nakorn ChaiSri, Nakhon Pathom via Tambon bang Phra and Bang Rakam
3. A 19 Km route from Amphoe Bang Lane, Nakhon Pathom via Tambon Lamphaya
4. A 30 Km route from Ladlunmkeaw, Pathum Thani, via Noppawong intersection and Tambon Bangpasi.
5. A 5 Km route from Amphoe Sainoi, Nonthaburivia Tambon Khun Sri and Thawee Wattana.

There are 8 main canals which people use for household consumption and for agricultural purposes namely

1. Khlong Sib Sok 2. Khlong Phra Mor Phi Sai 3. Khlong sawang arom 4. Khlong Taweewattana 5. KhlongTambon Naraphirom 6. Khlong Swischart 7. Khlong Chaikan 8. Borrowed pond (right-left of the irrigated canals)

The housing character of Tambon Naraphirom is that people preferably build their houses in their farm area and close to canals to easily utilize the canals for agricultural purposes. There are houses which are Central Thai type with elevated first floor, and the contemporary one without the elevated first-floor. The material used to build is for example concrete, ceramic tiles etc. There are big houses and expensive asset such as high-end cars motorcycles and electronic devices that can be commonly seen. This can show that people in Tambon Naraphirom are wealthy. The fact that there are big intervals between each houses show that the density of people versus area is low. Most of the land use is majorly agricultural land although there are a number of big factories in almost every village.

2. Socio-Economic characteristic

Population

The population number of Tambon Naraphirom is 4,865 which make 41,165 household, in this number there are 2,427 males and 2,438 females. The most populated villages are Moo.10; 603 people, Moo.6; 564 people, and Moo.8; 516 people consecutively. The least populated village is Moo.5, 258 people. Among all the number of population, there are 2,427 males and 2,438 females. There are

diversities of the original ethnic groups in Tambon Naraphirom, apart from Thai there are, Chinese, Indian (Sikh), Kalong (Burmese).

Village	Population				
	Male	Female	Total	%	Household
Moo. 1 KhlongTambon Naraphirom	248	234	482	10	118
Moo. 2 KhlongTambon Naraphirom	194	197	391	8	84
Moo. 3 KhlongTambon Naraphirom	235	227	462	9.5	124
Moo. 4 Khlong Sawang Arom	238	254	492	10	107
Moo. 5 Ban Khlong Jao	134	124	258	5	66
Moo. 6 Ban Khlong Sawang Arom	277	287	564	12	148
Moo. 7 Ban Khlong Sib Sok	195	174	369	7.5	97
Moo. 8 Ban Khlong Pra Mo Pisai	267	249	516	11	122
Moo. 9 Ban Khlong Pra Mor Pisai	177	165	342	7	84
Moo. 10 Ban Hua Kuu	271	332	603	12	131
Moo. 11 Ban Khlong Pra Mor Pisai	191	195	386	8	84
Total	2,427	2,438	4,865	100	1,165

Source: TAO Tambon Naraphirom

The population in Tambon Naraphirom consists of 1 Native people who are mostly farmer 2.The new comers. As the area is gradually urbanized and the trend of more housing development projects constructed throughout the area, it results in the rising of the new comers' number. The work source in Tambon Nraphirom outside agricultural sector are for example, SML size factories, service related business and construction site. Occupations of people in Tambon Naraphirom are 46% farmers, 32% employees in several sectors, 10% private merchandising, and 12% unemployed.

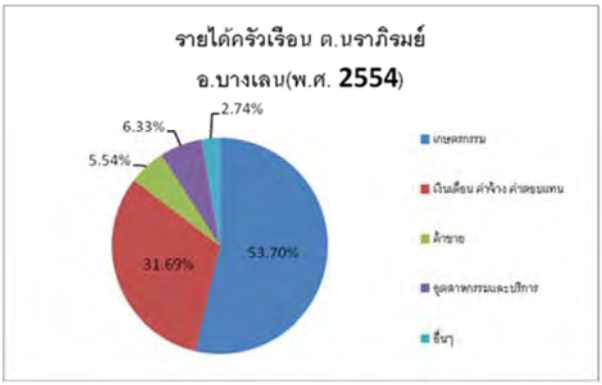
Vulnerable group

The following number of people classified as vulnerable would be support financially by TAO due to the government policy.

Elderly	Disabled	HIV Infected	Financially challenge Family
522	97	3	15

Moreover the number of critically ill patients classified by detail/condition of illness, would be kept by the Health volunteers for medical care service.

Income



The income source of Tambon Naraphirom is classified into 4 major parts being; 1.agricultural products 2. Wage and salary of the household members (both registered and non-registered in the

labor system) 3. Private merchandising 4. Public welfare (divides from fund groups, government welfare, elderly allowance).

According to the data from TAOTambon Naraphirom, the Tambon's gross income in 2010 was 341,497,452 Baht, 53.7% is from agricultural sector, and 31.69% is from wages and income, 6.33% from small industry and service sector, 5.54% merchandising.

Household expense

The average household expense of people in Tambon Naraphirom is 260,155 Baht/household/year (Living standard survey), 60% of the amount is used for production cost(1/3 of the production cost is used to by chemical substances, 40% of the overall expense goes to transport cost, housing, clothing, and fuels.

Debt

Tambon Naraphirom's debt in average from Tambon's living standard survey is 2,729 Baht/person/year. Most farmers get loan from Bank of agriculture and agricultural cooperative, followed by commercial bank and loan outside the banking system consecutively. However orchid farmers tend to use Bangkok Bank loan service because Bangkok Bank has deep relationship with this profession which would benefit the farmer in terms of conditions of the loan.

Rice farmer's debt situation in Tambon Naraphirom is considered fare, because most farmers support their own production cost, only a few people rely on loan for their production cost.

In the other hand, it is quite common that orchid farmers and other farmers of decorative and high value plants to get loan for further investment for the business are plants due to the high cost of production. However, there're no fund for investment group, or groups that support high value plants' input cost such as cheap sprouts, and insecticide, found in the area

Saving

The average figure of savings in Tambon Naraphirom is 4,538.54/person/year. Important saving source of Tambon Naraphirom people are the Bank of agricultural and agricultural cooperative for famers and commercial bank for non-farmer members. Moreover, people use Sajjasasomsap service in each village that they're the member of.

Labor

Tambon Naraphirom's main income comes from the agricultural sector composing of paddy farming, orchid farming, and other high value, decorative plants farming, therefore the demand of labor of all skills are highly needed regardless of seasons. The farm owners would pay for the agency to find the workers. Skilled labors are especially needed and well paid, especially in the high value plants profession.

Alien workers play significant role since the beginning of Tambon Naraphirom's orchid farming business. More than 10 years ago, Burmese and the tribal people from the north came in Tambon Naraphirom's orchid farming business as workers whose role is to take care of the orchid as well as plantation house maintenance. Nowadays, with the accumulated skills, these people team up, even set up a company and contract the farm owner for a repair job or any job concerning orchid.

Skilled and Educated labors would normally be employed in downtown Nakhon Pathom or Bangkok. Since the standard of living of families in Tambon Naraphirom is reasonably good, people tend to get

fair education, therefore it is common that educated people would commute or migrate to work in the office in Bangkok.

Tambon Administration Organization.

Tambon Naraphirom's Tambon Administration Organization covers 11 villages and has the following manpower and budget.

TAO Council Board	Number	Executive board TAO	Number
1. Chairman of TAO council board	1	Chairman of TAO Executive board	1
2. Vice Chairman of TAO council board	1	Vice Chairman of the TAO	2
3. Secretary of TAO council	1	Secretary of the TAO	1
4. TAO council members	16	Chief Administrator of the TAO	1
		Administrator of the TAO	17
		Finance Division	9
		Public Works Division	6
		Health Volunteer	86
		Civil Defense Volunteer	65

Source: TAO 3 years strategy plan

Table 4: Budget, Number of TAO's project from the 3 years development plan from 2011-2013

Strategy	2011 Budget		2012 Budget		2013 Budget		Total 3 year	
	No. Project	Amount (,000 Baht)	No. Project	Amount (,000 Baht)	No. Project	Amount (,000 Baht)	No. Project	Amount (,000 Baht)
1. Promotion of the development of Public Utility.	25	37,273	25	9,751	25	18,865	75	65,889
2.Promotion of Good living standard and social welfare	24	6,864	24	6,026	24	6,026	72	18,916
3. Promotion of Local art culture and wisdom	16	3,523	16	3,423	16	3,423	48	10,369
4.Promotion of good governance	19	2,495	19	2,910	19	1,615	57	7,020
5.Promotion of good living environment	7	780	6	700	6	700	19	2,180
6.Promotion of Development of local economy	9	810	9	480	9	480	27	1,770
Total	100	51,795	99	23,290	99	31,109	298	106,144

Source: TAO 3 years strategy plan

Education

Schools in Tambon Naraphirom/ Primary Education : Wat Naraphiron School, Ban Naraphiron School, Wat Sawang Arom School, Wat Pra Mor Phisai School.

Table 5 : Education Attainment of people in Tambon Naraphirom

Education	Male	Female	Total
No education	35	42	77
Below Primary grade 4	105	119	224
Primary grade 4-6	953	962	1915
Secondary 1-3 (old version)	4	8	12
Secondary 1-3	241	161	402
High School 4-6 (old version)	3	1	4
High School 4-6	116	116	232
High vocational certificate	48	31	79

Technical Certificate	34	22	56
Bachelor Degree	99	144	243
Master Degree	7	9	16
Doctoral Degree	1	2	3
Others	4	3	7
Total	1,650	1,620	3,270

Source: TAO's living standard survey

From the table, in Tambon Naraphirom, most people finished primary education from primary grade 4-6, 1,915 people (39%), secondly secondary grade 1-3, 402 people (8%), thirdly bachelor degree, 243 people (5%). It also shows that Tambon Naraphirom people attain their compulsory education and tentatively continue further education. As people who attain bachelor degree rank third, it is to say that Tambon Naraphirom people have good level of education.

Health Situation

Health stations in Tambon Naraphirom are located at Moo 1 and 5. The condition which people receive medication from the Health Stations the most are respiratory disease, blood circulation related disease consecutively. And the chronicle patients who receive monthly medical prescription are those with diabetes and high blood pressure. The health station receives assistance from the health volunteer (86 members) from each village who always keep records of chronicle, immobilized and patience. In Tambon Naraphirom there is a record of 9 severe patients who are classified as home-ward patients. Home-ward patients need extra care and regular visit from the health officers to their home.

Relationship of people in Tambon Naraphirom

Tambon Naraphirompeople are agricultural based society. As a characteristic, there are deeply connected to nature. Almost all of the residents are Buddhists therefore the Buddhist rituals people have in common are; rite of passage involving ceremonies of birth, death, ordain; ceremonies related to nature such as the praying of the river and forest. Although the urbanization of the area surrounded has taking in, Tambon Naraphirom people are still social-oriented but with some characteristic of urban people. They participated public activities especially in the time of crisis.

Land Use

Originally, the farming in Tambon Naraphirom was mainly paddy due to the geographical character of the land which is flat, suitable for paddy field. But later when the area was irrigated, and the government promotion on several other economic plantations, the area changed from paddy field to orchid farming since nearly 30 years ago. The reason that farmers decided to invest in orchid farming is the high return of investment and in demand of the market, until now more and more farmers still want to come in the orchid business. However, the fact that cost of investment and risk from plant disease and production lost are exceptionally high, stop several farmers from coming in the business.

Table 6 : Land Use in Tambon Naraphirom

Total Land	Residential Area	Paddy Land	Perennial plant	Vegetable and ornamental	Horticulture	Factory	Government Place	Water Source	Pasture land	Fishery	Herb growing	Others
23,450 Rais	1,016Rais	15,578 Rais	669 Rais	1,460 Rais	125 Rais	147 Rais	93 Rais	660 Rais	30 Rais	165 Rais	641 Rais	3031 Rais

Source: Land Development Department

Land Right

Main type of land right is pieces of land owned by legal owner possessing the land deed, it could be said that there's no controversial problem of intrusion of the public property.

Civil Defense Volunteers and One Tambon One Security team (OTOS)

The Civil Defense Volunteer are responsible for making sure of public peace that can varies from traffic work, security work emergency call and many others. It works under supervision of TAO. There are 65 Civil Defense Volunteers in Tambon Naraphirom, a number of members participated in the OTOS training. The volunteers take turn to attend the revision training that held annually and taught by defense authorities.

Although the volunteers work under TAO, the supportive expense is given only partially such as some necessary equipment, and training allowance, that is to say, the volunteers use their own expense or donation support. At present, there are 33 rescue boat are kept at the Tao office.

Social Group

Although, there're no enterprise groups in Tambon Naraphirom, the groups relating to agriculture such as seed group community rice group and fund groups such as Sujjasasomsup in every village still play important role. These groups exist in order to assist farmers for cheap production input, also to provide members for welfares divides and sometimes loan with low interest for members. In addition, there is woman right group, elderly group, in coherent with the government social welfare policy.

Moreover, Tambon Naraphirom has an organic fertilizer group set up as their Tambon's promoted product. Set as a commercial company, founded by Mr. Pim Kamtonwong (Manit), the group was invited to take part in the OTOP. So the TAO set up a budget to promote organic fertilizer as Tambon's OTOP to benefit farmers for cheap fertilizer also the group gives dividend to the members. The idea derives from TAO see the importance of using organic substance, however, farmers are still attached to the idea of faster and more productive way for commercial by using chemical product. As the result the group was not supported and flourished much by the area's farmers, but instead it sell mostly to farmers in the north eastern area.

Communication System

For communication system, Tambon Naraphirom information was distributed by the head of the villages to their residents, and authorities make use of the broadcasting tower situated in every village. The towers were in good condition, some broke down due to the flood.

Electricity

Tambon Naraphirom's residents can access to electricity every household provided by Provincial Electricity Authority (PEA). Even in time of flood, the local PEA can still energize normal level of electricity with assistant of skilled technicians to elevate electricity transformers above the water level.

Water work

Water for consumption in Tambon Naraphiromis to systemize ground water (wells) into filtered quality and distribute among each villages in Tambon Naraphirom. The wells used for this purpose were situated in every village with the depth of 300 meters. The water quality is fair.

3. Agriculture Situation in Tambon Naraphirom

Geographic and agricultural character

Tambon Naraphiromhas total area of 23,450 Rai. Most area is flat basin. Land registering for agriculturalare 18,688 Rai. Farmers use water from canals by pumping water into agricultural plots. Farm pattern is large and a high-wide ridge. Some of wide ridge are used for transportation into farm. This specific characteristics help to prevent flooding at a certain level. Farmers can cultivate three crops in one year. Farmers are mostly doing rice farming follows by vegetables and horticulture etc.

Fig.1 – 4 Crops and horticulture

Table 1 Agricultural area of Tambon Naraphirom

No.	Area	Number of farmers (Household)	Number (Rai)
1.	Rice	605	15,578
2.	Vegetables	87	687
3.	Orchard and Perennial plant	81	669
4.	Flowers and Ornamental plants	65	773
5.	Fishery	28	165
6.	Agronomycrop	24	125
7.	Livestock	18	30
8.	Other	No data	641
Total		**908**	**18,668**

Source : Agriculture Tambon Naraphirom (2554)

Report from Agriculture Tambon Naraphirom, General profile and information of agricultural at Tambon level Year 2554/2555, total population of 908 households and total agricultural land of 18,668 Rai are categorized to land use as follows (Table 1);

: Dry Season rice : 605 households, total area: 15,578Rai.

: Vegetables : 87 households, total area 687 Rai, Cucumber, Zucchini,Chili, Kale, Cantonese, Lettuce, Galangal, Lemongrass and Yard long bean etc.

: Orchardand Perennial plant : 81 households, total area 669 Rai, Mango, Guava and Coconut

: Flowers and Ornamental plants : 65 households, total area 773 Rai, Orchids, Impala Lily Addendum, Crown Flower, Roses, Jasmine, Gardenia Crape Jasmine and Marigold etc.
: Agronomycrop: 24 households, total area: 125Rai, Potatoes, Taro and Sugar cane etc.
: Livestock : 18 households, total area: 30 Rai, Cattle, Chickens and Goats etc.
: Fishery : 28 households, total area: 165 Rai, Miscellaneous fish and Fog etc.
: Other areas : total area: 641 Rai, Herb plant

Contribution of Agricultural land use

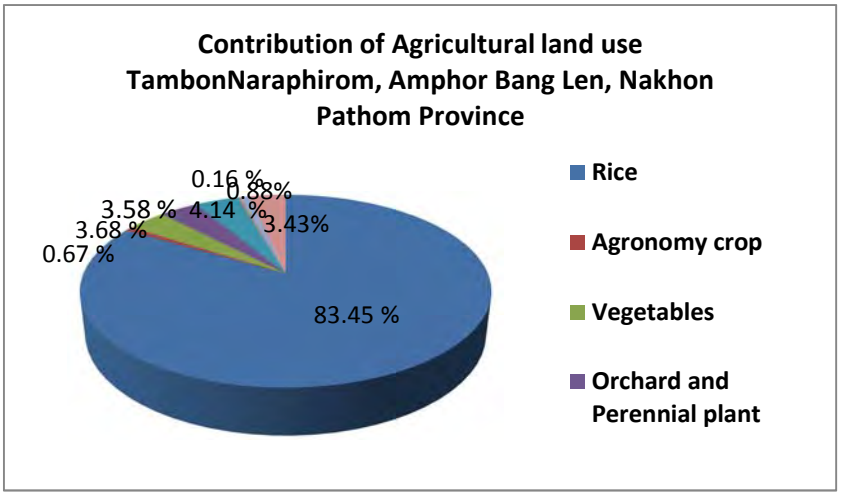


Fig. 5 Contribution of Agricultural land useof Tambon Naraphirom

Land registering for agricultural use at Tambon Naraphirom has total area of 18,668 Rai. Rice Significant economic crops is rice, vegetables and Flowers and Ornamental plants

Table 1 and Figure 5 Shown Contribution of Agricultural land use for dry season riceis 15,578 Raior 83.45% of total agricultural area. Agronomycrop is 125 Raior 0.67 %. Vegetables is 687 Raior 3.68 %. Orchardand Perennial plant is 669 Rai or 3.58 %. Flowers and Ornamental plantsis 773 Rai or 4.14 %. Livestock area is 30 Rai or 0.16 %. Fishery area is 165 Rai or 0.88 % andOther areas of 641 Rai3.43%

General view of Tambon Naraphirom is a traditional farming community. There is continuation of most farming, followed by flowers and ornamental plants and vegetables etc.

Table 2 Land damaged by flooding at Tambon Naraphirom

Moo	Farmer	Rice (Rai)	Agronomycrop (Rai)	Orchard and others (Rai)	Assistance in cash (Bath)
1	68	636.25	-	216.50	2,517,464.50
2	41	488.50	4.00	532.25	3,811,457.50
3	54	506.00	-	262.00	2,460,008.00
4	47	444.00	-	105.50	1,524,407.00
5	31	196.00	-	79.50	840,803.00
6	84	678.50	2.25	284.50	2,965,095.50
7	38	651.25	5.00	8.50	1,506,160.50
8	46	725.75	-	41.25	1,822,909.00
9	76	1,060.50	-	74.25	2,734,957.50
10	58	714.00	-	264.00	2,932,380.00
11	66	1,344.00	-	102.50	3,508,913.00
Total	**609**	**7,444.75**	**11.25**	**1,970.75**	**26,624,555.50**

Source: Department of Agricultural Extension (29 Aug 11-27 Dec 11)

Table 2 Shown agricultural lands which were damaged by flood. 609 farmers have been affected. Total damaged area is 9,426.75 Rai., categorized as follows; rice production area is 7,444.75 Rai, Agronomycrop(Potatoes, Taro and Sugar can) area is 11.25 Rai and Horticulture area and others(Chili, Kale,Cantonese,Zucchini, Galangal, Lemongrass, Yard long bean, Mango, Dragon fruit, Longan, Guava and Coconut etc.) is 1,970.75 Rai.

Subsidy and support by government is estimated as 55 % of investment cost per rai per year in 2554 BE. This subsidy is paid 100 % of actual damage area.

- Rice growing area subsidy for 2,222 Bht per Rai
- Agronomycrop area subsidy for3,150 Bht per Rai
- Orchard and others subsidy for 5,098 Bht per Rai

Total amount which government aid to farmers at Tambon Naraphirom, in cash is 26,624,555.50 baht.

Table 3 Total area high-cost plants. Damaged by the flood of Tambon Naraphirom

No.	Farmer	Rice (Rai)	Agronomy crops (Rai)	Orchard and others (Rai)	Total (Rai)	Assistance in cash (Bath)	Note
1	58	-	-	-	839.50	62,897,364.25	High-cost plants
2	13	-	-	-	211.75	34,482,378.50	High-cost plants
3	3	-	-	-	22.75	3,625,639.50	High-cost plants
Total	74	-	-	-	1,074.00	101,005,382.25	

Source : Agriculture Bang Len district (2554)

Table 3 Shown agricultural lands which was damaged by flood. Orchid cut flowers, Potted orchids and Flowers and potted plants etc. 74 farmers have been affected. Total damaged area is 1,074 Rai., Subsidy and support by government is estimated as 55 % of investment cost per rai per year in 2554 BE. This subsidy is paid 100 % of actual damage area.

- Orchid cut flowers area subsidy for 80,013 Bht per Rai
- Potted orchids. area subsidy for180,000 Bht per Rai
- Flowers and potted plants. subsidy for 60,000 Bht per Rai

Total amount which government aid to farmers at Tambon Naraphirom, in cash is 101,005,382.25 baht.

Learning Center of Farmers at Tambon Naraphirom

Farmers exchange experience and knowledge among themselves with various products. For instance, orchid growers will get information how to prevent diseases and insects or price of orchid by contacting (via telephone or other communication channel) directly to experts or those who have prior experience in orchid production, etc.

Supporting Organization

Subsidy and support by government is estimated as 55 % of investment cost per rai per year in 2554 BE. This subsidy is paid 100 % of actual damage area.

- Rice growing area subsidy for 2,222 Bht per Rai
- Agronomycrop area subsidy for3,150 Bht per Rai
- Orchard and others subsidy for 5,098 Bht per Rai
- Orchid cut flowers area subsidy for 80,013 Bht per Rai
- Potted orchids. area subsidy for180,000 Bht per Rai
- Flowers and potted plants. subsidy for 60,000 Bht per Rai

Table 4 Crop Calendar

Crop Season/Type	Varieties	Month												Product (Kg./Rai)
		Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec	
Raining period						X	X	X	X	X	X	X		
Flooding period (Normal case)										X	X	X		
Flooding period (crisis 2554)		X								X	X	X	X	
Drought period				X	X								X	
Dry Season (Year 2554)	RD 31,RD RD41,RD 47,51 Suphanburi 1, CP111	1st Paddy Cropping												800
						2nd Paddy Cropping								
										3rd Paddy Cropping				
Dry Season (Year 2555)	RD 31,RD RD41,RD 47,51 Suphanburi 1, CP111	1st Paddy Cropping												1,000
							2nd Paddy Cropping							
Cucumber	Amata	←	→		←	→		←	→		←	→		
Zucchini		←	→		←	→		←	→		←	→		
Orchid	Dendrobium	←										→		

Table 4 Shown the cropping annual plan in the agricultural area at Tambon Naraphirom. Farmers grow rice 3 crops. First crop start from December to March. Second crop start from April to July and third crop starts from August to November. Average yields are 80 Tung/Rai. After flooding disaster, farmers change from 3 crops to 2 crops in order to reduce risk from flooding of the third crop. Farmers use rice varieties i.e., RD 31,RD41,RD 47,Suphanburi 1and C.P. 111. Regarding that these varieties are dwarf and not sensitive to water level and average yields are 100 Tang/Rai. After flooding, soil is enriched and more fertile resulting higher yields.

Farmer in Tambon Naraphirom grows vegetables by means of c rotation base on price and quantity designated by middle man.

There are cutting orchid flowers, namely Dendrobium, in several varieties. Multiplication and growing by tissue culture transplant or by shoot separation. Orchid cultivation period start from nursery to harvest will take 1 year and 6 months. Harvesting periods are 3-5 years and can harvest all year round. Farmers gain income continuously if they can get good quality as required and sell to local market and export as well.

Table 5 Trend analysis of Crop Farming and Livestock Farming

Type of Commodities	History	Present	Future
1. Dry Season Rice	Chainat 1, Suphanburi 60, Suphanburi 90, Pathum Thani 1, RD 23 and RD7	RD 31,RD 41,RD47,51 Suphanburi 1 and CP 111	Certified seeds Flood-resistant rice varieties

2. Vegetables	Eggplant, Pepper, Parsley, Kale, Cantonese, Lettuce, Cucumber and Zucchini	Chili, Kale, Cantonese, Lettuce, Cucumber, Zucchini, Galangal, Lemongrass and Green beans	Local varieties, Hybrid varieties
3. Orchardand Perennial plant	Mango, Dragon fruit, Longan, Guava and Coconut	Mango, Guava and Coconut	Mango, Guava and Coconut
4. Agronomycrop		Potatoes, Taro and Sugar cane	Potatoes, Taro and Sugar cane
5. Flowers and ornamental plants		Roses, Orchids, Crown Flower, Jasmine, Gerdenai Crape Jasmine, Marigold and Impala Lily Adenium	
6. Livestock	Cows and Chicken	Cows, Chickens and Goat	Cows and Chicken
7. Fishery	Miscellaneous fish	Miscellaneous fish and Fog	

Table 5 shown trend farming pattern at Tambon Naraphirom. Land is suitable for agriculture i.e., rice farming, horticulture production because of basin land and abundant water resources. In addition, central market is near, convenient for transportation and farmer has experience, as well. Fruit tree and perennial crop are not suitable for commercial because long life and risk to be damaged by flooding. Farmers cultivate livestock and fishery mostly for household consumption.

Table 6 Production cost of rice (Dry Season) /Rai

No.	Items	Value (Bht)
1.	Land lease	750
2.	Soil preparation	500
3.	Rice seed including broadcasting	700
4.	Chemical fertilizer including application	1,050
5.	Insecticide and herbicide including application	1,500
6.	Labor fee for wild rice elimination	300
7.	Fuel	450
8.	Harvesting including transportation	650
Total production cost		**5,900**
Yield (Tang/Rai)		80
Income in average (Bht)		9,600
Net income (Bht/Rai)		**3,700**

Table 6Shown that production cost of rice in average per rai is 5,900 Bht with average yield 80 Tang/Rai (at moisture content 25-30%). Price of rice is 11,500-12,000 Bht/ton. Farmers will receive net income 3,700Bht/Rai. There are 3 rice farm patterns as follows;

Pattern 1: Own land tenure
Pattern 2: Land lease, rental rate in one year, 1500 Bht/year
Pattern 3: Land lease, sharing income with land owner by 1:3 (land owner : farmer)

Table 7 Production cost orchid cut flower dendrobium for 1st year / Rai

No.	Items	Value (Bht)
1.	Land lease	2,500
2.	Building	150,000 – 200,000
3.	The micro tubers(22,000 shoot tips : 3.50 baht per tip)	77,000
4.	Growing media	48,000
5.	Infrastructure (Building others)	63,000
6.	Chemical fertilizer including application	20,000
7.	Pesticide including application (2,000 baht per month)	24,000
8.	Labor costs to operate the greenhouse (2 workers at 11,000 baht/ month)	132,000
9.	Others	35,500
Total production cost		**552,000 – 602,000**

Table 8 Production cost orchid cut flower dendrobium for 1st year / Rai

No.	Items	Value (Bht)
1.	Land lease	2,500
2.	Building	150,000 – 200,000
3.	The micro tubers (22,000 shoots from tissue culture at 12 baht each)	264,000
4.	Growing media	48,000
5.	Infrastructure (Building others)	63,000
6.	Chemical fertilizer including application	20,000
7.	Pesticide including application (2,000 baht per month)	24,000
8.	Labor costs to operate the greenhouse (2 workers at 11,000 baht/ month)	132,000
9.	Others	35,500
Total production cost		**739,000 – 789,000**

Table 7 and 8 Shown investment cost of dendrobium orchid in first year, average 552,000-789,000 Bht. However, amount of investment vary upon the infrastructure of nursery and plant stock or stock from tissue culture. In first year, one plant give 2 flower bundles. There are 3-4 plants in one clump. Once the flower bundle was cut, that plant will not give new bundle, Only new plant give flower bundle.

Second year of cutting, yield will increase 5-7 bundles in one plant. Clump will increase in one pot each time of cutting. Third year, quality and flower bundle is stable. Fourth year, quality and flower bundle decrease. Fifth year, quality and flower bundle decrease in a significant amount. May not get benefit compare to management cost. Farmer may demolish for growing new stock.

Price depends on market price and negotiation between farmer and middle man. At present, price of cutting orchid flower is at 2-5 bht/bundle. About income, farmer said that depend on individual management cost and market price, market price is fluctuated.

Table 9 Production cost orchid cut flower dendrobium for 2nd year / Rai

No.	Items	Value (Bht)
1.	Land lease	2,500
2.	Chemical fertilizer including application	20,000
3.	Pesticide including application (2,000 baht per month)	24,000
4.	Labor costs to operate the greenhouse(2 workers at 11,000 baht per month)	132,000
5.	Others	35,500
Total production cost		**214,000**

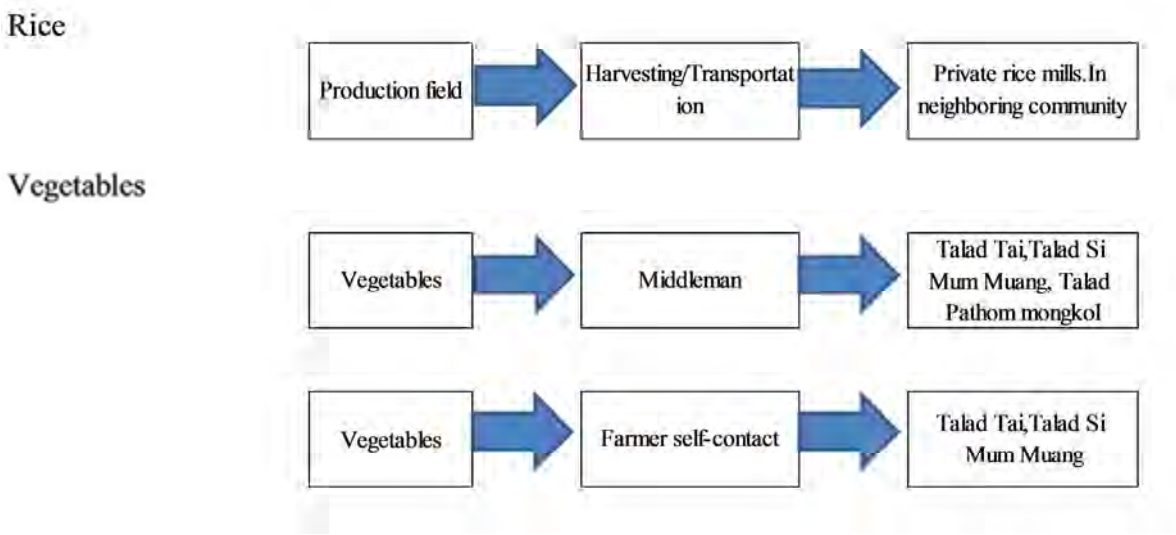
Table 9Shown that production cost of orchid cut flower; dendrobium in second year to fifth year in average per rai is 214,000 Bht. No investment cost (fixed cost) of infrastructure, stocks, substrate and other equipment and materials.

Table 10 Production cost of Cucumber /Rai

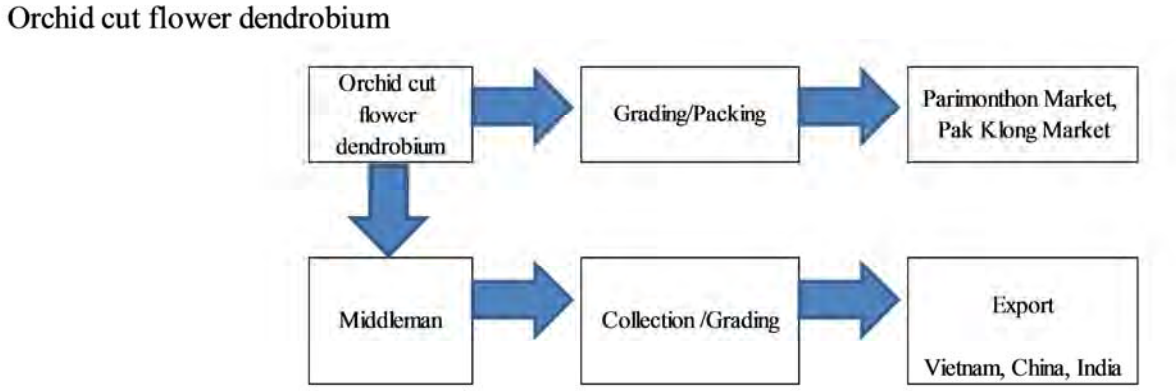
No.	Items	Value (Bht)
1.	Land lease	2,500
2.	Soil preparation	5,000
3.	Bitter gourd seed	3,000
4.	Chemical fertilizer including	2,080
5.	Pesticide including application	3,000
6.	Fuel	400
7.	Labor cost	1,000
8.	Materials for packaging	600
9.	Harvesting including transportation	1,500
Total production cost		**19,080**
Yields (Kg./Rai)		2,500
Income in average (Bht)		20,000
Net income (Bht/Rai)		**920**

Table 10 Shown that production cost of cucumber in first planting in average is 19,080Bht/ Rai with average yield 2500 Kg./Rai. Net income for one rai of first crop is ca. 920 bht. Price depends on market price and middleman. However, farmer can harvest 4 times in one year. During flooding, farmers stop planting and change to catching fish instead or produce for household consumption only.

Transportation and Market



Transportation vegetable has 2 types, First type is middleman comes to take vegetable from farm . Produce will be sent to domestic market such as Talad Tai, Talad Si Mum Muang and Talad Pathom mongkoletc. Second type is farmer himself sell vegetables to domestic market such as Talad Tai and Talad Si Mum Muang according to better price.



There are 2 types of transportation of orchid cut flower dendrobium i.e. , first type ; after grading and packing, the orchids will be transported to domestic market such as Parimonthon Market and Pak Khlong Market, second type; middleman will collect orchid flower, after grading, orchids will be exported to Vietnam, China and India etc.

Constraints

- Brown plant hopper outbreaks
- Market price fluctuations
- High production costs

- Global warming and insect pest outbreaks
- Weakness of orchid organization (Cooperative)
- Labor shortage
- No power in price negotiation against middlemen.

4. Water Management Situation in Tambon Naraphirom

Tambon Naraphirom is located in the east of Banglen district, approximately 19 kilometers from the Banglen district office. Tambon Naraphirom has the total area of 37.52 square kilometers or 23,450 rais.

Phraya Bunlue Operating and Maintenance Project

Phraya Banlue Operating and Maintenance Project is a part of the Chao Phraya West Bank Irrigation Project. The construction of the initial project started in 1939 (2482 BE), covering around 812,000 rais of targeted agricultural area. In 1964, the area of the project was expanded from Maha Sawad canal until the coastal bank, covering another 488,000 rais. The total area of the Chao Phraya West Bank Irrigation Project then increased to 1,300,000 rais. In 1969, the Royal Irrigation Department (RID) separated the project into three distinct projects, namely Chao Jed- Bang Yi Hon Operating and Maintenance Project, Phraya Banlue Operating and Maintenance Project and Phra Pimon Operating and Maintenance Project.

Phraya Banlue Operating and Maintenance Project is bordered to Chao Jed- Bang Yi Hon canal in the north, Noi river and Chao Phraya River in the east, gulf of Thailand in the south and Tha Chin river in the west

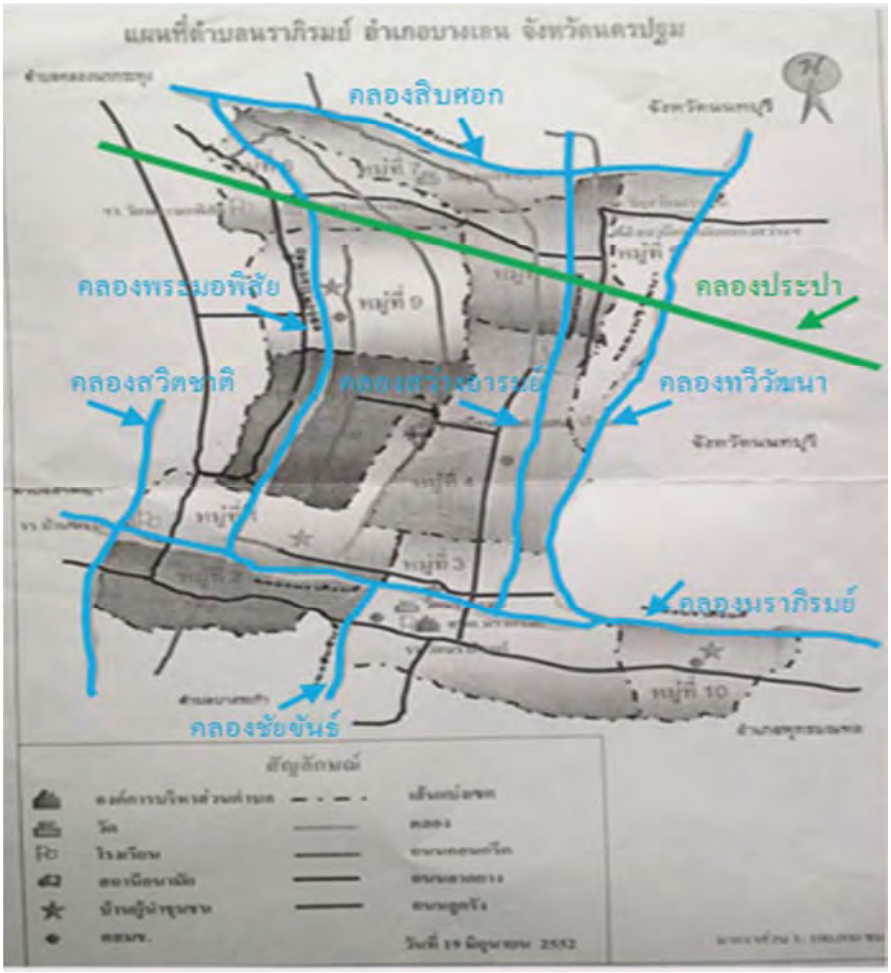
Fig: Bounday of Phra Pimon Operation and Maintainance Project

▲ (Pumping station) (Distributary canal) (water supply canal)

Water Sources for Agriculture

Surface water sources come in two forms i.e. natural source and artificial source.

1. Natural source: There are 8 important natural water sources in Tambon Naraphirom namely, Sibsork canal, Phramopisai canal, Sawang Arom canal, Taweewatthana canal, Tambon Naraphirom canal, Swisschat canal, Chaikan canal and borrow pits of the water supply canal (right-left).
2. Artificial sources are constructed by government units such as Royal Irrigation Department (RID) and Land Development Department (LDD). Main purposes are to be used in agriculture and water transportation. There are 19 sources in Tambon Naraphirom in total.



Map: Water Sources in Tambon Tambon Naraphirom

Water Sources for Agriculture

- Sibsork canal
- Phramopisai canal
- Sawang Arom canal
- Taweewatthana canal
- Tambon Naraphirom canal
- Swisschat canal
- Chaikan canal
- Borrow pits of the water supply canal (right-left).

Diversion System

The diversion system and water management of Tambon Naraphirom are under responsibility of Phrapimon Operating and Maintenance Project. Water in the Tambon is diverged from two main sources, Tha Chin River and Phraya Banlue Operating and Maintenance Project. Tha Chin River lies on the western side of the project. The Phrapimon O&M project pumps water from Tha Chin River into Phra Pimon canal which is in the north of the Tambon. Then water gates are used to control the diversion into all canals in Tambon Naraphirom. Water would be diverted to distributary canals that farmers are allowed to use freely. There are no water use regulations since water is retained in the

canal all the time. Farmers can pump water into their agricultural area throughout the year and the quality of water is acceptable.

Water Management for Agriculture


Pumps used for pumping water into fields


Tertiary canal


Water storage for village tap water

Tap Water

Village tap water system uses the underground water as the main source. The depth of the water source is around 300 meters from the ground surface. The quality of water is moderate.

Flood Situation in Normal Years

Water level in all canals in Tambon Naraphirom usually gets high in the end of September until the end of November. The affected area from the flood covers houses and agricultural fields that are located near the canals. The height of water is around 1-2 meters from the paddy field. Since some houses are not livable during the flood, vehicles will be moved to safe parking area and dike roads are used as evacuating places for some households until the water is dry in the end of November.

Flood Situation in 2011

In the beginning of October 2011, water level in the canal started to get higher. Thus, villagers living along the canals built up the sandbag embankment. On October 23rd, water overflowed from Sibsork canal, Phramopisai canal, Sawang Arom canal, and Taweewatthana canal. Houses along the canal had been under water since then. On the next day, water overflowed from Moo 7-8 into the lower part of the Tambon by flooding over the water supply canal. The flood covered the whole area of Tambon Naraphirom on October 29th 2011. All roads in the Tambon were under water and could not be used for transportation. The water level was around 1-2.5 meters from ground. The 2011 flood in the area of Tambon Naraphirom lasted until the end of January 2012.

Map: Water Direction of 2011 Flood

Preparation for Flood in 2011

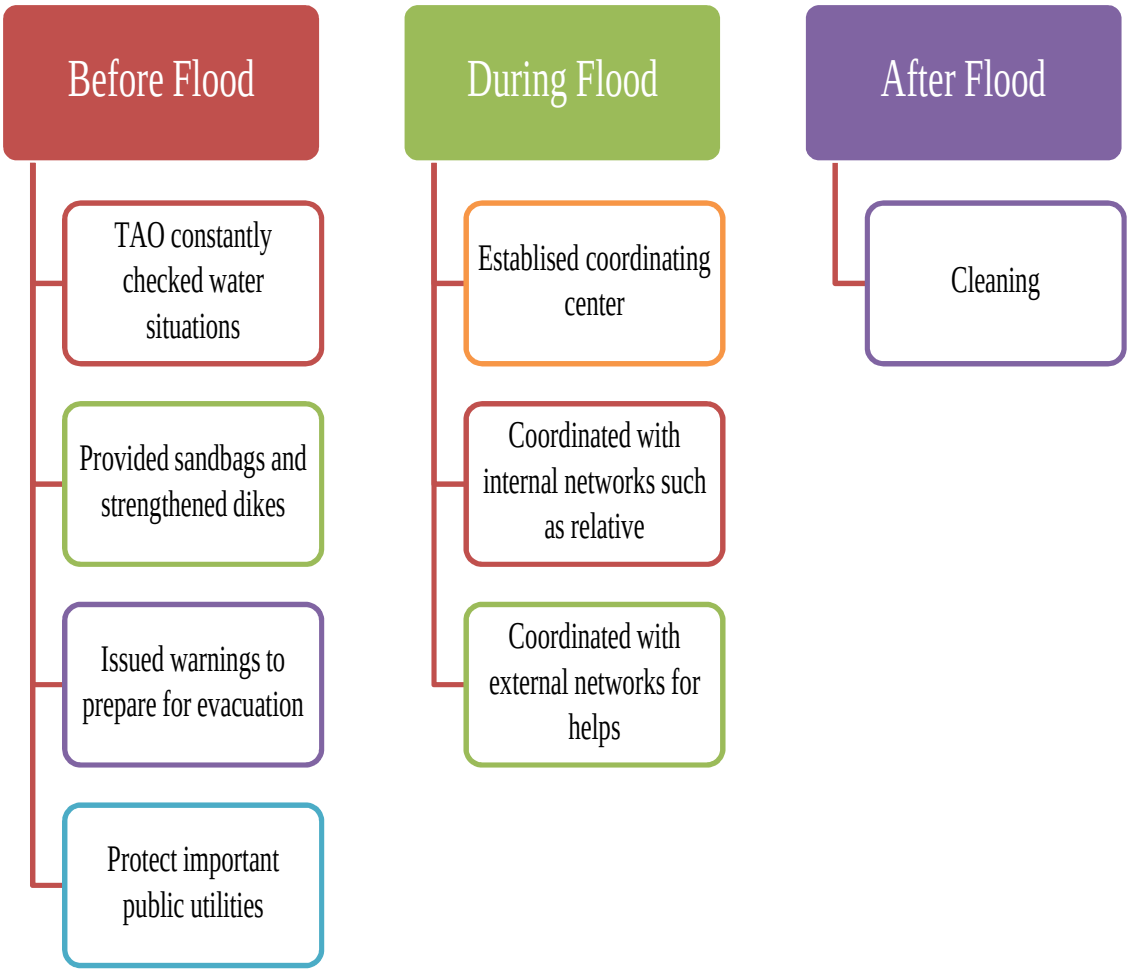
Flood precaution was carried out around one month prior to the flood, initiated by the chief executive of Tambon Naraphirom TAO. The water level in Tha Chin River was constantly checked and current situation of water was reported on each day. Two weeks before the dike along Pramopisai canal broke down, Tambon Naraphirom TAO was informed that the amount of water was too much to protect the area from flooding. Since flood was expected, defensive measure was set as followed;

1. People in the Tambon including, Tambon Naraphirom TAO, civil defense volunteer, TAO committee, sub-district headman, village headman, and villagers helped to find sandbags in order to lift the embankment along the canals for one meter higher. Villagers and farmers were allowed to use sandbags for the protection of their property.
2. Informed by associated agencies such as the RID, Tambon Naraphirom TAO announced the warning for people in Tambon Naraphirom to keep their property in higher place for the protection of loss. However, the actual flood was severer than expected. As the water level was not expected to be this high (2-3 meters from the paddy field), property losses were found in some households that could not move their belongings to the safe place in time. Most of the vehicles such as car and motorcycle were moved to the dike roads along the water supply canal (Khlong Prapa). For agricultural machines, motors were taken off and keep at the safe place before the flood came.
3. Tambon Naraphirom TAO took care of important public utilities such as electricity by making sure that they could be used during the flood. Food and clean water were distributed to the houses of community leader in each village so that the villagers could easily reach when they were in need.

After October 29th 2011 when flooding had covered the whole area, Tambon Naraphirom TAO and community leaders could not protect the area any further. Therefore, they changed their focus to work on giving aids and helps to their people.

1. Coordinating centers were established in each village (mostly at the house of village leader). The center worked as the information hub where any accidents, occurred in the area were reported so that helps could be sent. Since there were difficulties in communication and transportation, the center also hosted other public services such as mobile medical service. Donations such as food and clean water were kept and distributed to each houses in this center.
2. Coordinated with other agencies for the donations of food, drinking water, and other necessities through mass media such as television and radio and social media.
3. In the case of emergency, the center would coordinate with other agencies such as hospital and police so that aids could be given in time.

After the water decreased, people of Tambon Naraphirom started cleaning their houses and fields. Some area could be cleaned by family workforce while the others needed hiring some labors to complete the work such as clearing garbage and other sewage that came with the water from the orchards. Normally, garbage was eliminated by burning. However, some large pieces were gathered together so that TAO can collect and eliminate them. The restoration period took several months altogether.



Damage from Flood in 2011

Government compensation for flood damage is one method for helping. People who were affected by flood can file their lists of property damage at Tambon Naraphirom TAO office together with evidence of actual damage such as photos or confirmation from village leaders. However, different practices in different Tambons and confusing assessment method caused discontent among villagers. As a result, there were protests in many areas.

The followings are the detail of houses that have filed for flood compensation from the government. However, some households are appealing for reconsideration of the compensation. Thus, the number is subject to change according to the result of the appealing.

From the table, the total number of households that filed for compensation is 1,215. Houses from Moo 6 and Moo 10 represented the highest figure, respectively.

Moo (Village)	Number of Household filing for compensation	District level proposed damage	The result of Compensation payment(Baht)				
			House Damage	Rent	Lighting equipment	Occupation tools	Total
1	119	774,300	368,200	-	-	28,300	396,500
2	74	685,200	150,500	-	-	15,000	165,500
3	103	760,700	418,300	-	-	33,000	451,300
4	113	731,240	407,400	-	-	37,800	445,200
5	76	539,800	233,800	-	-	22,000	255,800
6	161	1,363,330	525,800	-	-	-	525,800

7	101	609,800	394,200	-	-	-	394,200
8	120	816,100	190,300	-	-	34,500	224,800
9	101	717,100	352,500	-	-	35,500	388,000
10	156	1,154,600	458,800	-	-	11,700	473,500
11	91	785,600	251,500	-	-	-	251,500
รวม	1215	8,937,170	3,751,300	-	-	217,800	3,972,100

Picture: Flood situation in 2011

(Left) People tried to protect their houses by using sandbags as the dike around their property.
(Right) The level of water was around one meter above the ground. Thus, the only mean of transportation was boat.

Water Supply Canal (Khlong Prapa) Dike along Water Supply Canal

During the flooding period, people used dike roads along Khlong Prapa to be their temporary residential area.

5. Impact Analysis (Tambon Naraphirom)

Tambon Naraphirom has geographical character that is suitable for agriculture especially for rice farming. The farm land in this area has been fed by water from Prapimon Operation and Maintenance (O&M) project which covers the whole area of Tambon Naraphirom. With nourished water resources and soil nutrient of the river basin, rice farmers in Tambon Naraphirom can earn high annual income from rice and other vegetable crops growing at the edge of their plot. Farmers can grow rice three times a year and vegetable is an all year round-product due to its shorten-life cycle. Also, a factor of location closed to Vegetable Central Market is another beneficial factor induced middle men to give a competitive price to farmers.

Another high value crop that has been promoted to grow in this Tambon is orchid. Orchid garden business in Tambon Naraphirom has been very successful for high quality and quantity to feed into export market and domestic market. With the effective of good management, skilled labor, technology, and market demand, it is attractive to both local people and people from outside Tambon to take a stake to invest in the business.

Workers who work in industrial and services sector can be divided into three types; 1). Unregistered workers who work in farmland, small business and factories in Tambon Naraphirom; 2). Registered workers who work in service business and industrial sectors ‘and 3). Unregistered migrant workers and workers from other region in Thailand who work in farmland. These groups of people are very important resources for economic development of Tambon Naraphirom.

However, the unexpected level of flood water that came sooner and larger than the usual pattern created a tremendous effect on people’s socio-economic situation. The following are details of the problems caused by the flood in 2012.

Negative impact of the flood situation

Socio-economic

Negative Impacts	Problems	Community Solution during flooding	Community Solution after flooding	Community response program and plan
1. Living condition was changed during flood.	1. Roads were cut off so that transportation was disrupted.	1. Boats were used during flood.	1. Restore damaged road after flood.	-
	2. People had to flee from their houses to live in evacuation center on dike roads, temples, schools.	1. People did not want to leave their house. If the house has 2 storeys, they will stay on the second floor. 2. People who could not stay in their house, they stayed on the dike road.	1.Move back to their house.	1. People plan to protect their house by building dike around their house. 2. People plan to adjust, elevate their house's floor. 3. People plan to prepare dried place to keep their machinery and belongings.
	3. People could not use toilet in their houses.	1. TAO had to procure floating toilet from external organizations to serve people. The toilets were placed in every village, yet, it was not sufficient for people.	1. Toilet was kept at TAO office for the future use.	-
	4. Crime rate was increased.	1. People were scared of theft. So that many people decided to stay in their house to take care of things.	-	-
	1. People suffered from sickness e.g. fever and athlete's foot, accounting for the flood water. 2 People who suffered from chronicle sickness could not see their doctors on timely manner. By this reason, it had been affected to their health condition.	1.A health volunteer team was set up to provide medical services for people who live in evacuation center. 2. A mobile health volunteer unit was set up to provide a home visit for people who got stuck in their house during flood and chronicle sickness cases. 3. People also could see a doctor at village health station.	1. Get back to normal situation	-
	6. People couldn't process funeral ritual as usual during flood	1. People processed funeral ritual at home instead of processing it at a temple by inviting their guests to attend in	1. Get back to normal.	-

		Buddhist chanting ceremony at home.		
	7. Drinking water was scarcity during flood.	1. TAO received drinking water donated by private companies, people in the society, governmental offices such as PAO. 2.TAO borrowed a water purifier from Nakhon Pathom Rotary Association to produce drinking water. 3. Water purifiers in some villages were lift up above flood water so that people could have water supply from the machine. 4. TAO decided to continually operate tap water supply to serve people though it might cause damage to the system afterward.	1.Cleaned up village's groundwater well by pumping up soil that was absorbed into the well.	-
2. People lost their income during flood.	1. People could not go to their workplaces due to transportation disruption by flood. 2. Factories located in Tambon Naraphirom area and its vicinity e.g. Bangkok, where are the source of income for the people in T. Tambon Naraphirom were shut down during flood accounting for loss of income for people who worked in those factories. 4. People who worked in farm land in T. Tambon Naraphirom had moved to find job in another location that was not flooded due to damage of the farmland.	1. People caught fish for food to save their living cost during the flood.	1. Some people got back to work in their former jobs. However, there were a lot of people who permanently lost their job due to condition of businesses shut down in T. Tambon Naraphirom.	-
3. Household expenditure was increased.	1.House construction and furniture in the house got damage from the flood. 2. People had to pay for the cost of	-	1. People receive compensation for the damage according to government policy on flood mitigation scheme.	1. People plan to construct wall, dike and construction necessary to protect future flood especially for orchid

	their house restoration after flood. 3. People had to pay for sand bags and walls to protect flood water in the past flood incident.		2.People had to loan money from commercial banks to fix their house and rehabilitate their career. 3. People use their own saving to fix the house and rehabilitate their career.	farms. 2. Some people prepare dried places to keep their belongings.

Agriculture

Negative Impacts	Problems	Community Solution during flooding	Community Solution after flooding	Community response program and plan
1. Loss of production	1.Farmers were not sure if the 3rd cropping could do.	-	-	1. People plan not to continue the 3rd cropping to avoid risk factors from flood. 2. Some rice farmers will plough their rice field and let some left over rice seed grow naturally. This method will reduce production cost, though it gives less production quantity and sales value.
2. Weedy rice was increased after flood.	1. Weedy rice came with flood water.	-	1.Eliminate weedy rice with herbicide or plough the rice field.	-
3. Plant disease and brown plant hopper was increased.	1. After flood, nourished paddy field attracted more insect and disease into it.	-	1. Farmers overuse chemical insecticide and herbicide to control pandemic of disease and insect.	-
4. Lack of workforce in agriculture business.	1.Workforce in orchid farm business was scarcity after flood. Because there was a job break during flood, labor in farmland were moved out to live and find a new job in another province. Some of them might come back after flood but some did not.	-	1.Some orchid farmers quit farm operation and rent their land to other farmers. 2.Some orchid farmers moved to another province e.g. Ratchaburi province, to set up new farm to avoid risk factors caused by flood. 3. Some orchid farmers quit farm operation and change crop type from orchid to rice.	-

5. Horticulture was wiped out from area in T. Tambon Naraphirom.	1. Horticulture farmers totally lost their farm to flood water. It was difficult to rehabilitate garden due to time consuming and risk factors to flood water. So horticulture farmers (longan) decided not to continue their business. Some of them rent out their land for rice farming. Some of them changed crop type from fruit to rice.	-	1, Horticulture farmers rent out their land for rice farming. 2. Change crop type from fruit to rice.	-
6.Vegetable price was versatile.	1.After flood, there was oversupply of vegetable in the market, and that caused price of vegetable decreased.	-	-	-

Water Management

Negative Impacts	Problems	Community Solution during flooding	Community Solution after flooding	Community response program and plan
1. Thailand's economic budget lost.	1. Roads and dykes were damaged by flood erosion. .	-	1. Government allocate budget to restore public utility and infrastructure.	1. Government plan to strengthen and heighten up dike at Khlong Phraya Bunlue and Khlong Phra Pimon. 2. Government plan to clean ditches and drainage in T. Tambon Naraphirom.

Positive impact of the flood situation

Positive Impact	Promotion Factors	Promoting Future Plan for Community
1. Soil is more fertile by deposition of sediment and organic matter accumulation. There are also wash out agrochemical from soils and enhancing soil acidity. This results in decreasing fertilizer for plant	1. Soil properties is increasing 2. Soil Resting Naturally	1. Provide Training on soil improvement to farmers
2. Projects for road restoration, cleaning ditches and drainage facilities, from related government agencies were speedy carried out.	1.Conformity of problem to national policy.	-
3. People were aware of risk factors from flood.	1. People are used to living with flood so they have sufficient survival skill to deal with problems if it reoccurs. 2. Farmers had a lesson learned about risk factors from flood. So they will have a better plan to deal with flood problem if it reoccurs.	-
4. Increasing life skills for children	1. Children learned survival skills from their parent e.g. boat rowing, fishing.	-

2. Pilot Project Sheets

Tambon Naraphirom, Ban Leng District, Nakhon Pathom Province

Sector	Model Area / Program	Nakhon Pathom Province (NT)	
		Project	Project Code Number
Flood Damage Reduction in Agriculture and Livestock Sector (AGRI)	Recovery of Orchid Sub-Sector (ORCD)	(1) Alternative Media Development for Orchid (2) Reduction of Cost by Bio-fertilizer and Bio-control	NT-AGRI-ORCD-1 NT-AGRI-ORCD-2

PILOT PROJECT SHEET

Project Code	Sector	Flood Damage Reduction Measures in Agriculture and Livestock Sector
AGRI-ORCD-01	Program	Recovery of Orchid Sub-Sector
Title	Alternative Media Development for Orchid Nursery	
Purpose	To find alternative plant growing media for orchid nurseries instead of coconut husks, which had been damaged by flood	
Location	T. Naraphirom, Banleng, NakhonPathom	
Beneficiaries	Orchid Farmers (3 plots)	
Implementing Agency	Department of Horticulture, Faculty of Agriculture at Kamphang Sean, Kasetsart University	

Background/Concept

Thailand is the largest producing country of orchid. The export was declined in 2012 due to flood damages. Then main product is cut flower of *Dendrobium spp.*

Export of Orchid(FOB, million THB)

Y2008	Y2009	Y2010	Y2011	Y2012
2,411	2,366	2,305	2,220	2,095

Source: Customs Department

Production of Orchid by Province (ton)

Province	Y2009	Y2010	Y2011	Y2012
NakhonPathom	19,684	21,201	15,526	10,073
SamutSakhon	13,757	13,913	12,146	11,533
Bangkok	6,183	6,014	4,901	2,708
Whole Country	52,422	54,026	45,750	36,702

Source: OAE

For revitalization of orchid sub-sector from flood damages, it is an urgent issue to be well prepared against forthcoming flood. Considering the potential economic loss, surrounding dike or land elevation need to be constructed especially where growing facilities were damaged by flood in 2011. In addition, for acceleration of revitalization, it is also needed to cope with general issues and problems one by one such as high cost of growing mediumand high appearance of pest and disease.

Yet, it should be the basic principle for orchid growers to invest in those things at their own risk. What the government should do in this sector is to provide technical assistance and institutional arrangement. One of which can be a development of new media for orchid growing. Given the fact that the price of coconut husk was skyrocketing these days (from 7Bt/bunch in 2011 to 13 Bt/bunch in 2012), it would be a great help for orchid growers to restart their business if more cost effective media becomes available.

Today, several trials have been carried out separately and individually. One example is the use of concrete block on which smaller amount of coconut husks are placed (by individual grower). Those trials are not integrated and no comparison study has been conducted. Thus, it is a good start up to do some experimental trial for development of new method of seedling preparation including the use of new materials.

Expected Outcome

The comparison of plant media is experimented in farm level. Farmers can confirm plant growth in commercial planting conditions.

Component(Input/ Activities)

- Comparison experiments of in 3 farms
  Plant media: coconut husk(control), silica zeolite made by rice husk ash, non-woven, concrete block
- Handout to farmers and exporters regarding alternative planting media of orchid

Related Program, if any	Reduction of Cost by Bio-fertilizer and Bio-control	**Code:** NT-AGRI-ORCD-2

Cost (w/ Source)

Monitoring, data collection and analysis, materials: 380,000THB

Implementing Schedule

November, 2012:	Meeting with stakeholders and identification of detail demands
December, 2012:	Start of comparison experiment
February, 2013:	Monitoring of plant growth
March, 2013:	Evaluation of experimental results

RESULT OF MONTHLY MONITORING

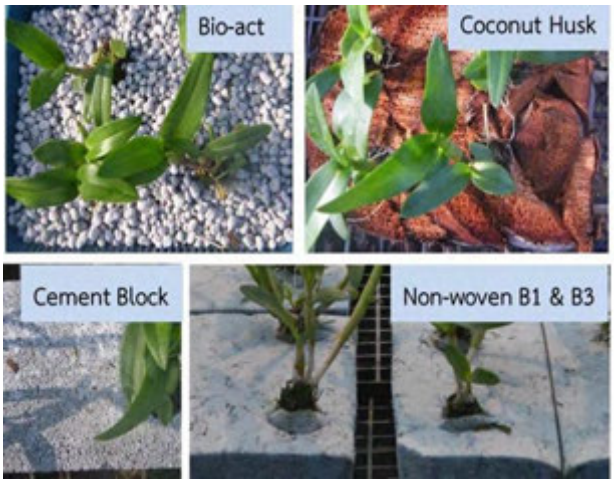
Term	Findings (Progress/ Problems/Other Issues)
Nov. 2012	- Meeting with the officers from DOAE, LDD, DOA and KU Kamphaeng campus together with orchid growers in order to identify orchid production problem and demands - The farmers pointed out that the main problems are shortage of re-investment money, labor force and orchid nurseries after 2011 flood. The recovery of facilities are going on, which works are cleaning of plant residues, construction of small dikes, installation of concrete columns of nets and shelves for cultivation and piping with sprinklers. Purchase of planting media and orchid nurseries are still on the way. The price of coconut husk become down at 10 B/bunch, but farmers pay high attention in contamination of pathogenic fungi, insect eggs and saline. Some coconut husks are harvested near seaside and in salinity soils. - Meeting with the officers from DOAE, LDD, DOA,KU together with orchid growers in order to identify support flood damage activity for orchid production, under 2 objectives as follows; 1) Development the alternative planting material instead of coconut husk 2) Reduce production cost especially chemical fertilizer and pesticide - Conclusion from meeting, 3 experiment were agreed and the details are as follows; 1) Alternative planting material for cut orchid flower cultivation by Department of horticulture, Faculty of Agriculture, Kasetsart University, KamphaengSaen Campus 2) Utilization of LDD biotechnology product for cut orchid cultivation by Land Development Department 3) Effect of Arbusular Mycorrhizal Fungi on Growth of cut orchid by Department of Agriculture
Dec. 2012	- To develop the alternative planting material instead of coconut husk, the research team from KU KamphaengSaen Campus informed that the experiment was started and 5 planting materials were used in this experiment namely Cement Block, Bio Act, Nonwoven1, Nonwoven3 and coconut hush. From started till finished, the researchers will monitor and checked orchids growth total 3 times. At the end will compare the growth in each planting material - The research team collected data and analysis plant growth after grew (I)
Jan. 2013	- JICA expert together with the officers from DOAE and Horticulture Research Institute of DOA visited the experimental farms. Observation the nursery orchid growth in each planting material, interview growers, discussion about the experimental and problems such as pest and disease were always done when visited. - The research team collected data and analysis plant growth after grew 1 month (II)
Feb. 2013	- JICA expert together with the Entomologist from Horticulture Research Institute of DOA visited the experimental farms. To confirm and identify the harmful insects were the purpose, an Entomologist also asked the growers about chemical and pesticide usage. - The research team collected data and analysis plant growth after grew 2 month (III)
Mar. 2013	- JICA expert together with the officers from DOAE and Horticulture Research Institute of DOA visited the experimental farms. - The research team collected data and analysis plant growth after grew 3 month (IV) - On March 27, Seminar about project experimental was conducted in order to presentation the experimental results, New Innovation for Cut Orchid Cultivation was title of Seminar. Total attendants is 96 persons mostly are growers, the remaining are officers of government agencies and private company
April, 2013	- JICA expert together with the officers from DOAE and Horticulture Research Institute of DOA visited the experimental farms. - The research team collected data and analysis plant growth after grew 4 month (V)

*Describe main findings about the project, including progress, problem, issues raised.

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	- Growers have choice to use others planting material instead of coconut husk. - Because after the 2011 flood, demand for coconut husk consumption has rapidly increased, several growers has invested high amount of money than usual to buy coconut husk to re-planting baby orchids in their farms. Furthermore, the coconut husk, an organic material, is easy to decompose and become primary source of pet, weed and diseases accumulation. Growers have to change this plant material or re-planting after three or four years of cultivation otherwise plant cannot grow well or even stay healthy.
Timing of Implementation (Pre-, During , Post- Flood)	- The activity can implement all the time because orchids are planted whole year.
Acceptance of technique by community (cost, benefit, easiness, relevance to current practice)	- Growers interested and also participated in the experimental. Due to the high value product, Government Agencies namely DOAE, DOA and LDD are support knowledge and assistance. - Concern business, Exporter and orchids tissue culture laboratory, also interested in the experiment because they think that it's very importance to provide the alternative material, coconut husk is not only use in orchid production it also use in the furniture industry and the competition of usage will be increased
Replication and extension (role of stakeholder, cost share, etc.)	There are orchid growers groups and Thailand Entrepreneur Orchid Cooperative members in Bang Len District when they knew about JICA experiment they came to visit the experimental plots several times and some trial to use Cement block in their farms
Sustainability (incl. O&M, benefit during normal time)	Inquire within the meeting, it was found that at the present time mostly want to use other materials instead of coconut husk and after the 2011 year cement block were use in the orchids production

PHOTOS



Five types of planting material used in this research

Alternating planting media

Non-woven developed by National Metal and Materials Technology Center(MTEC) under Ministry of Science of Technology

Planting of orchid nurseries (10 months age)

Silica zeolite made by rice husk ask, which manufactured by the aligned company of the rice husk burning power plant in Chainat Province

DendrobiumEarsakul as a target product, which has domestic demands for Buddhist ceremonies

PILOT PROJECT SHEET

Project Code	Sector	Flood Damage Reduction Measures in Agriculture and Livestock Sector
AGRI-ORCD-02	Program	Recovery of Orchid Sub-Sector
Title	Reduction of Cost by Bio-fertilizer and Bio-control	
Purpose	To reduce the costs of chemical fertilizer and pesticide/fungicide	
Location	T. Naraphirom, Banleng, NakhonPathom	
Beneficiaries	Orchid Farmers (3 plots)	
Implementing Agency	LDD (LDD bio-fertilizer and bio-control agent), DOA (Mycorrhiza)	

Background/Concept

Thailand is the largest producing country of orchid. The export was declined in 2012 due to flood damages. Then main product is cut flower of *Dendrobium spp.*

Export of Orchid(FOB, million THB)

Y2008	Y2009	Y2010	Y2011	Y2012
2,411	2,366	2,305	2,220	2,095

Source: Customs Department

Production of Orchid by Province (ton)

province	Y2009	Y2010	Y2011	Y2012
NakhonPathom	19,684	21,201	15,526	10,073
SamutSakhon	13,757	13,913	12,146	11,533
Bangkok	6,183	6,014	4,901	2,708
Whole Country	52,422	54,026	45,750	36,702

Source: OAE

For revitalization of orchid sub-sector from flood damages, it is an urgent issue to be well prepared against forthcoming flood. Considering the potential economic loss, surrounding dike or land elevation need to be constructed especially where growing facilities were damaged by flood in 2011. In addition, for acceleration of revitalization, it is also needed to cope with general issues and problems one by one such as high cost of growing medium and high appearance of pest and disease.

The target farmers use 6 kinds of pesticide and fungicide in the interval of 3 days. Since the orchids grow without microorganisms in the farms using fungicide, the vulnerability by insects such as thrips, midges and spider mites are very sensitive comparing with natural orchids. Those insects are increased due to long period retention water. Specially, the midges spend egg and larvae stages in dirty water.

By use of mycorrhiza (fungus) and beneficial bacteria, the orchids can grow in the environment closed to natural conditions. Symbiotic with orchids and microorganisms leads absorption of nutrient from roots and resistance from diseases brought by insects.

Expected Outcome

The comparison of plant media is experimented in farm level. Farmers can confirm plant growth in commercial planting conditions.

Component(Input/ Activities)

- Comparison experiments of in 3 farms
  Plant media: coconut husk, silica zeolite made by rice husk ash, concrete block
- Inoculation of mycorrhiza
- Apply of LDD bio-fertilizer
- Handout to farmers and exporters regarding alternative planting media of orchid

Related Program, if any	Alternative Media Development for Orchid Nursery	**Code:** NT-AGRI-ORCD-1

Cost (w/ Source)

Monitoring, data collection and analysis, materials: 276,000THB

Implementing Schedule

November, 2012:	Meeting with stakeholders and identification of detail demands, inoculation of mycorrhiza to orchid nurseries
December, 2012:	Start of comparison experiment
February, 2013:	Monitoring of plant growth
March, 2013:	Evaluation of experimental results

RESULT OF MONTHLY MONITORING

Term	Findings (Progress/ Problems/Other Issues)
Nov. 2012	- Meeting with the stakeholder in order to identify orchid production problem and demands. The farmers pointed out that the main problems are shortage of re-investment money, labor force and orchid nurseries after 2011 flood. The recovery of facilities are going on, which works are cleaning of plant residues, construction of small dikes, installation of concrete columns of nets and shelves for cultivation and piping with sprinklers. Purchase of planting media and orchid nurseries are still on the way. The price of coconut husk become down at 10 B/bunch, but farmers pay high attention in contamination of pathogenic fungi, insect eggs and saline. Some coconut husks are harvested near seaside and in salinity soils. - Meeting with the officers from DOAE, LDD, DOA, KU and orchid growers in order to identify support flood damage activity for orchid production, under 2 objectives as follows; 1) Development the alternative planting material instead of coconut husk 2) Reduce production cost especially chemical fertilizer and pesticide - Conclusion from meeting, 3 experiment were agreed and the details are as follows; 1) Alternative planting material for cut orchid flower cultivation by Department of horticulture, Faculty of Agriculture, Kasetsart University, KamphaengSaen Campus 2) Utilization of LDD biotechnology product for cut orchid cultivation by Land Development Department 3) Effect of Arbusular Mycorrhizal Fungi on Growth of cut orchid by Department of Agriculture
Dec. 2012	In this month, the experiment of LDD and DOA were started after finished the experimental design. For LDD, biotechnology products that apply in the experiment consist of LDD 2, 3, 7 and 12. There were 3 treatments in the experiment and details of each treatment are as follows; • Treatment 1is the control plot, methodology of growing will be followed farmer that means 100% of chemical fertilizer will be utilized. • Treatment 2; apply LDD 2, 3, 7, 12 and 50% of chemical fertilizer will be utilized. • Treatment 3; apply LDD 2, 3, 7, 12 and 75% of chemical fertilizer will be utilized. For DOA, the step of experiment was difference because at the beginning all nursery orchids will be brought to inoculate Arbuscular Mycorrhizal Fungi**)** AMF **(**at Rizobium Building, DOA, before transplanting at farms. There were also 3 treatments in the experiment and details of each treatment are as follows; • Treatment 1is the control plot, growing method will be followed farmer that means 100% of chemical fertilizer will be utilized. • Treatment 2; 100% of chemical fertilizer will be utilized on nursery orchids that inoculated of AMF • Treatment 2; 50% of chemical fertilizer will be utilized on nursery orchids that inoculated of AMF Both of research teams collected data and analysis plant growth after grew (I)
Jan. 2013	- JICA expert together with the officers from DOAE and Horticulture Research Institute of DOA visited the experimental farms. Observation the nursery orchid growth in each experiment, interview growers, discussion about the experimental and problems such as pest and disease were always done when visited. - Both of research teams collected data and analysis plant growth after grew 1 month (II)
Feb. 2013	- JICA expert together with the Entomologist from Horticulture Research Institute of DOA visited the experimental farms. To confirm and identify the harmful insects were the purpose, an Entomologist also asked the growers about chemical and pesticide usage. - Both of research teams collected data and analysis plant growth after grew 2 month (III)
Mar. 2013	- JICA expert together with the officers from DOAE and Horticulture Research Institute of DOA visited the experimental farms. - Both of research teams collected data and analysis plant growth after grew 3 month (IV) - On March 27, Seminar about project experimental was conducted in order to presentation the experimental results, New Innovation for Cut Orchid Cultivation was title of Seminar. Total attendants is 96 persons mostly are growers, the remaining are officers of government agencies and private company
April, 2013	- JICA expert together with the officers from DOAE and DOA visited the experimental farms. Both of research teams collected data and analysis plant growth after grew 4 month (V)

LESSONS LEARNED

Aspect	Lessons Learned/ Necessary Improvement/ Comments
Possibility and Impact as Flood Countermeasures (Normal Flood/ Big Flood)	- The flood in 2011 damaged orchid production widely and after flooded the growers problems were lack of fund to recovery and purchase the facilities and materials, high input cost and appearance of pest and diseases. - Utilization of LDD products will help growers to increase orchid productivity and decrease chemical fertilizer and pesticide. - Utilization of Arbusular Mycorrhizal Fungi will be prevented any plant diseases.
Timing of Implementation (Pre-, During , Post- Flood)	- The activity can implement all the time because orchids are planted whole year.
Acceptance of technique by community (cost, benefit, easiness, relevance to current practice)	- Growers interested and also participated in the experimental. Due to the high value product, Government Agencies namely DOAE, DOA and LDD are support knowledge and assistance. - Concern business, Exporter and orchid tissue culture laboratory, agreed with the experiment because they think that it's very importance to increase orchid productivity and help growers to decrease the production cost.
Replication and extension (role of stakeholder, cost share, etc.)	There are orchid growers groups and Thailand Entrepreneur Orchid Cooperative members in Bang Len District when they knew about JICA experiment they came to visit the experimental plots several times and always asked the owners plot about change.
Sustainability (incl. O&M, benefit during normal time)	Three growers who joined the experiments will continue to apply LDD products although the experimental was finished because they'd like to know the growth at the bloom stage and compare among the treatments.

PHOTOS

Kick-off meeting with the researchers of DOAE, LDD, DOA and Kasesart Univ. and the farmers

Pesticide/fungicide used currently, which are dosed in water tank and applied by sprinkler

Necrotized orchid plants by 2011 flood

Black spot disease in existing orchids

Developed roots of orchids applied DOA, Mychorrhiza

Healthy growing orchid applied LDD bio-fertilizer (45 days since transplanting)