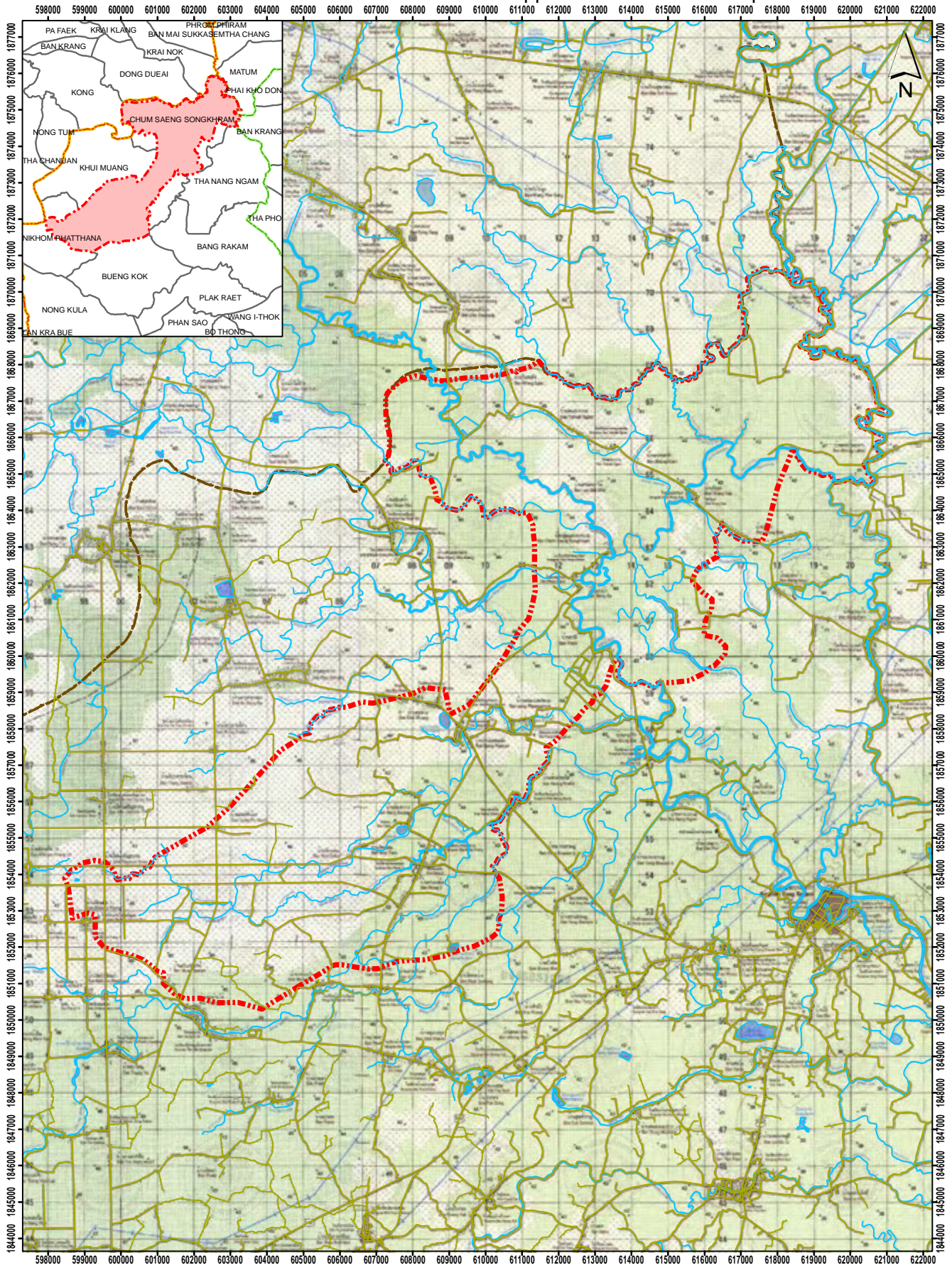


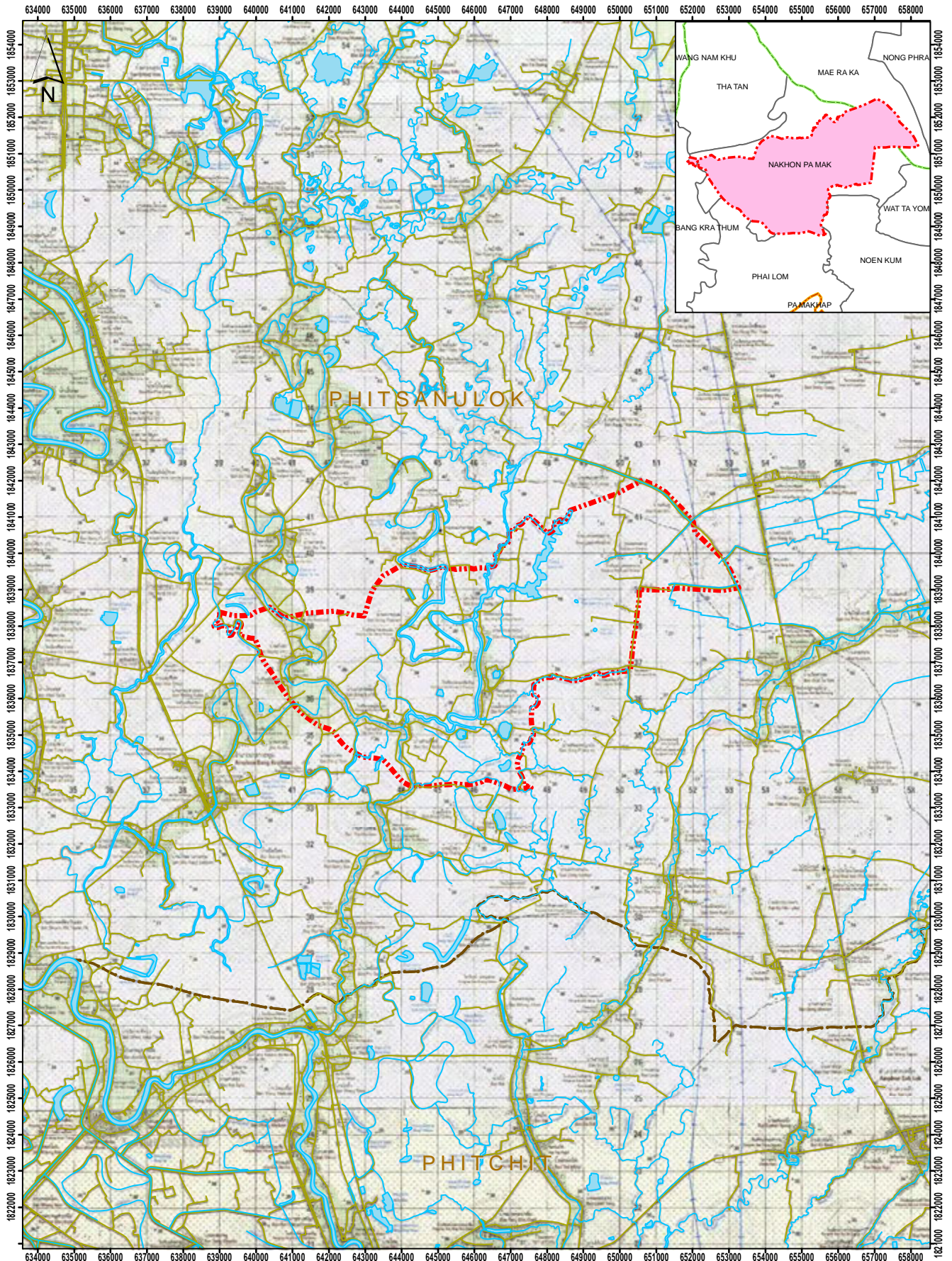
Appendix D

Appendix D-1 Location Map of 8 Model Areas



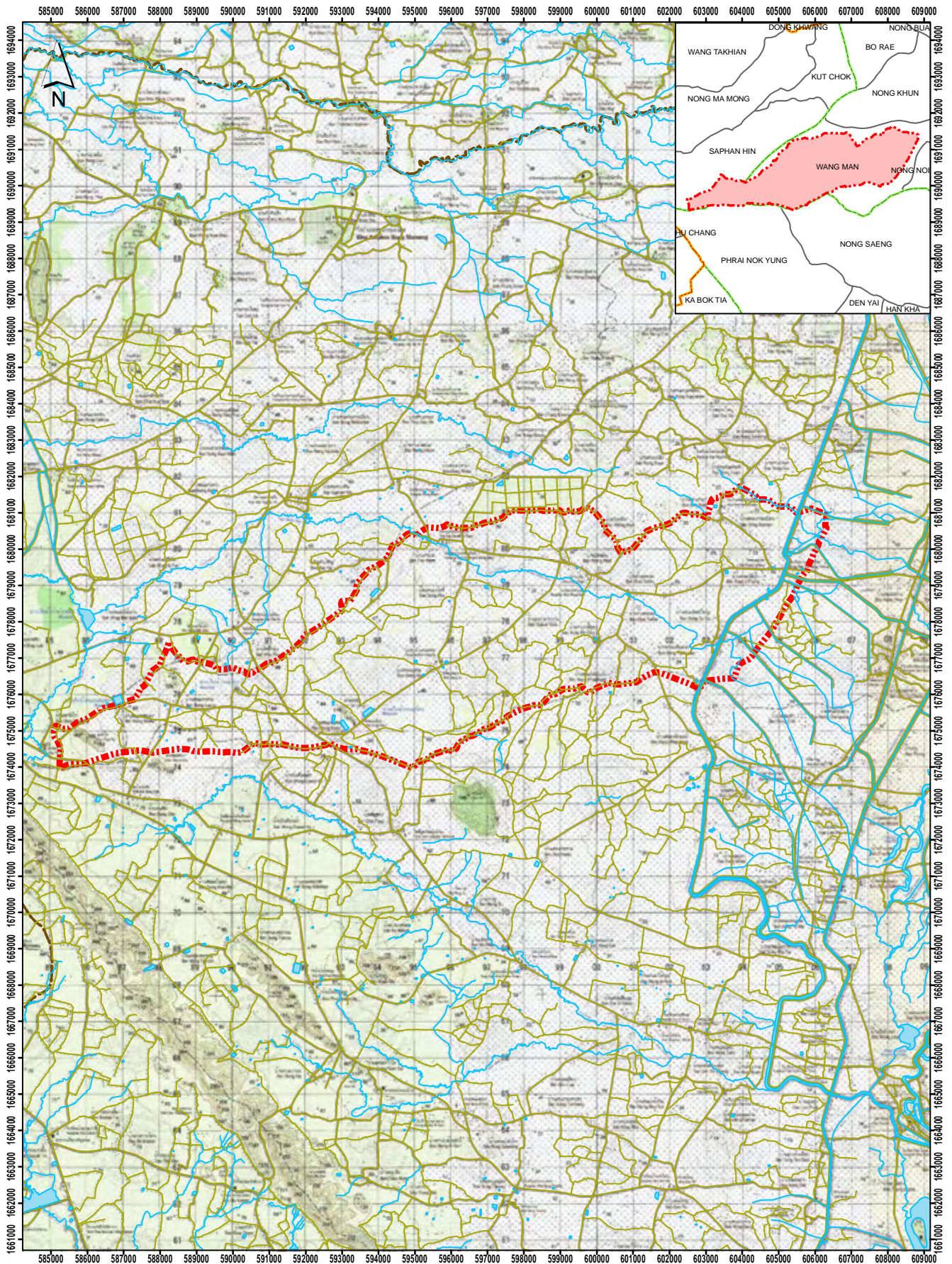
Legend	Provincial Boundary	Note Data Source: Tambon Boundary of Chun Saeng Songkhram: TAO Neighbouring Tambon Boundary: GISTDA Other data: RID	Project for Flood Countermeasures for Thailand Agricultural Sector
	Tambon Chun Saeng Songkhram		
	Water body		
River	Scale 1:100,000 		
Road	Date July 2013		

Topographic Map in Tambon Chum Saen Songkhram, Amphoe Bang Rakam, Pitsanulok Province



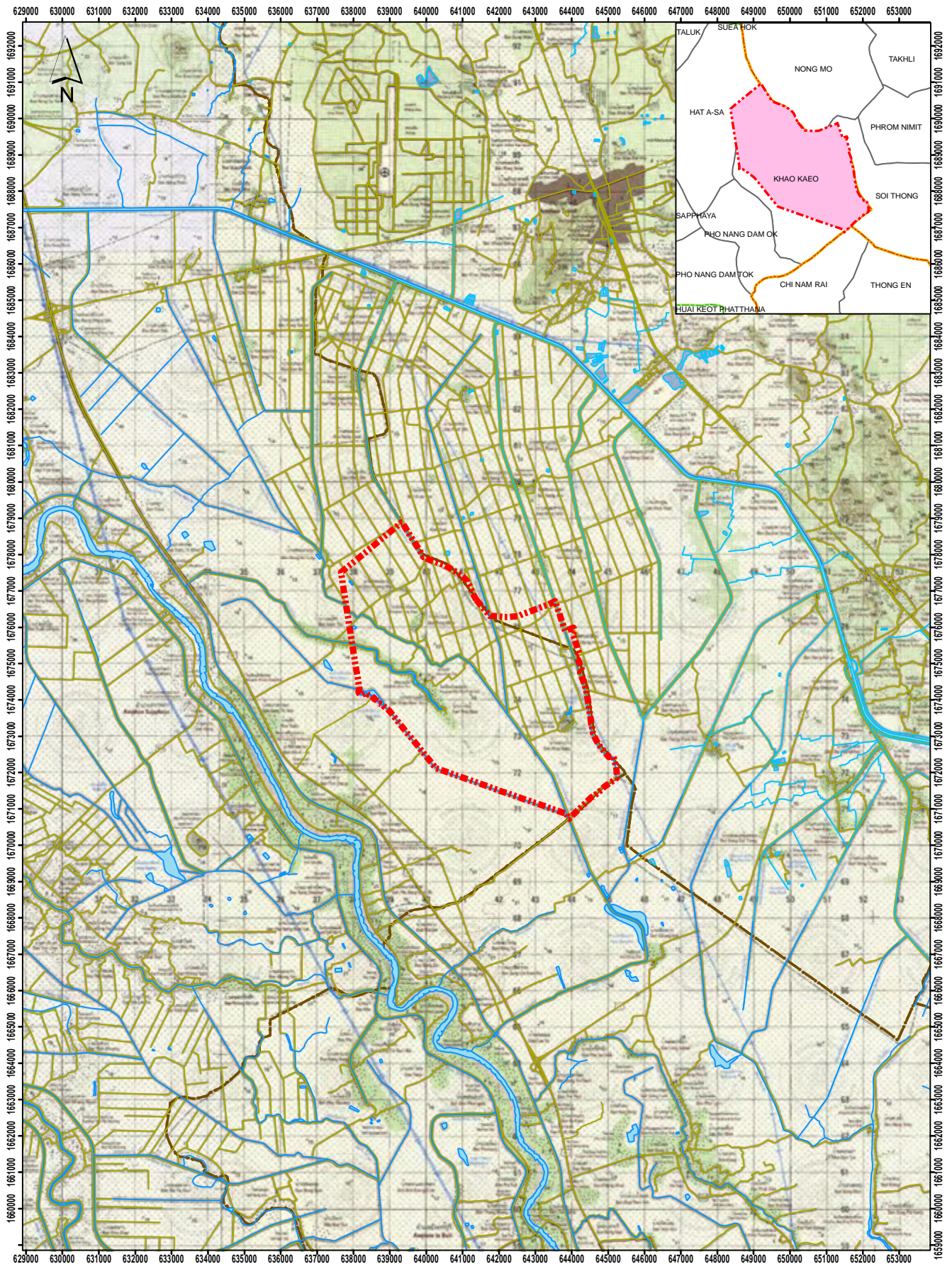
Legend	Provincial Boundary	Note Data Source: Tambon Boundary of Nakhon Pa Mak: TAO Neighbouring Tambon Boundary: GISTDA Other data: RID	Project for Flood Countermeasures for Thailand Agricultural Sector
	Water body		
Tambon Nakhon Pa Mak	River	Scale 1:100,000 	
Road	Date July 2013		

Topographic Map of Tambon Nakhon Pa Mak, Amphoe Bang Kratum, Phitsanulok Province



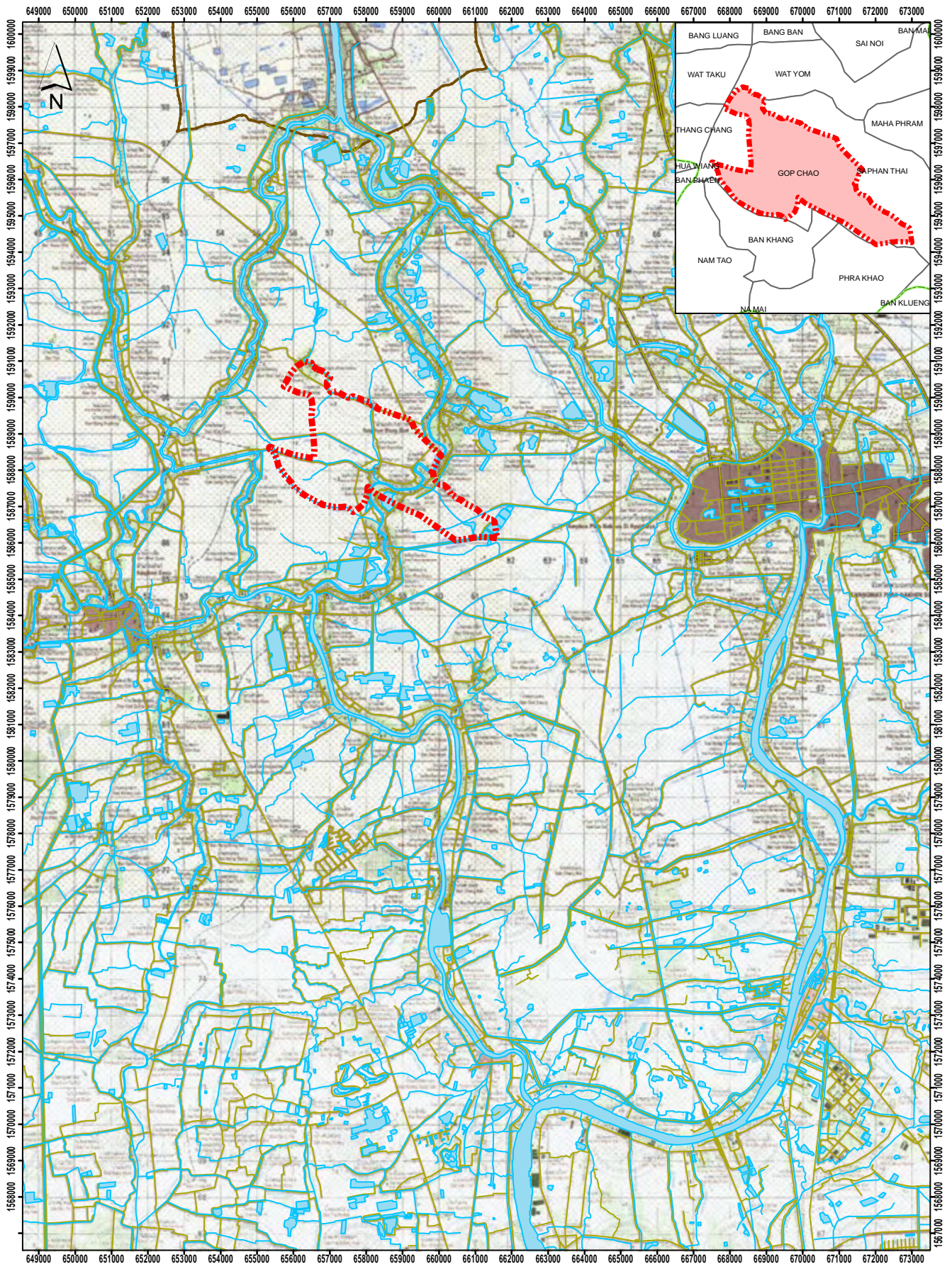
Legend	Provincial Boundary	Note Data Source: Tambon Boundary of Wang Man: TAO Neighbouring Tambon Boundary: GISTDA Other data: RID	Project for Flood Countermeasures for Thailand Agricultural Sector
	Tambon Wang Man		
Water body	Scale 1:100,000 	Date July 2013	
River			
Road			






Topographic Map of Tambon Wang Man, Amphoe Wat Sing, Chainat Province

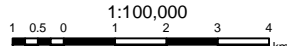


Legend Provincial Boundary Tambon Khao Kaeo Water body River Road	Note Data Source: Tambon Boundary of Khao Kaeo: TAO Neighbouring Tambon Boundary: GISTDA Other data: RID	Project for Flood Countermeasures for Thailand Agricultural Sector
Date July 2013		

Topographic Map of Tambon Khao Kaeo, Amphoe Sapphaya, Chainat Province



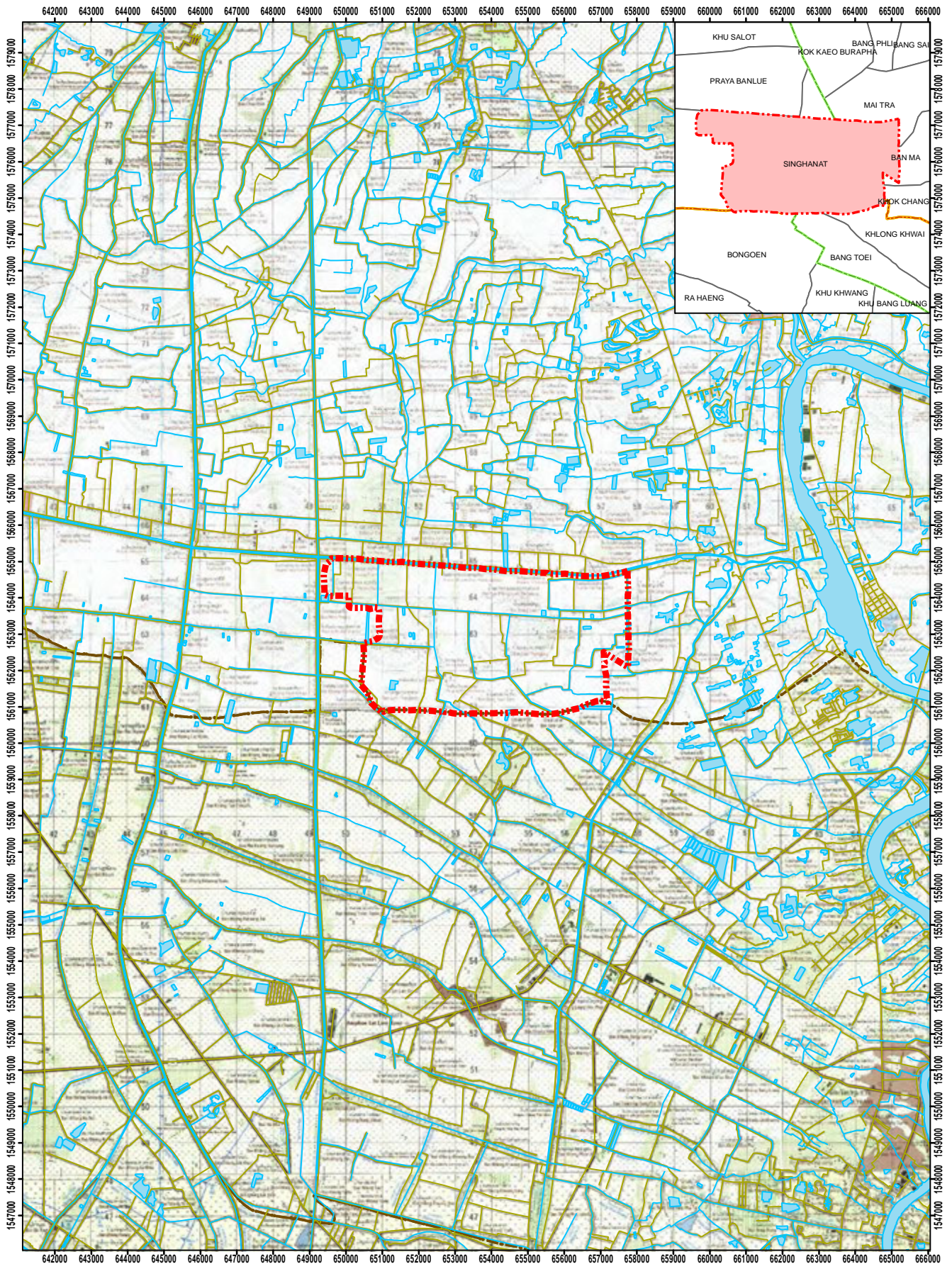
Legend	
	Provincial Boundary
	Tambon Gop Chao
	Water body
	River
	Road






Note	Data Source: Tambon Boundary of Gop Chao: TAO Neighbouring Tambon Boundary: GISTDA Other data: RID
	Scale  1:100,000
Date	July 2013

Project for
Flood Countermeasures
for
Thailand Agricultural Sector



Topographic Map of Tambon Gop Chao, Amphoe Bang Ban, Ayuttaya Province



Legend	
	Provincial Boundary
	Tambon Singhanat
	Water body
	River
	Road

Note
 Data Source:
 Neighbouring Tambon Boundary: GISTDA
 Other data: RID

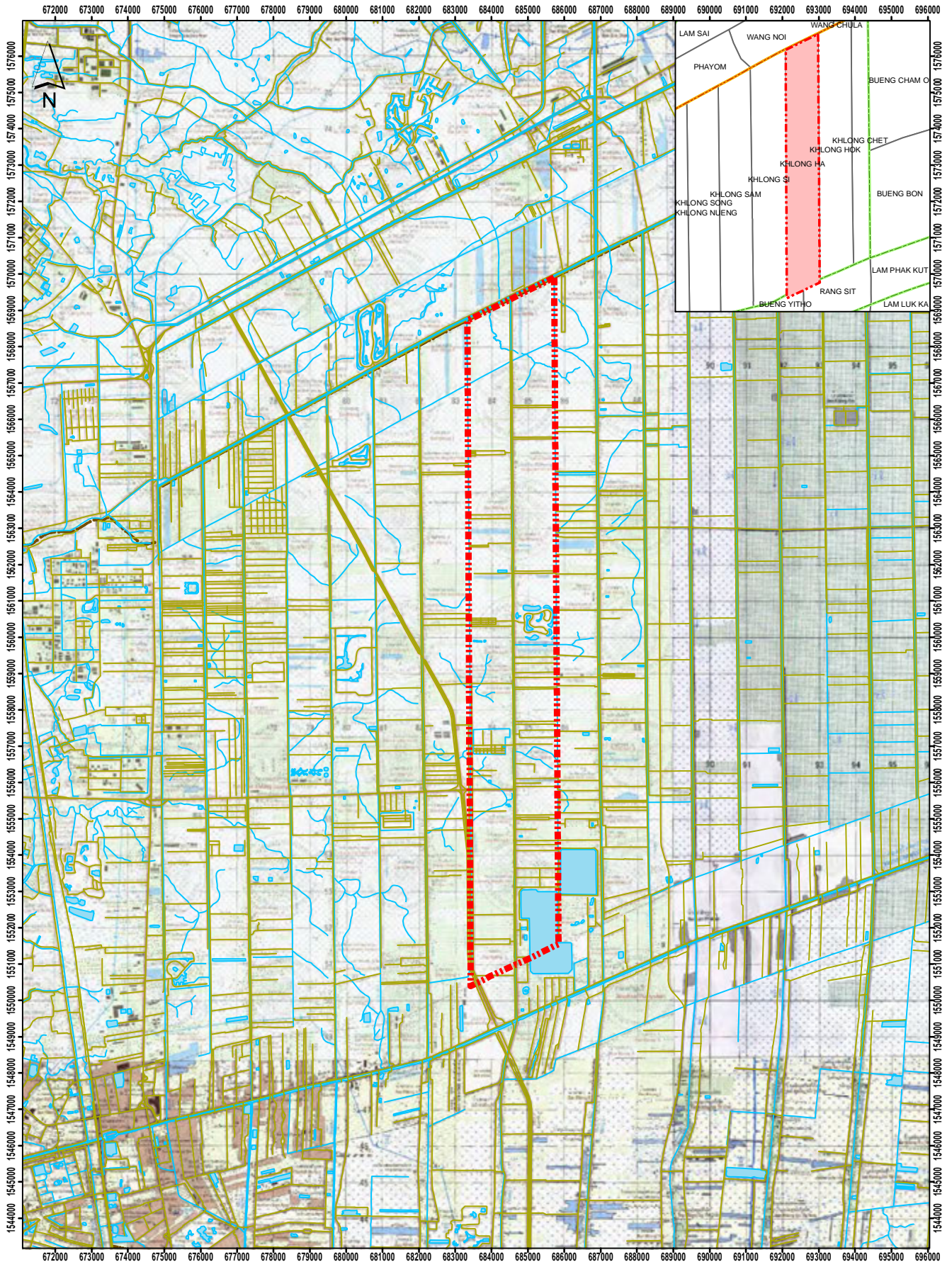
Scale
 1 0.5 0 1 2 3 4
 km

Date July 2013

Project for
 Flood Countermeasures
 for
 Thailand Agricultural Sector



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



Legend	
	Provincial Boundary
	Tambon Khlong Ha
	Water body
	River
	Road

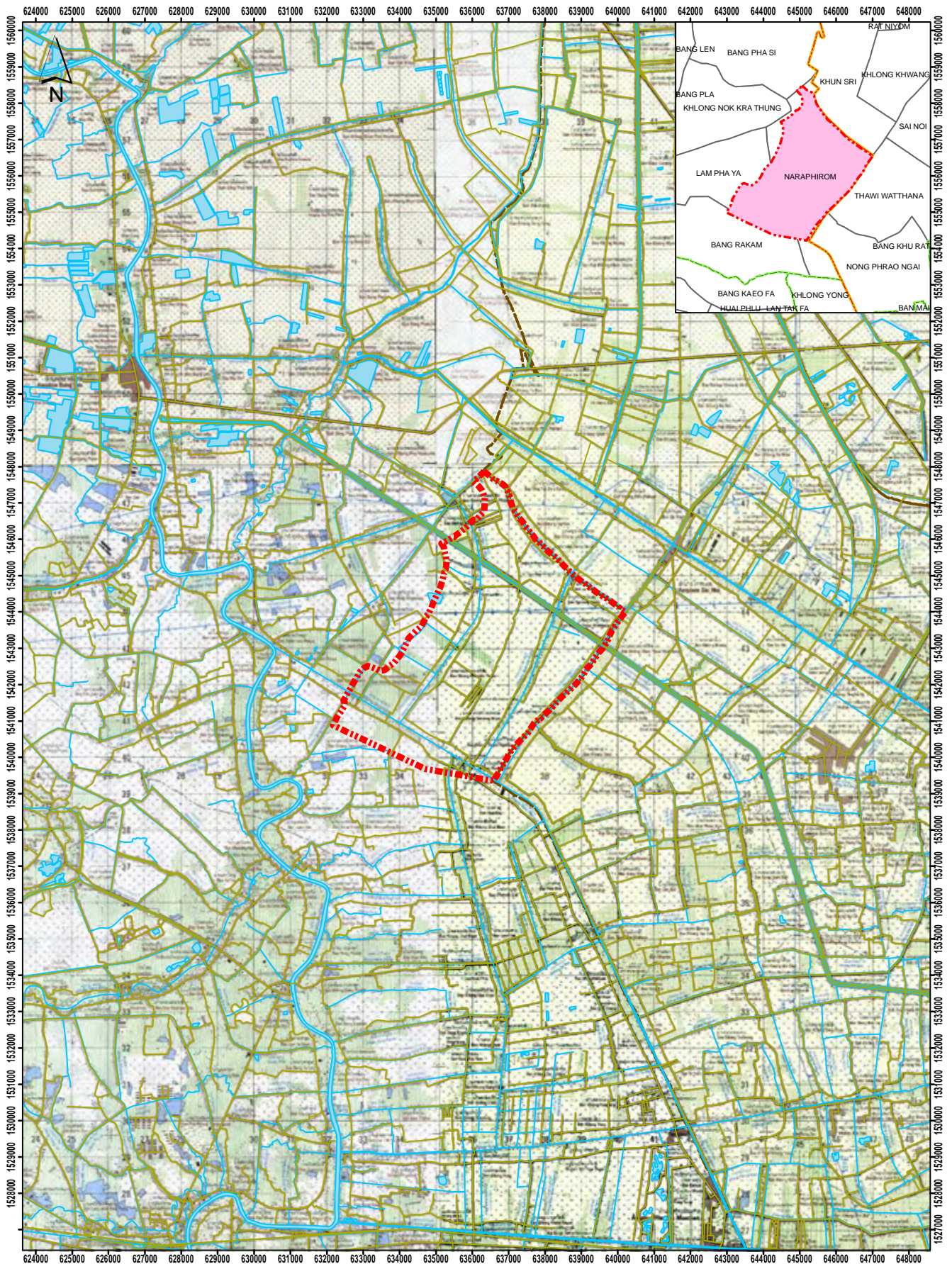
Note
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 Neighbouring Tambon Boundary: GISTDA
 Other data: RID







Scale 1:100,000

Date July 2013

Project for
 Flood Countermeasures
 for
 Thailand Agricultural Sector

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

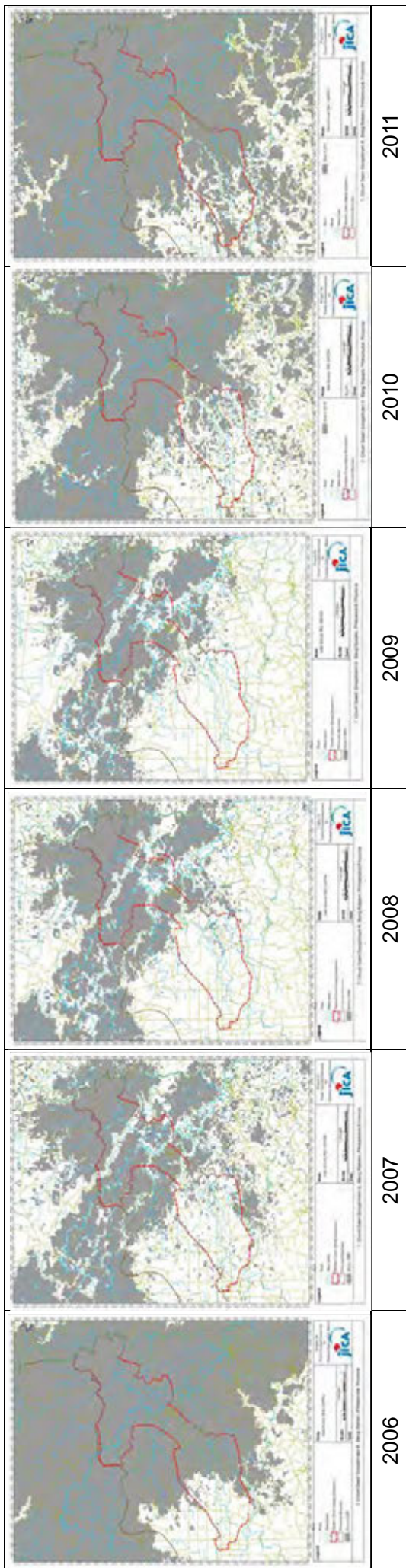


Legend  Provincial Boundary  Tambon Naraphirom  Water body  River  Road	Note Data Source: Neighbouring Tambon Boundary: GISTDA Other data: RID	Project for Flood Countermeasures for Thailand Agricultural Sector 
Date July 2013		

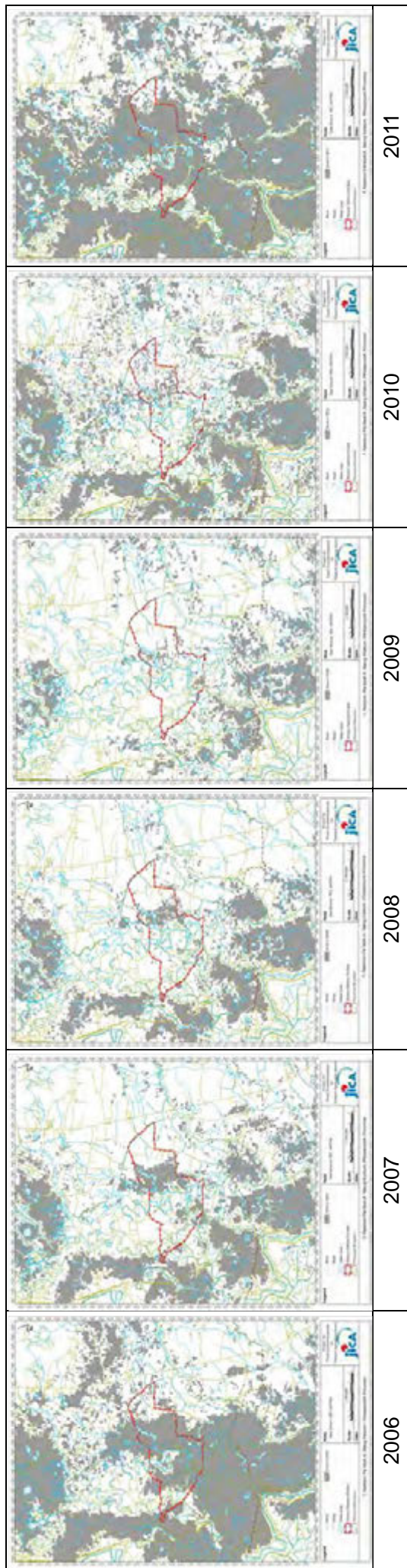
Topographic Map of Tambon Naraphirom, Amphoe Bang Len, Nakhon Pathom Province

Flood Prone Area from 2006 to 2011 in 8 Model Areas

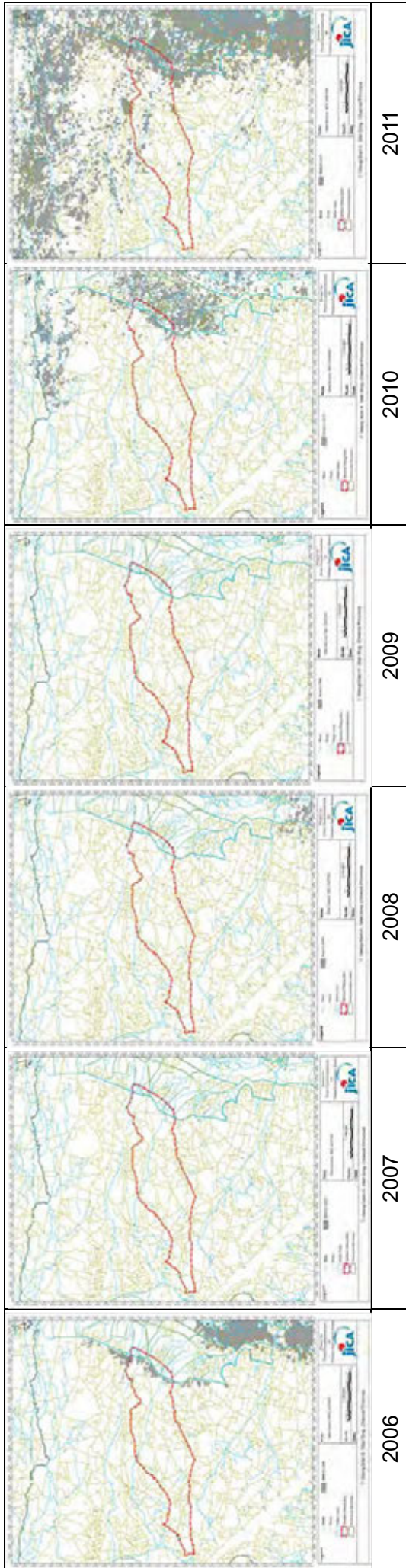
(1) Chum Saeng Songkhram



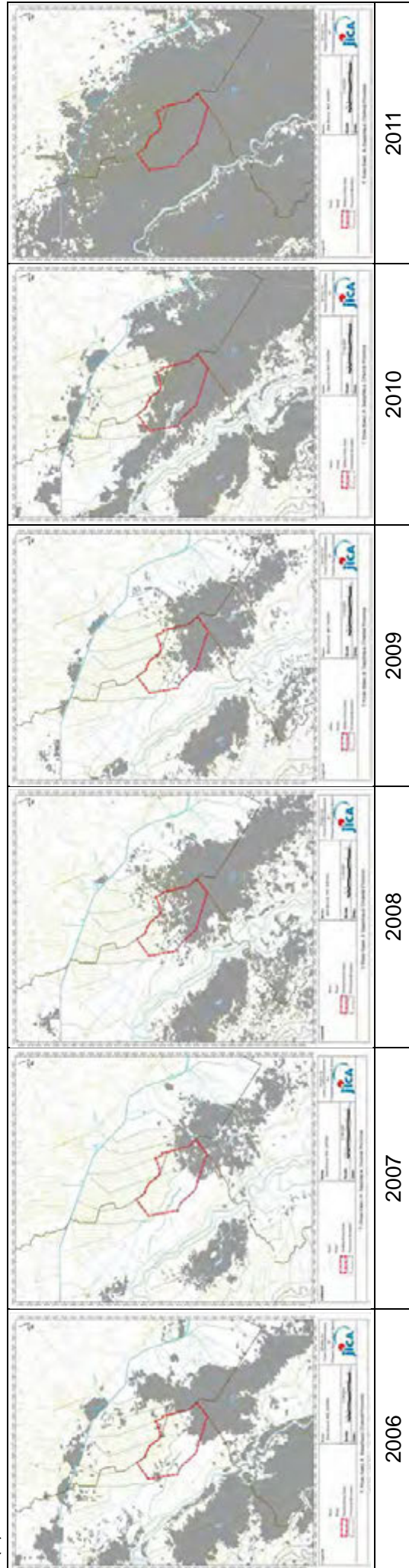
(2) Nakhon Pa Mak




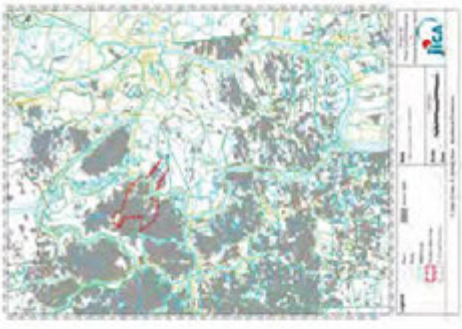
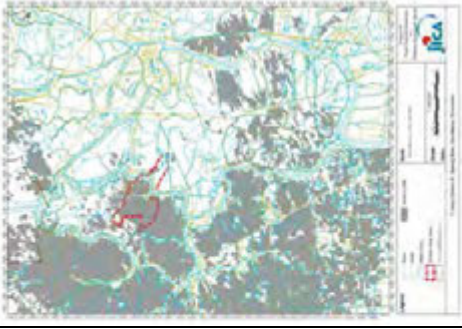
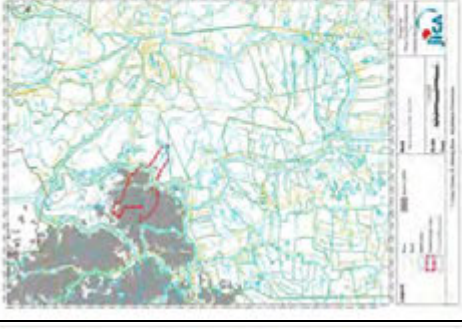
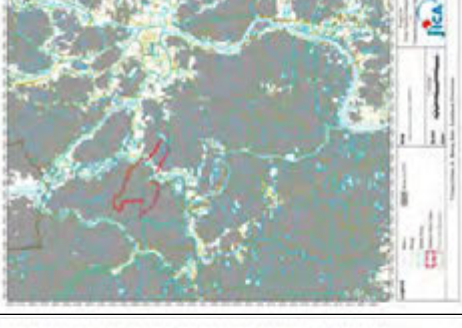
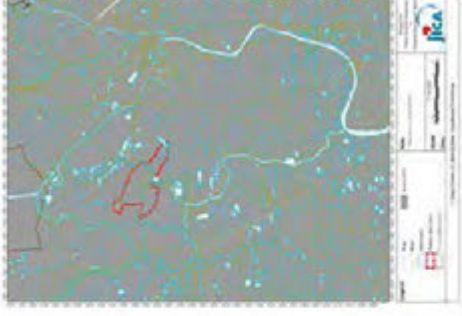
(3) Wang Man









(4) Khao Kaeo




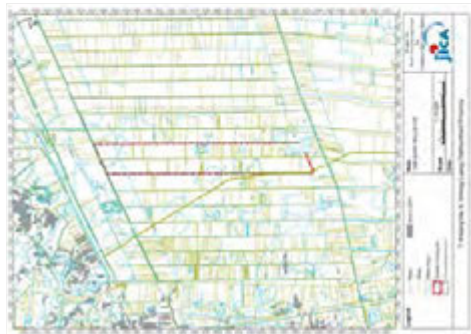



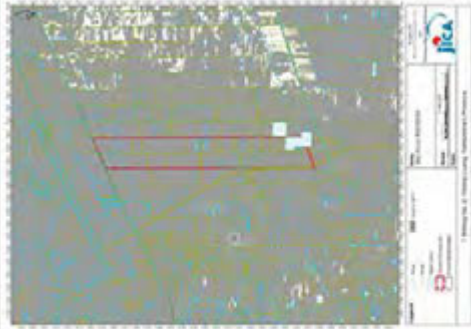
(5) Gop Chao

	2006
	2007
	2008
	2009
	2010
	2011







(6) Singhanat

	2006
	2007
	2008
	2009
	2010
	2011

(7) Khlong Ha

					
2006	2007	2008	2009	2010	2011

(8) Nara Phirom

					
2006	2007	2008	2009	2010	2011

Summary of Main Characteristics of 8 Model Areas

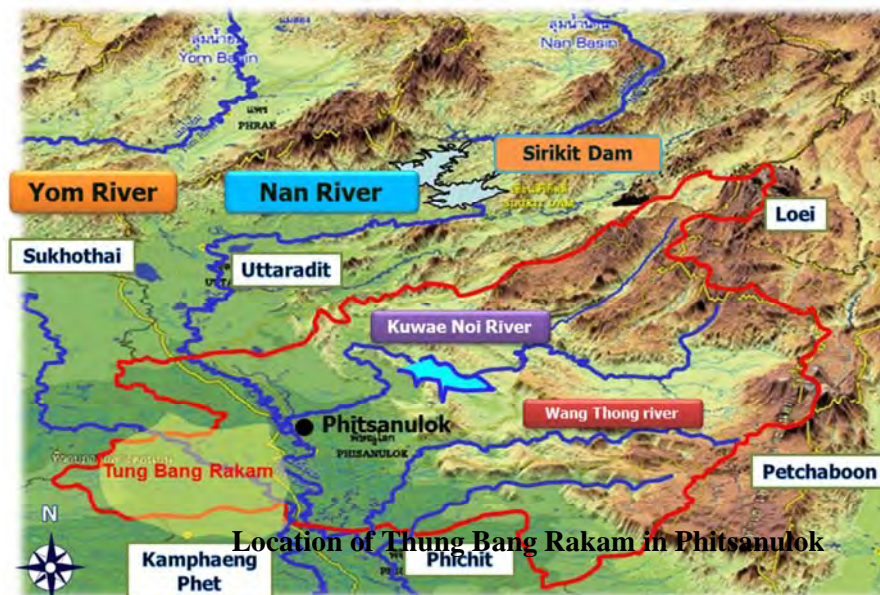
(1) Chum Saeng Songkhram, Bang Rakam District, Phitsanulok Province

'Bang Rakahm (Land of Cry) Model', Living with Flood in Yom River Flood Plain

Bang Rakam which became famous for 'Bang Rakam Model' to tackle with flood problem as mentioned by Prime Minister Yingluck Shinawatra, when she visited flood affected provinces in the Northern Provinces¹. Thung Bang Rakam is flood plain in which flooding occurs every year. Tambon Chum Saeng Songkram is a part of Bang Rakam District, and part of the Thung Bang Rakam flood plain. Yom River flows through the center of tambon from Northwest to Southeast.

Tambon Chum Saeng Songkram is approximately 20 km away from Phitsanulok town. It covers the area of 75,243.75 rai or 12,039 hectare with total population of 3,775 people from 2,370 families. The area could be divided into two zones with clear differences in the amount of water and canal network. The Northern zone is low area with canal network. Flood usually occurs in this zone as affected by Yom river.



The Southern zone is high land and difficult to receive water. The water for agriculture in this zone is mainly rain water and sometimes from Thor Thong Daeng Irrigation project of Sukhothai province.



70% of the area is rice production. In the northern zone, fishing during flood season is one of the income sources for farmers. In southern zone include pig farming and sugarcane production.

¹ Nation online news on August 29, 2011

<http://www.nationmultimedia.com/national/Bang-Rakam-water-plan-fast-tracked-30163923.html>

<p>Northern Zone</p>  <p>Pump Irrigation</p>	<ul style="list-style-type: none"> - village number 1,2,3 and 9 - 2 rice cropping in dry season - 800-900 kg/rai - water from Yom river and ground water - main income from rice cultivation, fishing and hired labor - Low land and high risk of flood
<p>Southern Zone</p> 	<ul style="list-style-type: none"> - Village number 4 , 5 , 6 ,7 ,8 , 10 and 11 - 2 dry season cropping - rice yield 800-900 kg/rai - ground water and Thor Thong Daeng Irrigation Project (Sometimes) - Rice, Sugarcane, Eucalyptus and Banana - main income source : rice farming, hired labor and pig raising - High land and drought

Two Zone of Chum Saeng Songkram



In some places, pumping irrigation is being used as a supplemental water resource for paddy cultivation.



Due to highly elevated water level, electricity meters needed to be replaced at way higher place, which may not be easy to read.

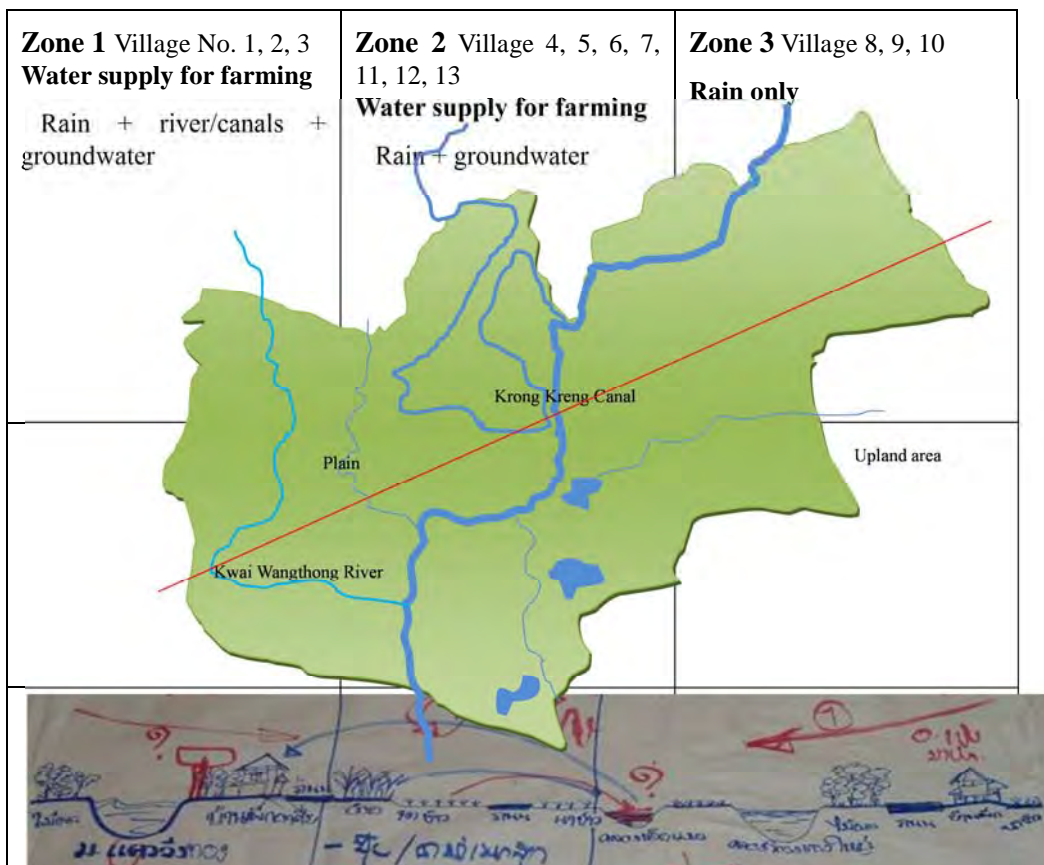
(2) Nakhon Pa Mak, Bang Kratum District, Phitsanulok Province

Flood Plain of Nan River Basin Frequently Facing both Flood and Drought

Nakhon Pa Mak sub-district covers total area of 58.62 square kilometers of which 25,888 rai or

4,142.08 hectare is cultivated land. It locates in the lower part of Phitsanulok province near Pichit Province. There are 13 villages with total population of 3,166 people from 1,723 families. The area could be divided into three zones based on the elevation and water resource availability.

- ✓ Zone 1 is the low area along the Kwai Wang Thong river where people from village number 1,2,3 enjoy two or three crops of rice cultivation in a year.
- ✓ The second zone covers 7 villages. Two rice crops are possible in this part of the sub district since water is available at natural river (Klong Krok Kreng) and three pumping stations. Moreover, ground water could be utilized.
- ✓ Zone 3 is upland area and covers three villages (village number 8,9 and 10) where water is available only in rainy season. No ground water could be used. One wet season rice is possible. Jasmine rice is cultivated. Sugarcane is the secondary crop since the area is high and dry. Moreover, a sugar mill factory is operating in the neighboring sub-district. Banana is found in every zone.



Source: Community Form of Nakhon Pamak Sub-district

Three Zones of Nakhon Pamak

(3) Wang Man, Wat Sing District, Chainat Province

Rain-fed Upland with Field Crops and Livestock as Major Livelihood in Land Reform Area

T. Wang Man is one of 6 tambons in Wat Sing District, Chainat Province, with a geographical character of lowland mixed with plateaus. Floods regularly hit the lowland areas in the rainy season while highland areas suffer drought problem with insufficient water for consumption and agricultural use. Farmers in highland areas can plant rice only once a year without irrigation systems.



The Tambon has 8 villages in the total area of approximately 78.72 km² or 49,200 rai having the population of about 4,400 with approximately 1,400 households. Out of total area of 49,200 rai, 83 % is farm land and 1,906 rai is the land declared as Land Reform Area (LRA). Among the households, 50% engaged in rice farming while 33% cultivates field crops such as cassava and sugarcane and 7% mainly makes living from livestock.

T. Wang Man is the area of purely rural characteristics being far from the downtown of the District. Moreover, the infertility of the land and the lack of available water in the dry season cause only few outside people come and farm in Wang Man land. There has been increasing number of migration out of the area to nearby industrial zone in the recent past.



An existing middle-scale farm pond located at the far western side of the Tambon; sedimentation is severer.



A new farm pond being excavated at a middle part of the Tambon; in upland places, securing water is a crucial issue.

(4) Khao Kaeo, Sapphaya District, Chainat Province

Future Water Retention Area in Large Scale Irrigation Projects Nearby Chainat Dam

Khao Kaeo Sub district is relatively low area locating on the left bank of Chao Praya River. It covers the total area of 17,531 rai or 2804.96 hectare. Agricultural land is irrigated in dry seasons. Two irrigation projects supply water to this area namely Manorom O&M Project and Maharat O&M Project. The irrigated area under the first project is a land consolidation project area but the second project is of normal irrigation project.

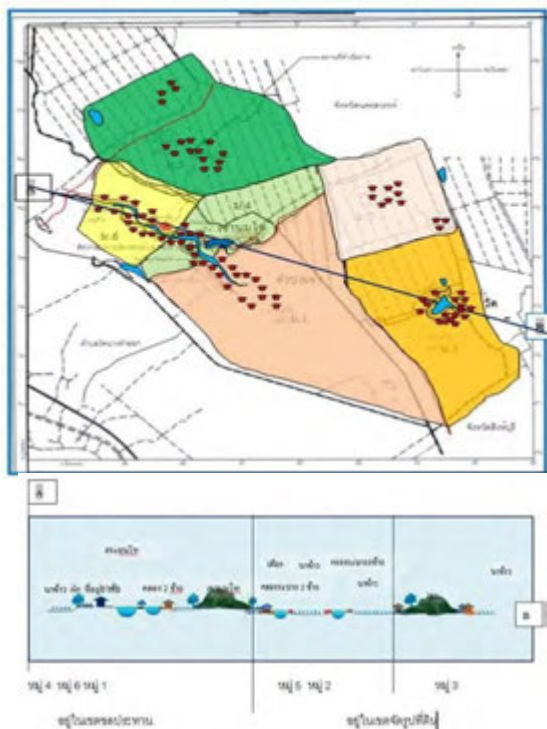


The total population is 3,135 people with 1042 families. Most of villagers migrated into this area after construction of the irrigation systems.

There are six villages and two of them locate in the lowest area where flood usually occur. Two dry seasons cropping of rice is possible because of irrigation but it is not possible to grow wet season rice since flood occurs continuously for 8 years after construction of the highway.

Farmers are satisfied with two rice crops in dry season if irrigation water is guaranteed by the irrigation projects. Moreover, they accept when necessary to retain water in their area after

August with condition that water level is not higher than road. The retained water should be drained before mid December so that they can start the first dry season rice production.



Future water retention area is a part of Thung Chen Rak, consisting of 8 tambons, which are organized into a inter-Tambon organization to deal with the Government's water retention plan.

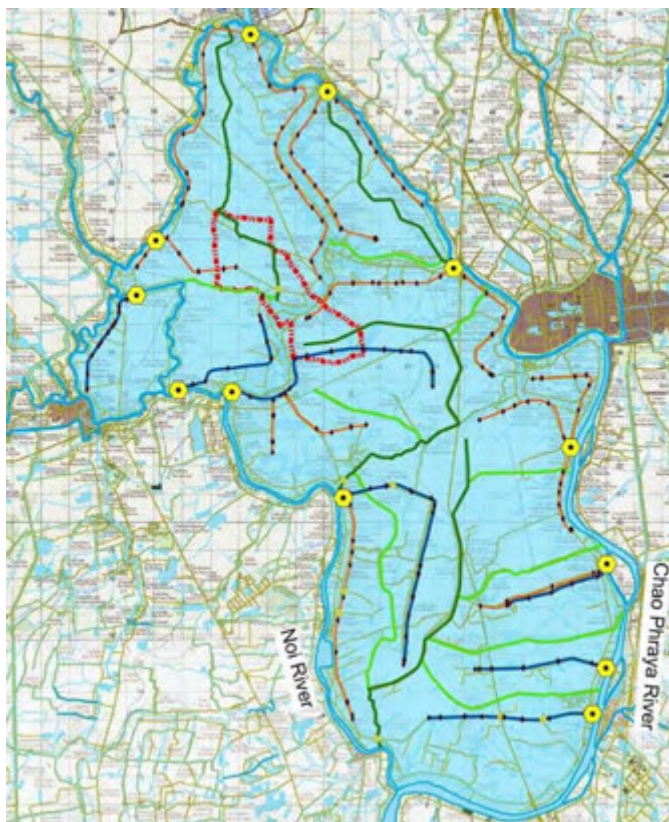


(5) Gop Chao, Bang Ban District, Ayutthaya Province

In the Monkey Cheek Project, Close to Ayutthaya Town and Industrial Estates

T. Gop Chao of Bang Ban District, Ayutthaya Province is located in the low alluvial flats of the Chao Phraya River. The Tambon is divided into 9 villages with the total land area of approximately 6,731 rai. Since the area is considered natural monkey cheek area, it is normal to have flood regularly. Houses along Noi rivers are elevated second-story houses.

The population of the tambon is 2,620 with 743 households. Main occupation in the area is employee with the share of 55% while paddy farming shares 25%. The rest consists of merchants, government officer, and other occupations. Many of people in the area commute to nearby industrial estates, namely Rojana, High Tech, and Bang Pa-In. There are also small enterprises of brick making and straw binding, with the use of materials locally available.



Gop Chao locates within Bang Ban Irrigation Project, which has a polder dike to protect the area from flood water and pumping up water from surrounding river by 12 pumping station.



After the flood of 2011, elevation of dike was elevated
No. 2 and 3 are located outside of Monkey Cheek.

More than 80% of farm land is paddy field. Most of rice farmers cultivate rice both in wet season and dry season with the irrigation water. However, there are non-irrigated areas of about 200 rai in the Tambon scattered along the Khlong Bang Ban tributary. PRA survey found 20% of farmers cultivate their own land while 80% rent their farm land. Part of Bang Ban Project is a Monkey Cheek pilot project and construction for heightening of dikes is on-going. Among 9 villages, only village

(6) Singhanat, Lat Bua Luang District, Ayutthaya Province

Paddy and Vegetable along Phraya Banlue Canal, Livestock in Muslim Community

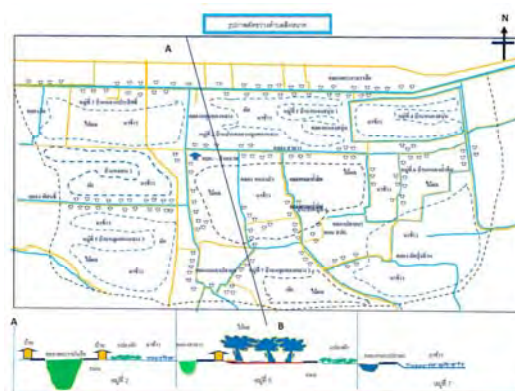
T. Singhanat of Lat Bua Luang District is located along Phraya Banlue canal, which was constructed in the late 19th century under King Rama V reign in order to connect Chao Phraya River and Tha Chin River. As upper most of Phraya Banlue O&M Project, farmers can irrigate all year round by pumping up directly from main and lateral canals to their own plot individually.



Singhanat TAO is a medium size TAO with 974 households in 7 villages and 14,882 rai or 2,381 ha. 20 % of community population is Muslim due to migration workers from the Southern Region during the construction of canal. Construction workers received land title according to the length they excavated from Siam Land, Canal and Irrigation Company. Some part of the area is under Agricultural Land Reform Area. Japanese ODA loan project has ever supported construction of polder dike and pumping station in the Area.

Singhanat is the southern most area of Ayutthaya Province and adjacent to Pathumthani Province. 14 km from district center of Lat Bua Luang and 60km from Ayutthaya town. Occupation of people here is mostly agriculture and hired worker in industry nearby but not so much in industrial estates in Ayutthaya nor Pathumthani. Singhanat is rice growing area for commercial basis. 70% of agricultural land is paddy field and farmers cultivate two crops a year with sufficient water throughout a year. Since medium and large scale rice mill exist in and nearby the Model Area, farmer can easily sell the produce directly to rice mills.

26% of agricultural land is for fruit tree, mainly mango and coconut tree. Mango was introduced in early 1980's but needed to be protected from flood by high ridge. However, 100% of mango trees were died due to the 2001 flood.

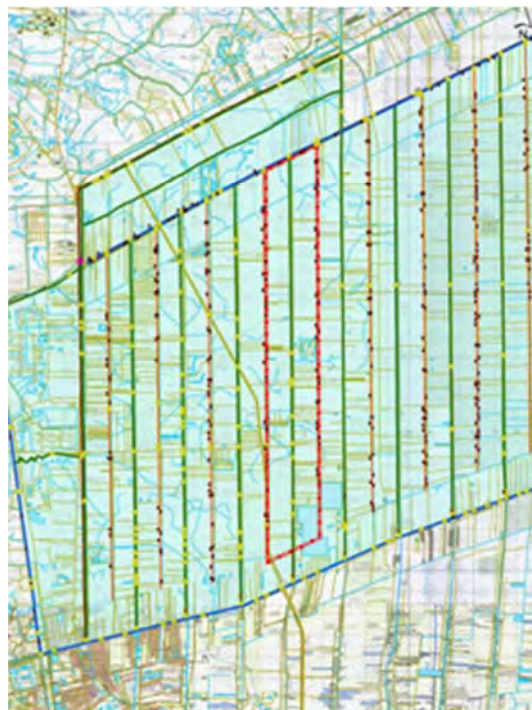


Growing sub-sector in the area is safe vegetable cultivation and harvesting for both domestic and foreign market. Safe vegetable group has GAP certificate and collects vegetable at two collection centers in the Tambon and five exporters purchase vegetables from the group. Area for growing vegetable is still merely 1% of agricultural land but has potential to expand more high value added agriculture in the area. Livestock in the area is mostly cattle raising and goat raising mainly in Muslim community. Goat meat price is getting higher and good business with market for Halal food (Muslim food). Goat milk processing is anticipated and fish culture and processing farm exists in Muslim community.

(7) Khlong Ha, Khlong Luang District, Pathumthani Province

Urbanizing Area and Paddy Field in Old Irrigation Project

T. Khlong Ha of Amphoe Khlong Luang, Changwat Pathumthani, is located in the low alluvial flats of the Chao Phraya River where soil type is argillaceous with moderate to high in acidity in the pH scale. The land slope from north to south is 0.1%. The tambon is surrounded by 4 canals, namely L4-5 Canal at west, L5-6 Canal at the east, Rapeepat Canal at the north, and Ransit Payunsak Canal at the south. T. Khlong Ha has the total land area of approximately 25,500 rai subdivided into 16 villages. People in the area build simple bridges across these canals as well as a drainage canal, which run the center of the area, for better accessing.



There are approximately 5,000 households with the population of over 12,000, who are classified into 2 major groups; 1) permanent residents, and 2) temporary residents who have migrated into the area to work at industry areas around the Tambon and small and medium size local factories in and around the Tambon. Although the area still has agriculture-based socio-economic natures, its geographic characteristic, which is close to Bangkok metropolitan and the convenience of transportation, has transformed the area from pure agricultural society into a more urbanized one.

Approximately 49% of the total land is paddy field. Farmers in the area cultivate the rice continuously with the supply of sufficient water from irrigation systems through a year. Besides the paddy field, land use for fishery business accounts for 3 % of total land. About 30% of the farmers own their land while 70% of the farmers rent the farm land which is owned mostly by the people from outside Tambon.



In the canal passing through the Tambon, fish culture is also conducted.

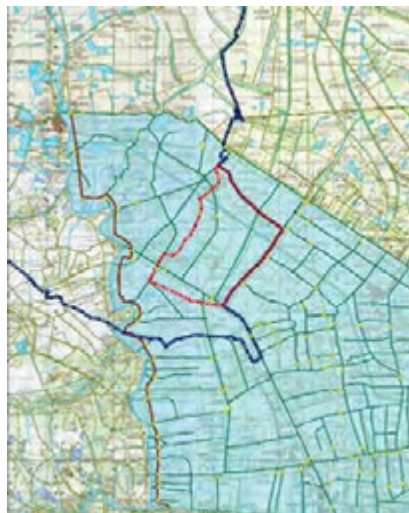


Water needs to be pumped up from the canal; the canal is used both for irrigation and drainage.

(8) Naraphirom, Bang Len District, Nakhon Pathom Province

Growing Orchid and Vegetable Farming in Phra Phimon Project near Tha Chin River

T. Naraphirom of Amphoe Ban Leng, Changwat Nakhon Pathom, is located in the low alluvial flats of the Tha Chin River with a land area of 23,450 Rai, or 37.52 Km². The tambon is composed of 11 villages with the total population of approximately 4,900 living in about 1,200 households. Occupations of people in the tambon is classified as; farmers 46%; employees in several sectors 32%; private merchandising 10%; and unemployed 12%. As the area is gradually urbanized with housing development projects in the area, the number of new comers has been increasing.



Historically, rice cultivation was the main agricultural activity in the area with its geographical character of the land which is flat and suitable as paddy fields. However, with the expansion of the irrigated area as well as promotion of commercial and export-oriented high value crops by the government, orchid farming has been popular in the area. Farmers in the area invest in orchid farming for high returns with a high market demand.

80% of total area of the Tambon is used as paddy field. Field crops, fruit trees and flowers, including orchid, are planted in the 6% of total land. Farmers use water from canals by pumping into agricultural plots. The farm plots are relatively large with a high-wide ridge which helps prevent flooding at a certain level. Farmers are cultivating rice three times a year. The number of households engaged in the rice farming is 605 with the average size of paddy land of 26 rai. 87 farm households grow vegetables, such as cucumber, kale, and chili, while 81 households engage in orchard business, such as mango, guava, coconuts. 65 households are for growing orchid flower business.

Water for agriculture is diverted from two main sources, Tha Chin River and Phraya Banlue Project. Tha Chin River lies on the western side of the project. The water is pumped up from Tha Chin River into Phra Pimon canal which is located in the north of the Tambon. Then, water gates are used to control the diversion of the water into all canals in the area. Water is diverted to distribution canals that farmers allowed for farmers to use freely. There are no water use regulations since water is retained abundantly in the canal all the



Summary Sheet of Eight Model Areas (1/2)

Province จังหวัด (Changwat)	District อำเภอ (Amphoe)	Sub-District ตำบล (Tambon)	No	Characteristics	Basic Information (1)				
					Population: Area: Character	Location	Land use	Major Crop/ Farming System	Irrigation System
Phitsanulok พิษณุโลก	Bang Rakam อ. บางระกำ	Chum Saeng Songkhram ต. ชุมแสงสงคราม	1	'Bang Rakahm (Land of Cry) Model', Living with Flood in Yom River Flood Plain	2,227 Household (HH) 7629 pop 75,243 rai 11 villages Rural	20 KM from the district and 50 KM from Pitsanulok town	70 % rice production, 20 % livestock production, 7 % fishery, 3 % integrated farming.	Rice (x2-3) Sugarcane Pigs	Non-Irrigation
		Bang Kratum อ. บางกระทุ่ม	Nakhon Pa Mak ต. นครป่าหมาก	2	Flood Plain of Nan River Basin Frequently Facing both Flood and Drought	1,791 Household 13 Village 36,000 rai Farm 24,000 rai Rural	15 KM from the district and 40 KM from Pitsanulok town	Total area 25,888 rai, paddy field 23,419 rai, field crop 1,470 rai, vegetable 8 rai, fruit tree 926 rai, tree 65 rai, residential 10,740 rai	Rice 90% (x 2 crops) Sugarcane 10%
	Wat Sing อ. วัดสิงห์	Wang Man ต. วังใหม่	3	Rain-fed Upland with Field Crops and Livestock as Major Livelihood in Land Reform Area	1,400 HH 4,400 pop. 93.17 km2 (58,231 rai) ALRO area 30%	20 KM from the district and 60 from Chanat town	61% paddy field, 19% field crop, 9% forest, 3% orchard and 8% others	Rice (x1) 653 HH Sugarcane/Cassa va 167 HH Cattle 103 HH	Non - Irrigated Area
Chainat ชัยนาท	Sapphaya อ. สรรพยา	Khao Kaeo ต. เขาค้อ	4	Future Water Retention Area in Large Scale Irrigation Projects Nearby Chainat Dam	752 HH 2700 pop 6 villages 28 Km2 (17,531) Rural	30 KM from the district and 50 KM from Chanat town	paddy 16,609 rai, residential area 5,316 rai, horticulture 300 rai, vegetable 150 rai, fish pond 57 rai	90% Rice farmer (x2-3)	Manorom O&M, Maharaj O&M
	Bang Ban อ. บางบาล	Gop Chao ต. กบเจา	5	In the Monkey Cheek Project, Close to Ayutthaya Town and Industrial Estates	762 HH 2,597 pop 9 villages 10.76 km2 (6,731 rai) Rural/ Majority work in industry	20 KM from the district and 30 from Ayutthaya town	83 % paddy field, 1 % orchard and 16 % other crops.	Total Farm Land 7100rai Rice 6500rai(x 2) others Banana, Field Crop	Bang Ban Pump Irrigation Project (Polder Dike) total 152,000 rai, 12 pump station
Ayutthaya พระนครศรีอยุธยา	Lat Bua Luang อ. ลาดบัวหลวง	Singhanat ต. สิงหนาท	6	Paddy and Vegetable along Phraya Banlue Canal, Livestock in Muslim Community	974 HH 3,252 Pop 7 villages 28km2 (17,199rai) ALRO area 80% Buddhism 20% Muslim	14 km from district center and 60 km from Ayutthaya town	agricultural area 14,877 rai, paddy 13,355 rai, fruit tree 1,106, vegetable 185 rai	Rice(x2) 70% Fruite Tree 26% Vegetable 3% Livestock 1%	Prayabanlu O&M Project
	Khlong Luang อ. คลองหลวง	Khlong Ha ต. คลองห้า	7	Urbanizing Area and Paddy Field in Old Irrigation Project	1400 HH, 16 villages Peri-urban	20 KM from the district and 60 KM from Pathum Thani town	49 % paddy, 21 % residential area, 6% water resource, 3% fishery, 21 % other crops	Rice (x 2.5), mango, banana, jack fruit	North Rangsit Project
Nakhon Pathom นครปฐม	Bnag Len อ. บางเลน	Naraphirom ต. นราภิรมย์	8	Growing Orchid and Vegetable Farming in Phra Phimom Project near Tha Chin River	1200 HH, 4,900 Pop	50 KM from the district and 60 KM from Nakhon Pathom	80 % paddy, 2% field crop and orchard, 4 % flower, 4 % fishery, 5 % residential, 5 % others	Orchid 123 farm Rice	Papimol Project

Summary Sheet of Eight Model Areas (2/2)

Province	District อำเภอ (Amphoe)	Sub-District ตำบล (Tambon)	No	Basic Information (2)				Other Project	Issues	Potentials
				Problems in Farming	Flood in 2011	Gov's Flood Management Master Plan				
จังหวัด (Changwat)	Bang Rakam อ. บางระกำ	Chum Saeng Songkhram ต. ชุมแสงสงคราม	1	1. High production cost 2. Quality of Product (Vegetable?) not meet market demand 3. Flood occur every year in the lower part of the area while water shortage occur in the other half.	4 villages under flood	Water Retention (Yom River Basin)	Monkey Cheek Project (RID, DWR)	Start construction of infra for Monkey Cheek, no water management, agri.plan	Provide platform for coordination of relevant agencies	
Phitsanulok พิษณุโลก	Bang Kratum อ. บางกรวย	Nakhon Pa Mak ต. นครป่าหมาก	2	1. Not enough water for dry season cropping in one third of the area. 2. Flood usually occurs in village number 7, 8 and 9 during wet season 3. Weedy rice and high input cost	91% of Tambon was Flooded in 15 days. 23,000rai mainly Paddy field. Flooded every year. 613/1791 HH were inundated	Water Retention (Wang Tong River)	dredging of canal by RID	Flood + Drought	Change Paddy to Vegetable Banana Processing Group, Sugar Mill	
Chainat ชัยนาท	Wat Sing อ. วัดสิงห์	Wang Man ต. วังใหม่	3	1. Drainage problem in the lower part of the area in wet season 2. Drought in most part of the area because of no water storage and sandy soil.	Flood occurs every year	none	3 community ponds as Monkey cheek	Rain-fed Area, Flood + Drought, poor soil	Cattle raising, ALRO area Community water management with Ponds	
Ayutthaya พระนครศรีอยุธยา	Sapphaya อ. สรรพพนา	Khao Kaeo ต. เขาน้ำ	4	1. Flood occurs for 8 years in the lower part of the area. 2. Two villages are in high risk in case of big flood	100% of Rice Evacuate to other area 2 villages received food for 3 month	Water Retention	Evacuation Center is Planned	Paddy	Transplanting machine, community rice center, evacuation center	
Ayutthaya พระนครศรีอยุธยา	Bang Ban อ. บางบาล	Gop Chao ต. กบเจา	5	1. Flood occurs to the residential area along the river 2. No income during the long flood period	162 families, 1,484 rai	Royal Initiated Monkey Cheek Project (30,000 rai)		300 rai still plant 3 x paddy	OTOP, Tourism	
Paithum Thani ปทุมธานี	Lat Bua Luang อ. ลาดบัวหลวง	Singhanat ต. สิงหนาท	6	1. High production cost 2. Quality of Product (Vegetable?) not meet market demand 3. Plant brown hopper 4. Rice Price, 5. Economic Risk, 6. Land rent, 7. Capital, 8. Natural disaster	100% of mango orchard damaged, Move cattle to Saraburi Prov. 100% vegetable damaged	South of Prayablanu canal will be protected by high ten road along canal	ALRO OECF loan project area (4 blocks/ 10 blocks not flooded)		Halal, GAP vegetable for export, livestock (incl. goat).	
Nakhon Pathom นครปฐม	Khlong Luang อ. คลองหลวง	Khlong Ha ต. คลองห้า	7	1. high production cost for rice 2. Weedy rice and brown hopper	100 percent of rice and vegetable damaged	Shall be protected		use existing surface water for domestic pipe water	Water management by community, Near urban market	
Nakhon Pathom นครปฐม	Bhag Len อ. บางเลน	Naraphirom ต. นราภิรมย์	8	1. high production cost for rice 2. Lack of information on flood	90% of Orchid damaged two crop of rice damaged	Shall be protected		warning system for orchid protection	Orchid	

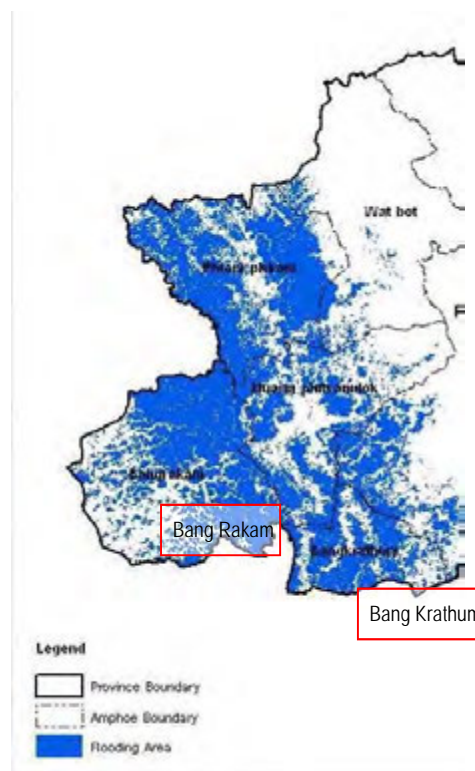
Appendix D-4

2011 Flood Damage in Agricultural Sector in the Model Area Provinces

(1) Phitsanulok Province

Phitsanulok province is located in the lower Northern Region but at the northern most among the five provinces of the model areas. Half of provincial area is mountainous area, which were not damaged by the 2011 flood. Four districts, namely Muang Phitsanulok, Phom Phiram, Bng Rakham and Bang Krathum are low land districts. Two model areas were selected from Bang Rakam District and Bang Kratum District.

In Phitsanulok province, 590,223 rai (94,436 ha) rice farming area, 57,374 rai (9,180 ha) field crop farming area and 9,184 rai (1,469 ha) horticulture farming area were damaged in 2011 flood. Among 9 Districts, Bang Rakam District had the most severe damage in paddy field with 208,807 rai (33,409 ha) as well as field crops with 14,037 rai (2,246 ha). Bang Krathum Distrcit had the worst damage in horticulture with 2,769 rai (443 ha).



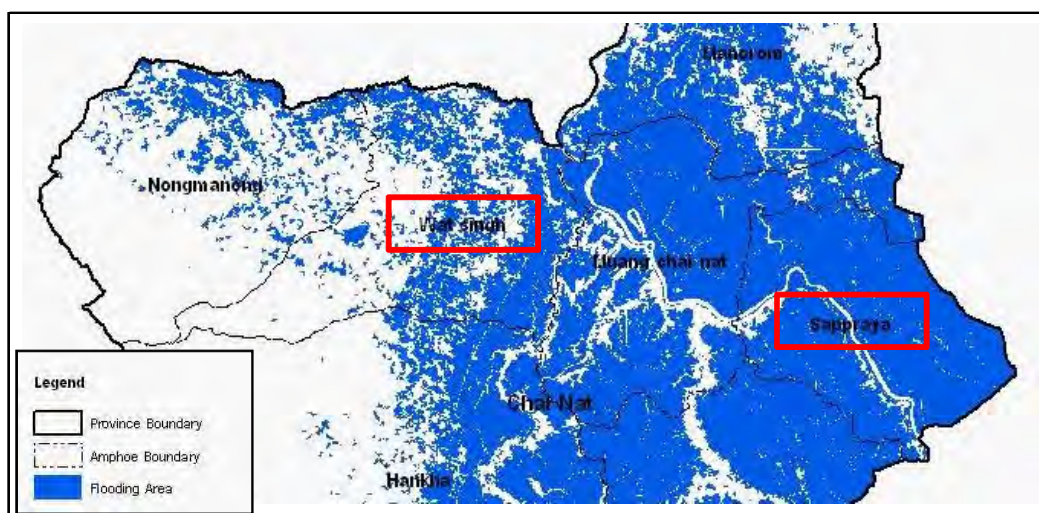
Agricultural Damage by 2011 Flood in Phitsanulok

No.	District	Farmers (person)	Rice (rai)	Field crop (rai)	Horticulture (rai)	Total (rai)	Remarks
1	Mueang Phitsanulok	4,214	64,034	2,866	2,030	68,930	
2	Wang Thong	4,387	59,307	12,019	506	71,832	
3	Bang Rakam	10,145	208,807	14,037	2,493	225,337	Model Area
4	Bang Krathum	4,650	64,080	6,136	2,769	72,986	Model Area
5	.Phom Phiram	7,549	139,869	2,679	550	143,097	
6	Noen Maprang	1,013	7,260	1,059	34	8,353	
7	Wat bot	2,662	28,189	6,994	32	35,215	
8	Nakhon Thai	3,087	10,012	3,026	737	13,775	
9	Chat Trakan	2,158	8,665	8,558	34	17,256	
Total		39,865	590,223	57,374	9,184	656,780	

Source: Report on the result of damaged and assistance to farmers affected by flood year 2011 (Plants) special case under the resolution of the Cabinet on 25th September 2011 (Disaster affected period since 15th May to 11st November 2011)

(2) Chainat Province

Chainat province is located in the Central Region. 2011 flood damage area expanded all the lowland areas, including two model areas of Wat Sing District and Sapphaya District. The eastern part of Chainat mainly flooded in 2011. A part of Wat Sing District is upland and not flooded while, almost all of Sapphaya District flooded. (Figure 6.3.1)



Two Districts Flooding Map in Chainat, 2011

102,331 rai (16,373 ha) or 15% of 680,810 rai of major rice planted area, 2,304 rai (369 ha) of field crop farming area and 13,854 rai (2,217 ha) horticulture and others farming area were damaged in 2011 flood in Chainat. Among 8 Districts in Chainat, Sapphaya District had the most damage area with 61,401 rai (9,824 ha).

Agricultural Damage by 2011 Flood in Chainat

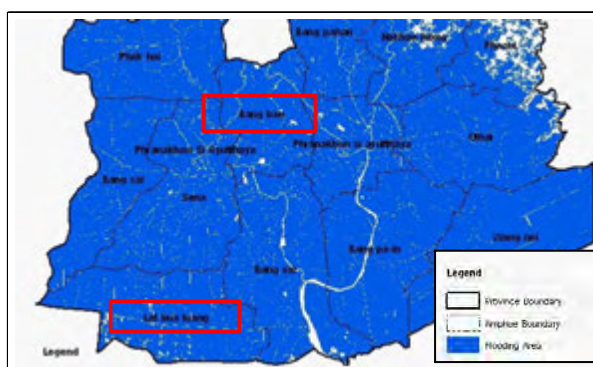
No.	District	Rice (rai)	Field Crop (rai)	Horticulture and other (rai)	Total (rai)	Remarks
1	Sapphaya	61,401	6	4,305	65,712	Model Area
2	Hankha	4,565	306	954	5,824	
3	Mueang Chai Nat	18,365	1,166	3,332	22,863	
4	Manrom	13,015	539	4,794	18,348	
5	Wat Sing	4,190	143	417	4,750	Model Area
6	Sankhaburi	456	0	47	503	
7	Nong Mamong	331	144	0	475	
8	Noen Kham	9	0	5	14	
Total		102,331	2,304	13,854	118,488	

Remarks: Report on assistance result to disaster affected people year 2011, Disaster period 16th August - 23rd March 2012, Chainat Provincial Agricultural Extension Office, Department of Agricultural Extension

(3) Ayutthaya Province

Ayutthaya province is located in the Central Region and almost lowland. Model areas were selected from Bang Ban District and Lat Bua Luang District. The 2011 flood covered almost all of the provincial area.

346,330 rai (55,413 ha) of rice farming area were damaged, which account for 42 % of total planted area of major rice in Ayutthaya Province (828,590 rai).



Flooding Map in Ayutthaya, 2011

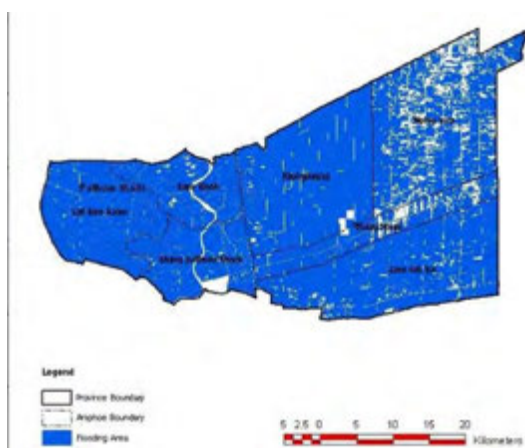
Agricultural Damage by 2011 Flood in Ayutthaya

No.	District	Rice (rai)	Field Crop (rai)	Horticulture and other (rai)	Total (rai)	Remarks
1	Sapphaya	61,401	6	4,305	65,712	Model Area
2	Hankha	4,565	306	954	5,824	
3	Mueang Chai Nat	18,365	1,166	3,332	22,863	
4	Manorom	13,015	539	4,794	18,348	
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6	Sankhaburi	456	0	47	503	
7	Nong Mamong	331	144	0	475	
8	Noen Kham	9	0	5	14	
Total		102,331	2,304	13,854	118,488	

Remarks: Summary of total Central budget spending to aid flood victim farmers in agriculture sectors in 2011, Ayutthaya (As of 1 Aug 2011 - 10 Jan 2012)

(4) Pathumthani Province

Pathumthani province is located in the Vicinity of Bangkok. There is one model area selected in Khlong Luang District. Almost all of Pathumthani area was also flooded in 2001. Almost all of Khlong Luang District also flooded. (Figure 6.3.3)



87,560 rai (14,024 ha) or 31% of 281,940 major rice planted area, 1,034 rai (165 ha) field crop farming area and 30,406 rai (4,865 ha) garden plants and others farming area under damaged by 2011 flood in Pathumthani. Among 7 Districts in Pathumthani, Klong Luang District had the worst damage in paddy cultivation with 29,562 rai (4,730 ha). Proportion of horticulture is rather high in this Province.

Flooding Map in Pathumthani, 2011

Agricultural Damage by 2011 Flood in Pathumthani

No.	District	Farmers (preson)	Rice (rai)	Field Crop (rai)	Garden Plants and others (rai)	Total (rai)	Remarks
1	Amphur Muang, Pathumthani	1,536	3,512	52	5,745	9,309	
2	Samkhok	855	8,570	0	5,462	14,032	
3	Lad Loom Keaw	1,970	22,856	0	7,357	30,212	
4	Thanyaburi	828	3,148	258	1,883	5,288	
5	Klong Luang	2,947	29,562	497	5,566	35,625	Model Area
6	Nong Sua	8,714	1,053	0	959	2,012	
7	Lam Look Ka	2,389	18,861	227	3,435	22,523	
Total		19,239	87,560	1,034	30,406	119,001	

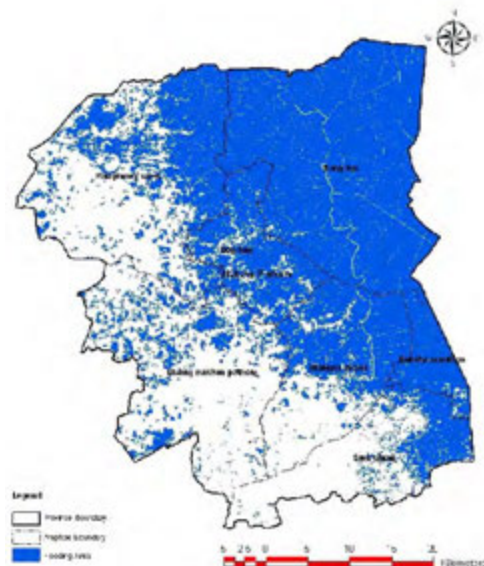
Remarks: Report of primary flood damage in agriculture sector (crops) in Pathumthani (As of 1Sep 2011 - 15 Mar 2012)



(5) Nakhon Pathom Province

Nakhon Pathom province is located next to the western part of Bangkok. There is one model area in Bang Len District. The northeast part of Nakhon Pathom was mainly flooded in 2011, and almost all of Bang Len District flooded. (Figure 6.3.4)

53,490 rai (8,558 ha) rice farming area, 1,150 rai (184 ha) field crop farming area and 44,930 rai (7,189 ha) horticulture farming area were damaged by 2011 flood in Nakhon Pathom. Among 7 districts in Nakhon Pathom, Bang Len was most severely damaged with 31,981 rai of paddy, 524 rai (84 ha) of field crop, 14,220 rai (2,275 ha) of horticulture.



Flooding Map in Nakhon Pathom, 2011

Agricultural Damage by 2011 Flood in Nakhon Pathom

No.	District	Rice (rai)	Field crop (rai)	Horticulture (rai)	Total (rai)	Remarks
1	Mueang Nakhon Pathom	5,379	168	1,236	6,783	
2	Bang Len	31,981	524	14,220	46,726	Madel Area
3	Kamphaeng Saen	3,874	261	601	4,736	
4	Nakhon Chai Si	4,707	159	11,384	16,249	
5	Sam Pharn	2,052	0	12,960	15,011	
6	Don Tum	3,012	33	905	3,950	
7	Phutthamonthon	2,486	6	3,624	6,116	
Total		53,490	1,150	44,930	99,569	

Source: Request form to allocate budget for assist disaster affected farmers year 2011 (Disaster period 29th August 2011)



2011 Flood Damage in Model Areas

(1) Chum Saeng Songkhram, Bang Rakam District, Phitsanulok Province

Flood occurs regularly in the northern zone of this Tambon, so farmers adapt themselves to flood by adjusting their cropping pattern and fishing. However, the flood in 2011 occurred earlier than the usual and caused more damage to farm lands and household properties. In 2011, flood came earlier than usual and TAO and villagers tried to harvest paddy before flood come and constructed temporary dike on roads along waterways. It could delayed water to enter paddy field, but in some area harvest had been not finished before water coming in.



Figure 6.3.5 Flooding Map in Chum Saeng Songkhram, 2011

Table 6.3.6 shows agricultural damage which were damaged by 2011 flood in Chum Saeng Songkhram. 39,093 rai (6,255 ha) out of 60,855 rai of farm land was damaged by the 2011 flood.

Agricultural Damage by 2011 Flood in Chum Saeng Songkhram

Vill. No.	Northern Part (Lowland)				Southern Part (Upland)							Total
	1	2	3	9	4	5	6	7	8	10	11	
Area (rai)	3,749	3,769	4,201	5,390	2,174	3,361	2,947	6,127	2,505	3,025	1,845	39,093

Source: Chum Saeng Songkram TAO

Table 6.3.7 shows houses damaged by 2011 flood in Chum Saeng Songkhram.

House Damage by 2011 Flood in Chum Saeng Songkhram

Vill. No.	1	2	3	9	4	5	6	7	8	10	11	Total HH
No. of HH	140	119	124	129	44	-	124	91	109	29	46	955

Source: Chum Saeng Songkram TAO



Photo: Inundation of Paddy Field and Urgent Harvest Unripe Paddy by boat

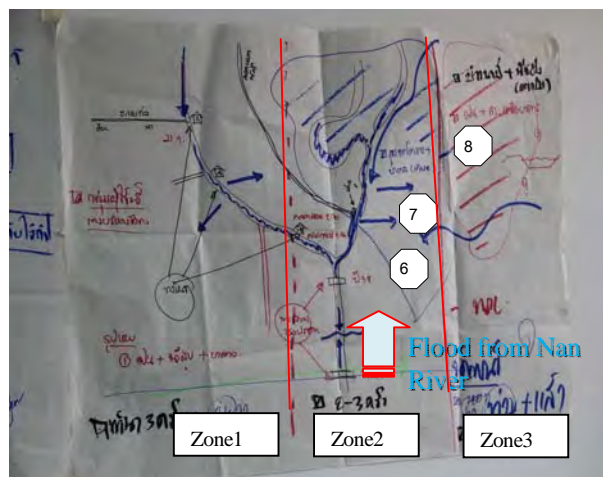
Source: Shum Saeng Songkram TAO

(2) Nakhon Pa Mak, Bang Kratum District, Phitsanulok Province

Seasonal flood occurs every year in the zones two and three. However, flood in 2011 caused the biggest damage to rice in village number 6, 7 and 8. Flood last 65 days from August to October.

Total area damaged from the 2011 flood was 16,970.5 rai of rice, 1,140.75 rai of field crop and 221.5 rai of horticulture. Water came up from southern part of Tambon, overflowing Nan river.

In case of flood, the villagers from village number 6, 7 and 8 are suffering crop damage. On the contrary, those who live in village number 8, 9 and 10 suffer regularly from drought.



Flooding Map in Nakhon Pa Mak, 2011

Table 6.3.8 shows houses damaged by 2011 flood in Nakhon Pa Mak.

THouse Damage by 2011 Flood in Nakhon Pa Mak

Vill. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
No. of HH	32	40	70	59	39	92	52	40	7	19	6	39	23	508

Source: Nakhon Pa Mak TAO

(3) Wang Man, Wat Sing District, Chainat Province

According to the geographical characteristics of T. Wang Man, water comes from north towards south and from west towards east in the monsoon season during September and November. Water from the north and west passes through the area along the Tambon Wang Man Stream, Land Development Stream and Huaylam Stream. The end of the three streams is the main irrigation canal. Some parts of the main irrigation canal are shallow due to the density of mimosa. With the insufficient capacity of the canal, it is often incapable to release surplus water in time and cause the flooding in the area. The radius of flooded areas is around 1 kilometer from the irrigation canal and the flood water level is in between 1-2 meters. Flood remains for around 2-3 months. The picture below shows the direction of water.



Similar to the average year, T. Wang Man was affected by inundation in 2011 as caused by the flash-water from the accumulation of rainfall. Areas around irrigation canal were inundated for about 2

months.



As presented in the Table below, 543 rai of agricultural land was reportedly damaged during the 2011 flood, including 486 rai of paddy field. The number of farm households in the damaged area reached to 46.

Agriculture and House Damage by 2011 Flood in Wang Man

Rice (rai)	Field crop (rai)	Orchard and others (rai)	House Damage
486	52	5	46

Total damaged farmland area is 543 rai or 1.1% of total area (49,200 rai), categorized as follows; rice farming area is 486 rai or 44.8% of total damaged area, field crops (Cassava and sugar cane) 52 Rai, others (tomato) is 5 rai. Livestock and fishery had no damage by 2011 flood.

There are 8 villages in Wang Man. Damaged farmland of No.3 and 8 village near irrigation canal is the most, 295 rai (47 ha) and 121 rai (19ha).

Agricultural Damage by 2011 Flood in Wang Man

Villgae	Farmland(rai)				Livestock(head)						Fishery(rai)			
	Rice	Field Crop	Others	Total	Cow	Buff	Pig	Chicken	Others	Total	Fish	Swrimp	Others	Total
1	15	-	-	15	-	-	-	-	-	-	-	-	-	-
2	-	-	-	0	-	-	-	-	-	-	-	-	-	-
3	269	21	5	295	-	-	-	-	-	-	-	-	-	-
4	81	6	-	87	-	-	-	-	-	-	-	-	-	-
5	-	-	-	0	-	-	-	-	-	-	-	-	-	-
6	-	25	-	25	-	-	-	-	-	-	-	-	-	-
7	-	-	-	0	-	-	-	-	-	-	-	-	-	-
8	121	-	-	121	-	-	-	-	-	-	-	-	-	-
Total	486	52	5	543	-	-	-	-	-	-	-	-	-	-

People in T. Wang Man responded to the flood by moving their assets and animals to higher places, securing drinking water with the initiative of Tambon Administrative Organization (TAO), securing food and vaccine for the livestock, providing medical care services by village health volunteers, and other activities.

(4) Khao Kaeo, Sapphaya District, Chainat Province

Regular floods have occurred for 8 years after drainage system was blocked by the newly constructed road and the water flows into the area from the southern direction of the Tambon. The damage to rice is not so much since most of farmers could harvest before floods occur. However, flood in 2011 occurred on 17 September which caused a lot of damage to rice and household properties. The flood lasted for 3.5 months. Total damage covered 7,765 rai of rice, 26 rai of horticulture and 57 rai of other crops. Total livestock damage is 8,312 head, categorized as follows; poultry is 8,294 or 99.8% of the total damage. Total fishery damage is 40 ponds.

Agricultural Damage by 2011 Flood in Khao Kaeo

Village	Farmland (rai)				Livestock (head)						fishery (pond)			
	Rice	Field Crop	Others	Total	Cattle	Buffalo	Pig	Poultry	Others	Total	Fish	Shrimp	Others	Total
1	2,314	24	3	2,341	-	-	-	1,057	-	1,057	6	-	-	6
2	1,779	-	2	1,781	14	-	2	942	-	958	13	-	-	13
3	2,513	-	14	2,527	-	-	-	410	-	410	12	-	-	12
4	-	-	-	0	-	-	-	-	-	0	-	-	-	0
5	-	-	-	0	-	-	-	-	-	0	-	-	-	0
6	1,159	2	38	1,199	-	-	2	5,885	-	5,887	9	-	-	9
Total	7,765	26	57	7,848	14	-	4	8,294	-	8,312	40	-	-	40

Table below shows houses damaged by 2011 flood in Khao Kaeo. 689 partially houses damaged in 2011 flood. There are 6 villages in Khao Kaeo. Damaged house of No.5 village is the most, 150 houses.

House Damage by 2011 Flood in Khao Kaeo

Village	House		
	100%	Part	Total
1	-	113	113
2	-	93	93
3	-	137	137
4	-	124	124
5	-	150	150
6	-	72	72
Total	-	689	689

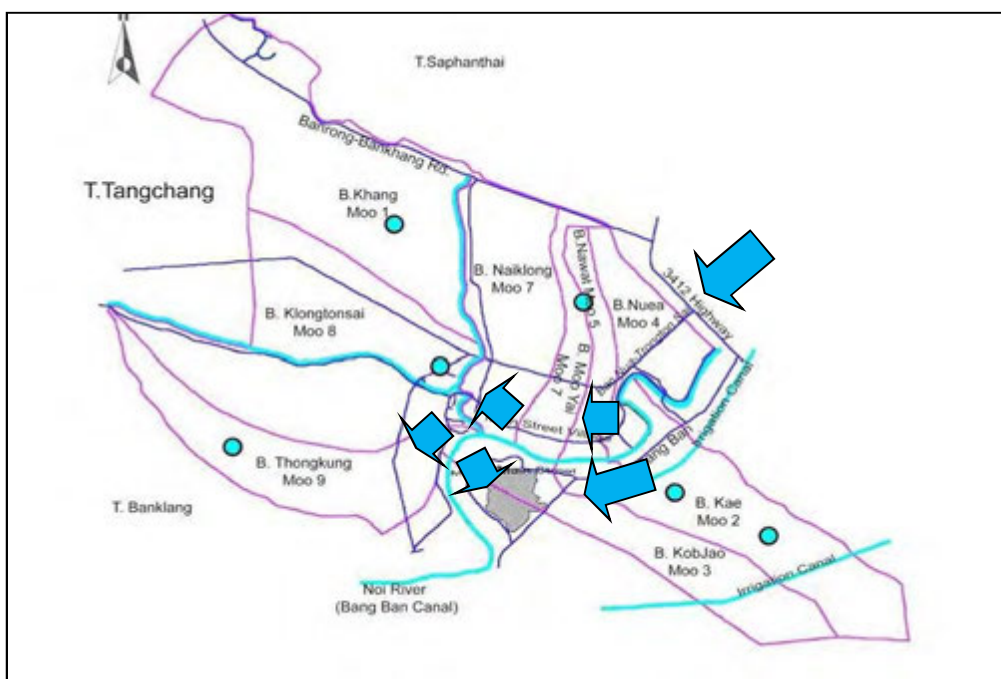


During the flood 2011, TAO acted as the center for disaster management. TAO set kitchen and prepare food for evacuated people in Khao Kaew mountain and other sites everyday for 3 months. TAO is now improving Khao Kaew mountain as evacuation center. Herbs and vegetable is to be planted. Shelter is designed. During the no flooding time, the center can be used as tourist attraction site.

(5) Gop Chao, Bang Ban District, Chainat Province

T. Gop Chao is normally flooded after their second harvest in a year in August or September. The land is usually inundated with a depth of 3 meters from paddy field. This is considered as a regular situation for people in this community. Some people who can't stay in their houses move to stay at a prepared shelter on village's dike roads closed to their houses.

During the 2011 Flood, the area was inundated in August. At the peak time of the flood, only a dike road in front of Tambon Administrative Office (TAO) was not submerged, and the TAO was used as evacuation center for the people. There was a protest by the people towards Bang Ban O&M Irrigation Project Office to open the water gate to relocate the water. Inundation continued until the beginning of January 2012 before it was completely drained out. The direction of water flow during the flood is as shown below.



Direction of flood water flow



Life during the flood



Dike and paddy land

As presented below, 1,309 rai of rice field and 176 rai of orchard and 439 houses were reportedly damaged by the 2011 Flood. Besides, the damage on agricultural land and products, properties of the people, including houses and working equipment, were damaged and became the objects of compensations by the government.

Table 6.3.13 Agricultural and House Damage by 2011 Flood in Gop Chao

Village	Rice(Rai)	Orchard and others (Rai)	House with registration	House without registration
1	185.00	40.75	76	1
2	668.50	24.25	86	12
3	10.00	24.50	51	1
4	14.00	22.25	23	9
5	12.75	12.50	37	3
6	8.00	12.50	15	2
7	190.00	12.75	48	6
8	150.75	13.50	21	-
9	70.25	12.50	48	-
Total	1,309.25	175.50	405	34

As an area of natural water retention, or monkey cheek, people in the Tambon are familiar with the life with the flooding. During the 2011 Flood, people in the area responded as usual by monitoring water level, broadcasting information, mobilizing volunteers, and moving properties to the higher places. Village health volunteers provided services for the reported cases of fungus infection, athlete's foot, stress and others as well as the care for persons with chronic illness, such as diabetes and high blood pressure.

(6) Singhanat, Lat Bua Luang District, Ayutthaya Province

Singhanat faces periodical inundation in lowland and cause damage of paddy harvesting but water level does not reach to road usually. In the past, the area had rather big flood in the years 1942, 1975, 1983, 1985, 1996, 2006 and 2007, according to the memory of villagers.

In 2011, flood water reached to Ayuthaya province at the beginning of October and TAO started to

prepare for pile up sandbags on bank of Phraya Banglue Canal. Flood water came into areas from several directions as shown in the figure right.

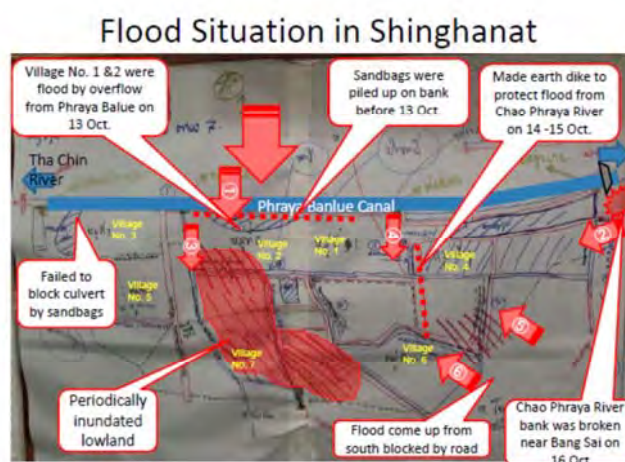


Table below shows agricultural damage caused by 2011 flood in Singhanat.

Total damaged farmland area is 3,306 rai or 22.2% of total farmland area (14,877 rai), categorized as follows; rice farming area is 1,846 rai or 55.8% of total damage area, horticulture is 1,179 rai or 35.7%, field crop is 142 rai, others is 139 rai.

Total livestock damage is 5,994 heads, categorized as follows; chicken is 5,844 heads or 97.5 % of total damaged head, cow is 38 heads, pig 3 heads, others is 109 heads.

Total fishery damage is 386 rai, categorized as follows; fish is 373 rai or 96.6% of damaged area, shrimp is 1 rai, others is 12 rai.

There are 7 villages in Singhanat. Damaged farmland of No.5 village is the most, 953 rai (152 ha). Damaged livestock of No.4 village is the most, 1,632 heads. Damaged fishery in No.5 village is the most, 110 rai.

Agricultural Damage by 2011 Flood in Singhanat

Villgae	Farmland(rai)					Livestock(head)						Fishery(rai)			
	Rice	Horticulture	Field Crop	other	Total	Cow	Buff	Pig	Chicken	Others	Total	Fish	Shrimp	Others	Total
1	-	112	7	2	121	12	-	-	844	-	856	20	-	-	20
2	55	19	6	4	84	-	-	-	380	-	380	34	-	-	34
3	472	96	57	-	625	-	-	-	338	4	342	32	-	-	32
4	291	436	40	133	900	26	-	-	1,591	15	1,632	91	-	-	91
5	661	273	19	-	953	-	-	3	1,401	-	1,404	110	-	-	110
6	177	95	13	-	285	-	-	-	576	3	579	86	-	-	86
7	190	148	-	-	338	-	-	-	714	87	801	-	1	12	13
Total	1,846	1,179	142	139	3,306	38	-	3	5,844	109	5,994	373	1	12	386

Table 6.3.15 shows houses which were damaged by 2011 flood. Total damaged household is 722 or 74.1% of total household (974). Village 4 is the highest number of house and terrible, particularly serious.

Farmer from two villages (village number 5 and 6) have experience growing vegetable for companies. They start growing immediately after water level go down. It took them two months until they catch up with the company again. However, vegetable production provided quick income so the producers could recover their lost during the flood.

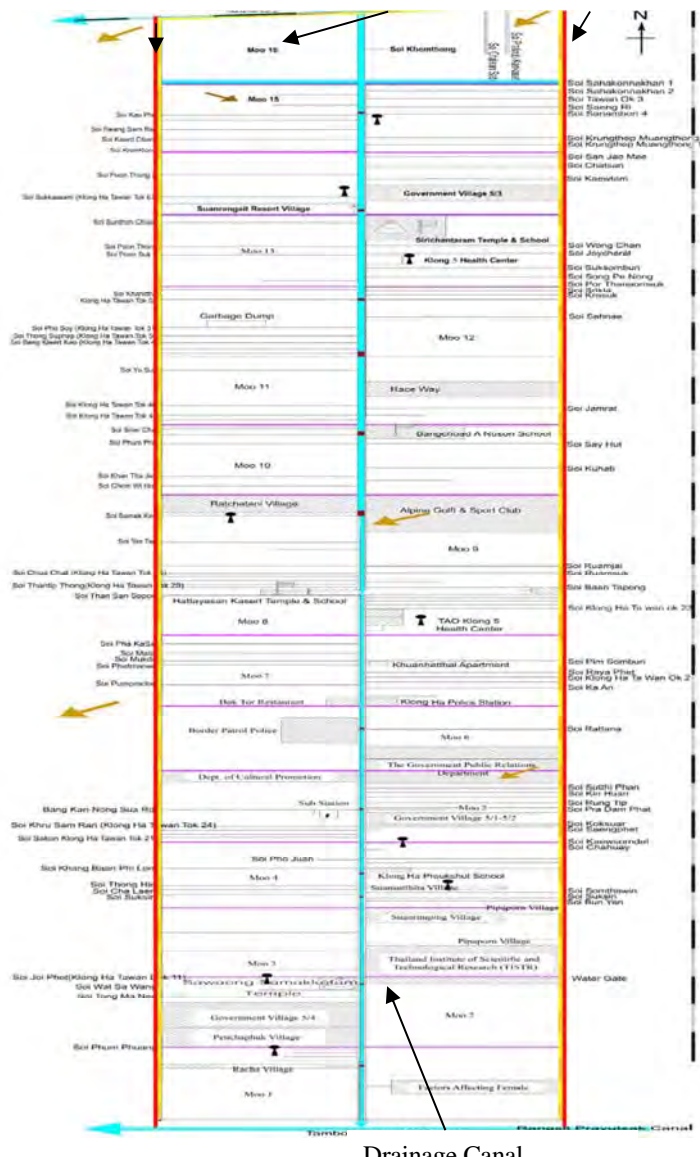
Community are more active to prepare themselves to face flood such as repairing boats, identifying vulnerable people and identify key person to take care of important evacuation activities. Two evacuation centers are identified for Buddhism community and Muslim community.

House Damage by 2011 Flood in Singhanat

Villgae	House		
	100%	Part	Total
1	-	80	80
2	2	77	79
3	3	91	94
4	132	-	132
5	2	90	92
6	-	116	116
7	-	129	129
Total	139	583	722

(7) Khlong Ha, Khlong Luang District, Pathum Thani Province

Distributory Canal L4-5 Rapeepat Canal Distributory Canal L5-6



Direction of water flow during flooding

In the area of T. Khlong Ha, flood is common during October to November. When there is excessive rainfall, agricultural areas are flooded with damages on agricultural products. Southern part of the Tambon is more vulnerable for flooding due to the lower geographical character compared to other parts of the Tambon. 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 as well as L5-6 distributor canals by one meter from the original height of embankment to prevent inundation with sandbags. However, as the level of the flood water reached as high as

1.2 meter, the area was inundated

by the water overflowing the mbankment. The inundation lasted 1.5-2 months in the area depending on the location.

As can be seen the Table below, 4,540rai of paddy field as well as 1,192 rai of other agricultural products were damaged by the 2011 Flood. The number of household whose fields were damaged reached to 304 households. Many of fruits and other plants were reportedly withered during the inundation. Besides the farm land, many of agricultural tools and machines, such as tractors and combine harvesters, were reportedly damaged as the farmers did not move many of

them in time before the inundation.

Total farmland damage area is 5,732 rai or (917 ha) 50.9% of total area (11,253 rai) , categorized as follows; rice farming area is 4,540 rai or 79.2% of total damaged area, field crops (taro, sweet potato) 85 rai, orchard and others (lemongrass, pandanus, yard long been, eggplant, Chinese bitter gourd, zucchini, bird chili and sweet corn) is 1,107 rai.

Agricultural Damage by 2011 Flood in Khlong Ha

Village	Rice (rai)	field crop (rai)	Orchard and others (rai)	Total (rai)
1	20	-	138	158
2	73	-	73	146
3	264	-	13	277
4	138	-	18	156
5	112	-	23	135
6	92	-	21	113
7	418	-	48	466
8	142	-	51	193
9	88	-	34	122
10	296	-	12	308
11	323	-	94	417
12	255	-	90	345
13	716	-	72	788
14	479	-	7	486
15	562	-	41	603
16	562	85	375	1,022
Total	4,540	85	1,107	5,732

Source : Department of Agriculture

Total damaged houses are 4,417 households or 89.0% of total household (4,962 household).

House Damaged by 2011 Flood in Khlong Ha

Damaged houses	Number of households
Damaged houses	4,417
Lightening gear	1,877
Kitchen ware	3,667

People on T. Khlong Ha took various actions to prevent/mitigate impacts of the flooding during and after the inundation. During the inundation, Tambon Administrative Organization (TAO), in collaboration with village health volunteers, set-up medical unit at evacuation points. Local wisdoms were utilized during the flood for fish catching as well as preservation of foods. Civil Defense Volunteers were involved in various activities for the villagers, including patrol in and around the Tambon in the night time. After the inundation, a Cleaning Day was set-up to clean the community with the initiative of TAO. Farmers also responded with the use of chemical insecticide

as well as herbicide to control when the problem of brown plant hopper occurred after the flooding.

(8) Naraphirom, Bang Len District, Nakhon Pathom Province

Water level in all canals in T. Naraphirom usually gets high at the end of September until the end of November. The affected area from the flood covers houses and agricultural fields located near the canals. The height of water is around 1-2 meters from the paddy field. During the flood, vehicles are moved to safe parking area and dike roads are used as evacuating places for some households.

In the beginning of October 2011, water level in the canal started to get higher. Accordingly, people along the canals built up the sandbag embankment. However, water overflowed gradually to inundate whole area of the Tambon by the end of October. All roads in the area 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 lasted until the end of January 2012.



Direction of water

Table 6.3.18 shows agricultural damage which were damaged by 2011 flood in Nakhon Pathom. 609 farmers have been affected and damaged houses were 1,215.

Total damaged farmland area is 9,427 rai (1,508 ha) or 50.5% of total area (18,668 Rai) , categorized as follows; rice farming area is 7,445 rai or 79.0% of total damaged area, field crops (potato, taro and sugar cane) 11.25 rai, orchard and others (chili, kale, Cantonese, zucchini, galangal, lemongrass, yard long bean, mango, dragon fruit, longan, guava and coconut etc) is 1,971 rai.

Agricultural Damage by Flood in Naraphirom

Village	Rice (rai)	field crop (rai)	Orchard and others (rai)	Total (rai)
1	636	-	217	853
2	489	4	532	1,025
3	506	-	262	768
4	444	-	106	550
5	196	-	80	276
6	679	2	285	965
7	651	5	9	665
8	726	-	41	767
9	1,061	-	74	1,135
10	714	-	264	978
11	1,344	-	103	1,447
Tota1	7,445	11	1,971	9,427

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

The water level in Tha Chin River was constantly checked and reported each day before the inauguration. Defensive measure, such as set-up of embankment with sandbags, move of properties to higher places, and securing public utilities, were taken with the initiatives of Tambon Administrative Organizations (TAO). During the inundation, a coordination center was established at each administrative village as hubs of information and coordination for necessary assistance. TAO



took the key role to provide the basic services through procurement of necessary material, such as drinking water and floating toilets. Medical services were provided during the inundation by the teams of village health volunteers.

Learning from Good Practice

By reviewing 45 good practices, following points were learned and proposed as direction and guideline of pilot projects to be implemented in addition to distinctive techniques applied to model areas.

1) Change cropping pattern and varieties of paddy to avoid flood damage

Largest number of cases are practice regarding paddy cultivation and its change of pattern and varieties across regions. Some cases in flood prone communities in the North, farmers try to harvest earlier than July, when the flood come in 2011, by change to short duration variety of 90-95 days.

Traditional varieties which are tolerant to inundation or short-lived were re-discovered in the Northeast. By combination of different varieties, farmer can reduce risk of flood and drought damage.

2) Risk Reduction by Diversification of Livelihood

Integrated agriculture, flood tolerant crops and combination of fish culture or natural fish capture are less risky to sustain livelihood than single income source from mono-crop.

3) Social Capital

Community groups for different activities, such as saving group, farmer group, women's group, religious group can coordinate with group members and local authorities for receiving assistance from outside or self-help among community people. Distinctive cases can be found in CODI supported communities, in which community groups are organized into community council. Trust and ties in normal period may affect effectiveness in emergency case.

4) Enabling Environment and Supporters

Connection with outside organization such as universities and NGOs can increase access to resources and supports during emergency. Cases on temporary dike construction were possible when Tambon and Province support financially in addition to contribution from villagers.

5) Disaster-Resilient Community, learning and local knowledge

In flood prone areas, communities accumulate knowledge based on own experience of flood. Such a learning from past is most valuable instructor for preparedness toward future hazards. School curriculum on flood may be one way to deliver such local knowledge to the next and future generation, since the 2011 flood like big flood might occur once in 20 to 50 years.

6) Living with flood, Change Crisis into Opportunity

Many good practices see flood as resources or opportunity rather than threat. More varieties and number of fish (or even snake) can be caught and sold in market to earn cash income during flood period and for household consumption. Some area enjoy flood by organizing boat race and invite tourist during flood season.

Good Practices Profile N-5

Good Practices on : Local curriculum for flood fighting	
Name of Contact Person:	1. Mr. Renu Changthong , principal of the Bangrakham school 2. Mr. Somchai Doungsuwan ; teacher of 8th grade of Bangrakham school 3. Miss Patchara Gunsook , science teacher of 8th grade of Bangrakham school
Positioning in Group/network:	Bangrakham School
Address :	Bangrakham Scool , Bangrakham Sub-district , Bangrakham District , Phitsanulok Province
Telephone: 081-962-2379 , 055-297-236 (Mr. Renu)	E-mail: -
Name of group/network/other:	-
No. of member/ persons involved:	37 teachers , 675 students
Areas covered:	Bangrakham District

Summary on past problems with flood and initiation of problem solving practice

▪ Past and present situations with flood

Bangrakham School is one of the 5 schools of Bangrakham sub district located at Mu 14 of Bangrakham sub district. It consists of 37 teachers and 675 students teaching from pre-school level to the 8th grade level. All schools in Bangrakham sub district including Bangrakham School are usually flooded in the rainy season because the location of this school is lower than the main road level of the district. The level of flood is usually 1-1.5 meter high. In 2006 and 2011 flood crisis, the level of water was more than 2 meters. Every building of this school was totally flooded.

▪ Initiation of problem solving practice

Before 2008, all schools in Bangrakham sub district were automatically closed in the flood period affected learning result of the students who could not go to school. Moreover, every year there were students died in the period of flood because there was nobody to take care of them when they were at home. For example, there were 4 students died in the big flood in the year 2006.

Distinct techniques of this case

1. The vision of the school principal: never closed school in the period of flood. The principal of this school solved those problems above by coordinating many units such as military and private sector and asked for supplies such as boats, vehicles and man power to take students from home to school in flood period. Since 2008, this school has never been closed in the flood period. There has been no student died since then either and the students' learning was not also affected by flood. Moreover, by managing budget receiving for school lunch, students would have both breakfast and lunch when they come to school during flood period. This activity would reduce parents' burden in both cooking food and taking care of their children during flood period.
2. This school offers swimming lesson for students who could not swim.

3. Since 2008, the school has many additional activities relating to flood such as teaching how to live with water both for parents and students in the flood period such as fish processing and fish saucing. However, there was still no activity relating how to guard for flood and how to protect themselves in the flood period.
4. In 2010, the principal of the school started the research relating to flood in Bangrakham district with Dr. Uraiwai vianranakul from the Rajapat Phiboonsongkhram. The main purpose of this research was to get knowledge of flood in this district and created local curriculum based on those knowledge. This curriculum is called “Being on guard against flood” and it is still a lesson teaching in this school nowadays.
5. The main combination of this curriculum are :
 - 1) Sources of flood in Bangrakham area and its effects.
 - 2) Knowledge of the relation between quantity of rainfall, the velocity of the flow of water and the forecasting methodology of the effects of flood on Bangrakham.
 - 3) Warning system and guideline of guarding for flood.
 - 4) Preparation for dealing with flood and living with flood
 - 5) Encouraging participation of every units in draining water out of the area
6. Learning process of this curriculum are both in class and outdoor by letting students search for knowledge and learn from the ones who got direct experience from flood.
7. Another interesting activity is the invention of safe-guard jacket from plastic cloth and bottle in which student could make it by themselves.
8. This school is one of the main sources of supplying fresh water in the period of flood because school has its own fresh water manufacture.

Benefits gained

Activities and flood fighting curriculum of this school brought many gains

1. The result of study of students was not affected by flood.
2. The quality of lives of both students and parents were not too much affected by flood.
3. With the clear understanding of flood nature , the attitude about flood effects would be improved, especially for the young generation

Negative impacts (direct, indirect)

None

Conditions for replication

Knowledge relating to flood should be local curriculum of every school in the flood area. However, each school should have its own knowledge such as learning the nature of flood of its own area, not the lesson of the best practice. The learning process is the key factor of this curriculum.

Good Practices Profile N-8

Good Practices on : disaster fund , bank of vegetable seeds and plants , network of seeds and plants	
Name of Contact Person:	Mr. Sakorn Songma
Positioning in Group/network:	Coordinator of the center for encouraging community to rehabilitate environment.
Address :	Office of civil coordination : Nan and Kwa Noy Rivers ; Chom Thong Sub district , Muang District , Phitsanulok Province
Telephone: 081-675-1835 (Mr. Sakorn)	E-mail: -
Name of group/network/other:	the center for encouraging community to rehabilitate environment
No. of member/ persons involved:	70 households of 2 villages of Chom Thong sub district
Areas covered:	2 villages of Chom Thong Sub district are directly covered : Mu 7 and Mu 9 , people of Ma Thoom Sub district are indirectly covered as network of seeds and plants

Summary on past problems with flood and initiation of problem solving practice

▪ Past and present situations with flood

The area of Chom Thong sub district is located between 2 rivers; Nan River and Kwa Noy River. The flood is then unavoidable. Even though there are 2 irrigation dams, Sirikitt and Kwa Noy dams, the flood is still the problem because the location of this sub district and the quantity of rainfall since 2006 has been increased. Draining of water from these 2 dams was then increased. Flood started in August and remained in the area for a few months.

▪ Initiation of problem solving practice

Chom thong sub district is the area of the remaining traditional integrated orchard of Phitsanulok province. The degree of biodiversity is high. It is then the area of interest of NGOs who are interested in conservation of plants and animals genetics.

The center of encouraging community to rehabilitate environment is the NGO working in this area coordinating by Mr. Sakorn Songma since the financial crisis in 1998 under the Social Investment Fund (SIF) project. The area of working has been more clearly after the supports of CODI since 2006 and SGP/GEF/UNDP in 2010-2011. The important achievement outputs of this center relating to flood problem solving are preservation of seeds and plants and encouraging community to keep vegetable seed for their own food security.

Distinct techniques of this case

1. The center of encouraging community to rehabilitate environment has seed bank. They used these seeds to grow seedling and then distributed these seedling to community right after the flood to grow for their own consumption and for sell. It was the fastest way for making revenue after the flood ended.
2. Due to the flood in 2010, the community received a lot of external donation including money. With the coordination of the center of encouraging community to rehabilitate environment, community decided to keep the remaining money in term of the disaster fund. Every household would join this fund by putting money 10 baht per month into this fund. For the 2011 flood , community decided

to used this fund to buy more vegetable seed and banana seedling and sell them to villagers at a very low cost to restore their orchard.

3. They also created network of plant seeds with the community nearby: Ma Thoom sub district, Phrom piram district, by exchanging vegetable seed and plant to each other. This activity would create not only the network of seed and local traditional plant, but it would also create the security in term of food because it seemed like saving seeds and plants of Chom Thong sub district elsewhere. If flood occurs, it could be sure that their varieties of plants are still safe.
4. With the coordination of the geography department of Naresuan University, 3 D map model of flood risk was constructed. The center of encouraging community to rehabilitate environment used this 3 D map model of flood risk to explain villagers about the nature of flood of this area. This was the good starting point of finding the way of self adjustment to live with flood. For example, villagers learned about the kind of plant resisting to flood. They then kept those plants and planted more.
5. Growing vegetables on the bamboo raft before flood coming was another activity which a community leader, Mrs. Wanna Khammoon, tried to demonstrate to the community. The main objective of this activity was to have vegetables for consumption in the period of flood instead of waiting for only survival bag from the outsider.

Benefits gained

1. Giving seedling instead of giving seed to community was the key strategy of encouraging villagers to carry on their live. It created not only spirit, but also harmony to the community as a whole. A lot of villagers participated in this activity.
2. Villagers helped villagers activity increased degree of self reliance and food security for the community.
3. Seed and plant bank help preserved biodiversity and environment

Negative impacts (direct, indirect)

None

Conditions for replication

1. The success of self adjustment to flood of Chom Thong sub district depended mainly on the working of the center of encouraging community to rehabilitate environment as facilitator mobilizing community and the participation of the community. Mobilizing community needs continuously support not come and go development project and facilitator is one of the key factors.
2. Restoring community right after the flood ended is necessary. Waiting for the distribution of seed for the governmental agency takes time. Keeping seed for their own benefit should be encouraging.
3. Networking is necessary in terms of self reliance from helping each other activity.

Good Practice Profile N-10

Good Practice on: Local Authority's Network in Contribution to Control Water Level	
Name of Contact Person:	-
Positioning in Group/network:	Head of Yanyao Village, Rangnok Sub-District, Sam Ngam District, Phichit Province
Address :	Moo 12 Yanyao Village, Rangnok Sub-District Administrative Organization, Sam Ngam District, Phichit Province.
Telephone:	-
Name of group/network/other:	Group of Communities' leader of Rang and Group water management (no network's name)
No. of member/ persons involved:	The whole village, about 175 households
Areas covered:	Yanyao Village and some areas of Rangnok Sub-district

Summary on past problem with flood and initiation of problem solving practice

This case shows a good practice on villagers' contribution of controlling the water level in agricultural lands. By this practice, they can save rice yield approximately 50 – 70 per cent, according to interviewed informants. In the case of Banmaisaengmorakot, water from up-north area with a strong current reached to this area so fast. To protect the rice which had not yet been harvested, the villagers had to slow down the water flow and control water level. Network of the leaders of the Rangnok sub-district under the cooperation of sub-district administrative organization, consisting of the village heads, and PM, Mayor as well as the administrative teams of sub-district administrative organization, play a crucial role for this. They mobilize pumps from the villagers, group of water management, and government sectors. They also asked for the cooperation from group of water use to not release water from up-north before Moo 3, 7, 11 and 12 harvesting. There were around 60 pumps contributed to release water. In addition, many villagers helped solving drainage pipes clogged. And eventually, they could control the level of water. They succeeded in protecting some agricultural areas. So, the villagers could save some rice yield mentioned above.

Besides, as the cases of Sukhothai and Phichit, to cope with flooding problem they first followed up flood news of up-north areas. Second, this year they changed the rice varieties from the long-lived seeds to the shorter ones. Third, some farmer tried to grow rice from stubble (*Pruc Kao Lom Tor Sang* – ปลูกข้าวล้มตอซัง) which can reduce the cultivate time about one month. It helps reducing cultivating cost too. Forth, they also tried to make a ridge higher to slow down water flow into their field.

Fifth, villagers also take flooding opportunity to do fishery. According to the village head, fishery generated villagers' income in average 10,000 baths per month. However, once level of water was so high, they could not catch fish since fish scatters around the flooded field. They also made a fermented fish for their own consumption and sell it. After flood, the villagers start cultivating wet rice. They did not apply fertilizer to their paddy field because the flood brought

the natural nutrient to the soil. The villagers told me that they get rice yield over 800 kg per rai which is higher than or equivalent to the yield with the intensive use of fertilizer.

Distinct technique of this case

1. Networking of protecting agricultural land by controlling the level of water before harvesting
2. Use of flooding period to do other jobs pertaining to flood like fishery
3. Making ridges and dikes to slow down water flow so as to harvest rice in time
4. Changing the rice varieties, from the long-live varieties to the short-lives ones
5. Changing the way of cultivating wet rice from sowing rice to growing from stubble

(*Pruc Kao Lom Tor Sang* – ปลูกข้าวล้มตอซัง)

Benefits gained

1. Rice yield around 50 – 70 per cent were protected
2. During the flood, the villagers could generate incomes from fishery around 10,000 baths per month.
3. Alternative way of cultivating wet rice was found to reduce both time and cost
4. Flood also made paddy field more fertile which helped reducing the fertilizer cost.

Negative impact (direct, indirect)

1. To grow short-lived rice, the farmers will gain yield less than that of the long-lived ones which means they will get less an amount of money once they sell their rice.
2. To make the ridge higher causes the higher cost of cultivating wet rice.
- 3.

Conditions of replication

1. Living with flood for a long time; that is enough for livelihood adaptation
2. Some leaders have enough political power. And the leaders have been working together publically for a long time.

Good Practice Profile N-10

Good Practice on: Local Authority's Network in Contribution to Control Water Level	
Name of Contact Person:	-
Positioning in Group/network:	Head of Yanyao Village, Rangnok Sub-District, Sam Ngam District, Phichit Province
Address :	Moo 12 Yanyao Village, Rangnok Sub-District Administrative Organization, Sam Ngam District, Phichit Province.
Telephone:	-
Name of group/network/other:	Group of Communities' leader of Rang and Group water management (no network's name)
No. of member/ persons involved:	The whole village, about 175 households
Areas covered:	Yanyao Village and some areas of Rangnok Sub-district

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the natural nutrient to the soil. The villagers told me that they get rice yield over 800 kg per rai which is higher than or equivalent to the yield with the intensive use of fertilizer.

Distinct technique of this case

1. Networking of protecting agricultural land by controlling the level of water before harvesting
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5. Changing the way of cultivating wet rice from sowing rice to growing from stubble

(*Pruc Kao Lom Tor Sang* – ปลูกข้าวล้มตอซัง)

Benefits gained

1. Rice yield around 50 – 70 per cent were protected
2. During the flood, the villagers could generate incomes from fishery around 10,000 baths per month.
3. Alternative way of cultivating wet rice was found to reduce both time and cost
4. Flood also made paddy field more fertile which helped reducing the fertilizer cost.

Negative impact (direct, indirect)

1. To grow short-lived rice, the farmers will gain yield less than that of the long-lived ones which means they will get less an amount of money once they sell their rice.
2. To make the ridge higher causes the higher cost of cultivating wet rice.

Conditions of replication

1. Living with flood for a long time; that is enough for livelihood adaptation
2. Some leaders have enough political power. And the leaders have been working together publically for a long time.

Good Practices Profile N-18

Good Practices on : Preparation to deal with flood , Adjustment of lifestyle to live in the flood period	
Name of Contact Person:	1. Mr. Pramuan Visavapreechanon , Head of Mu. 3 Baan Khongkharam 2. Mr. Somporn Laingam , Head of Mu.4 Baan Bangsavern
Positioning in Group/network:	-
Address :	Mu. 3 Baan Khongkharam, Pho Nangdamtok Sub district, Supphaya District , Chainat Province.
Telephone: 089-817-7583 (Mr. Pramuan), 084-491-8447 (Mr. Somporn)	E-mail: -
Name of group/network/other:	Mu. 3 Baan Khongkharam , Pho Nangdamtok Sub district
No. of member/ persons involved:	325 households of Mu.3 Baan Khongkharam
Areas covered:	Mu.3 Baan Khongkharam

Summary on past problems with flood and initiation of problem solving practice

▪ Past and present situations with flood

Mu.3 Baan Khongkharam, Pho Nangdamtok Sub district is located on the right bank of Chao Phraya River consisting of 325 households. The total areas are flooded, normally 2 months in August and September every year but it was 4 month long in the year 2011. The level of water is normally 2 meter high but it was 4 meter high last year. The area of this sub district is plain low land with a few canals such as Bang Sauay canal and Bang Savvern canal flow through. Flood flows from Muang district of Chainat and overflow into this village. Nevertheless, flood is said to be a normal situation of this sub district. There are a few natural swamps and many private ponds in this sub district which help keep some water in the flood time. There is also an irrigating water gate for draining water from those swamps into Chao Phraya River in the flood time.

▪ Initiation of problem solving practice

Rice plantation is the main occupation of people in this village. With the characteristic of the area and the location of the area, flood is unavoidable situation or it could be said that flood is a part of their lifestyle. People of this area need to adjust their lifestyle to live with water in the flood period. Moreover, this area used to receive restoring after disaster project from the Community Organization Development Institute (CODI) since 2006 because there are many volunteer groups in this village and this is the starting point of central kitchen for villagers received effect from flood.

Distinct techniques of this case

Activities during flood period

1. Villagers would prepare themselves by reserving milled rice and dry food including water and move their families to the high area such as roadside. They also construct temporarily nonpermanent house to stay along the roadside in the flood time.
2. Housewife group would volunteer themselves to cook fresh food for villagers who could not cook for themselves. Provincial Administrative Organization provided raw material for cooking. However, each house needed to cook rice for their own consumption.

3. Children center was set up in the period of flood by the coordination between school and head of village with many volunteer to not only take care of children during flood period , but also to teach them how to take care their health during this time.
4. Head of village would collect household data of senior citizen and villagers who have personal disease such as diabetes and heart disease to prepare an appropriate treatment during flood period.

Lifestyle Adjustment Activities

5. Changing the period of rice plantation and the variety of rice. Rice production in this area is normally twice a year. The first crop is needed to be harvested before August, then production would start at least not later than April. The second crop starts after the flood ended in November. It was found that demand for short term rice variety for the first crop is significantly increasing due to the uncertainty of raining season.
6. Fishing in the flood period approximately 10% of villagers of this village do fishing for additional revenue in the flood time. Moreover, approximately 10% of farmers have their own ponds in their rice field to keep water for their own utilization and to get additional revenue from catching fishes after ended. They could also catch fish from many natural swamps in this village after flood ended. But for Mu.4, the village nearby, fishing and fish processing especially fermented fish are the main careers of 70% of villagers.
7. High basement house. Most of the houses in this village are high basement houses and every house has their own boats. Because of the last year flood, approximately 50 houses were lifted high to avoid flood in the future. Also, school was repaired from last year flood by using ceramic wall to be more easily cleaned after flood.

Benefits gained

1. The quality of lives of Mu.3 villagers were not too much affected by flood by all activities above.
2. Working of volunteers such as cooking fresh food in flood time showed many things. It showed that
 - I. there still is community unity
 - II. Local administrative would be an efficient and effective organization in helping people in the emergency situation such as flood.

Negative impacts (direct, indirect)

Head of the villages said that survival bag creates many problems such as more of irresponsibility of villagers in taking care of themselves in flood time.

Conditions for replication

1. Local administrative organization or head of villager should be the center in cooking and supplying meals to villagers, not the district or provincial unit. Provincial Administrative Organization should be the unit of supplying raw material of fresh food and milled rice.

2. Collecting data of patients with personal disease is a very necessary activity that every local administrator should do before flood period every year to prepare for an appropriate assistance.
3. More of private ponds distributing all over the rice field could alleviate flood problem.
4. More of private ponds distributing all over the rice field could alleviate flood problem.

Good Practice Profile C-2

Good practice on solving flooding issues based on faith, knowledge and coordination	
Name of Contact Person:	Ajam Firesal Boonrod
Positioning in Group/network:	the Director of Sri Ayutthaya Islamic School
Address :	Klong Ta-Kien Subdistrict, Muang District, Pra-Nakorn Sri Ayutthaya Province
Telephone: (66) 81-852-5005	E-mail: -
Name of group/network/other:	Klong Ta-Kien Subdistrict Organization Council
No. of member/ persons involved:	814 households and 4,238,400 square meters of farmland
Areas covered:	Klong Ta-Kien Subdistrict

Summary on past problems with flood and initiation of problem solving practice

Klong Ta-Kien Community is an Islamic community. Employees and merchants are the main occupation of the residents and only few of them are farmers. Klong Ta-Kien is flooded every year because it is a drainage area. So, it is not a problem for residents to live with water. Year 1995, 2006, and 2011 are the year that the community suffered from flooding with dramatically high level of water especially in 2011. The water came faster and the flood level is 3-4 meters height and last for 4-5 months. For these reasons, people trapped in floods longer and were suffered than other years. Some agricultural areas have not been harvested before flooding. Animals were also affected due to wide flooded areas and difficult to find grass or food to feed them. Vegetables grown in houses were all flooded. Therefore, everyone was affected not only one in the agricultural sector. They could not live their lives and go to work as usual. They could not do anything much during flood time and needed help from external agencies.

Distinct techniques of this case

The problems discussed above made people in the community grouped together to solve all these issues. They also collaborated with are mosques, teachers, imams, temples, all residents and government agencies in order to solve flooding problems together. Therefore, Klong Ta-Kein community can live with water happily and handle it well.

The role of the community during the flood

1. Self-reliance and knowing how to survive - The Community was aware that they can live with water during flood time if they know how to survive by themselves before asking for help from outside agencies because they never knew that when the outside agencies came to the community. So, the best way to deal with flooding was self-reliance.
2. Find the cause and how to handle

- Setting up a meeting with all sectors including government agents, the Sub-district (Tambon) Administrative Organization (TAO), community, and the supporting agents to make a plan together.
 - Searching for and evaluating the potential and capabilities of the community and deploy the available resources at their maximum strength.
 - Analyzing and assessing the water situation all the time.
 - Preparing for volunteer team and give each person a role and responsibility.
 - Establishing a coordination center to coordinate the various aspects, solve emergent problem and get help from the outside.
3. Collaboration – Klong Ta-Kien Community had lots of network because the religion was a force that draws support from various sectors especially the alumni of the Sri Ayutthaya Islamic School and people who respect in mosque.
 4. The management of 5 collaboration - teachers in the community, religion leaders, temples, residents, and government agencies grouped together as a working team for solving the flooding problem. The appropriate role of each participant was given according the agreement from the meeting.
 5. 7-tiger team – the team consisted of 7 people who were village headman, assistant of the headman, and TAO members. The team acted as a community representative to cooperate with government and private sectors and the residents to create a common understanding and caring for the whole community in every aspect including health, agriculture, and livelihood.
 6. Caring for the agricultural part – the useful information and water situation were regularly provided to the farmers both form the community working team, village committee, the community organization council, and government agencies. The mosques provided an area for temporary animal husbandry. Some farmers traded their animals before flooding.

Benefits gained

1. The residents of Klong Ta-Kien have time to prepare and store their valuable assets in a timely before the flood because of the information that they received from the meeting and external agencies.
2. Farmers can harvest in time before the flood by selecting seeds that suitable for community's climate and geography, so they can calculate the exact date to cultivate.
3. The community has a temporary area for livestock (cattle) during the flood.
4. People in the community have sufficient consumer goods to live during the flood.
5. The temporary shelter center provided the residents some food, medicine, public health, shelter, and communication.
6. Love and unity were built within the community. People in the community are aware that all of them are the owners of the community.
7. The collaboration of all sectors including the mosques, schools, temples, community and other agencies was formed, especially a group of Sri Ayutthaya Islamic School alumni and people who believe in mosques who gave help to the community.

Negative impacts (direct/indirect)

1. Public policies were not consistent with the community. This meant that the community did not benefit as much as they should.
2. Flooded for a long time forced the villagers, who are the farmers, to change their job
3. The infrastructure was damaged, especially the main street of the community.

Condition for replication

1. Disaster victims should cooperate with various networks for managing, planning, solving problems and surveillance both provincial, city, and community level.
2. Organizing disaster victim fund which is managed together by the community leaders and public sector network with local support.
3. Encouraging people for learning and gaining experience which lead to a well-manage team and help center both before and after the disaster (Help Center System / Surveillance / House Repair).

Good Practice Profile C-10

Good practice on Water Resources Management	
Name of Contact Person:	Khun La-Eiot Thepnarong
Positioning in Group/network:	The president of the Association of Water Users in Tumbol Ta-Kha
Address :	The electrical pumping station Ta-Kha Sub district, Bang Plama District in the Southern part of Suphanburi Province
Telephone: (66) 35 587 520	E-mail: -
Name of group/network/other:	The Association of Water Users in Ta-Kha Sub district
No. of member/ persons involved:	139 Households/ 12 Committees/ 4,000 Rai located in Ta-Kha Sub district
Areas covered:	Ta-Kha Sub district

Summary on past problems with flood and initiation of problem solving practice

According to the problems of repetitious annual flood, it could not only cause tremendous damage to homes for 3 - 4 months, but also particularly damage farmlands affecting to agricultural productivity. People grow the crop one time per year due to the unfavorable weather. Therefore, the Association of water users in Ta-Kha Sub district was set up in 1993 by Ministry of Science Technology and Environment and then transferred to Royal Irrigation Department. In 2003 Ta-Kha District Administrative Organization took over the Association of water users after Royal Irrigation Department. There were a president and committee to have the water resources management plan for the Association of water users in Ta-Kha efficiently. There was the new organization such as President and committees that was able to make decisions to water resources management especially the sluice of Watergate of Ta-Kha Sub district.

Distinct techniques of this case

1. Fund system: Fund management consists of membership fee, common fee and fund support, and they handle with it systematically.
2. Rules: The rules were set up spontaneously by community including social rules, respect and harmony which mean folks take care of themselves practically.
3. Meeting: There is a monthly meeting and the annual big meeting and even an emergency meeting if needed.

4. Public Relations (PR): They realized that the importance of public relation including announcement, public relations, and area study for other communities.
5. Flood Patrol: There is a team of community to take care of the problems of flood.
6. Network Connection Setting: To build up the cooperation with both the internal organizations and the external organizations in order to coordinate and get helped.
7. Public Utility System: To build the public utility system and flood prevention way such as embankments, piping system, road building, canal dredging and pesticide spraying along canals
8. The Sluice of Watergate: The Sluice of Watergate system is the most useful for the community.
9. The importance of information: gain all the information from Royal Irrigation Department in order to coordinate.
10. Equality: They take care of all members of the Association of Water Users equally for the best profit.

Benefits gained

1. Members of The Association of Water Users could grow the crops two times per year instead of one time per year.
2. Agricultural productivity is able to be harvested in time before the flood.
3. Farmland could be grown in advance while nearby areas couldn't be planted due to the drain system.
4. The price of crops tends to increase because of good quality seeds and the period of plant without the flood problems.
5. To have enough water for agriculture in Ta-Kha Sub district due to the water resource management.
6. To be a study area for the water resource management for agriculture for nearby communities.
7. To reduce conflicts in community including the Water Resource Management and the Sluice of Watergate system.
8. To sustain the agricultural community

Negative impacts (direct/indirect)

Direct

1. The environment of Ta-Kha Sub district was changed due to embankments and canal dredging to make balanced embankment level.
2. The money from fishery in the short period of flood is less than before because of the Water Resource Management.

Indirect

1. There is a conflict between community and Government because Government tries to use their authority to force the Association of Water Users let the flood come to farmlands.

2. There is a conflict between community and nearby communities because of the Water Resource Management in Ta-Kha Sub district affecting the Sluice of nearby areas.

Condition for replication

1. Communities suffering the flood should have Fund Community Foundation Management to tackle the disaster including villages, districts, and provinces.
2. All local residents should participate in the Water Resource Management fairly causing the efficient profit.
3. They should have a flood prevention plan for small communities or districts to cover the data system of communities including people, domestic animals, agriculture and etc.
4. Coordination center by community works typically with Local Administration, many parts in communities and Local Disaster Warning Center.
5. Local residents take care of each other basically to prepare themselves for living with the flood.

Good Practices Profile of C-13

Good Practices on Water Resource Management for Agriculture	
Name of Contact Person:	Mrs. Siriporn Khuanchum
Positioning in Group/network:	Mayor of Pokpaek Chairman of Pasak Development Agricultural Group, Chairman of Khok sa-ad Community Water Resource Management Committee
Address :	78 Moo 2, Nongno sub-district, Muang Sarabuti district, Saraburi
Telephone: 08-1852-5578	E-mail: kingpasak9@gmail.com
Name of group/network/other:	Khok sa-ad Community Water Resource Management Committee
No. of member/ persons involved:	-
Areas covered:	-

Summary on past problems with flood and initiation of problem solving practice

1. Water shortages and flooding for more than 50 years
2. Insufficient water for agricultural (rice farming) in dry season, and flood over agricultural area in rainy season. Community need to wait for government support.
3. Cannot irrigate water from local canal (Huayba canal)

Distinct techniques of this case

1. Use of satellite images and Digital Elevation Model (DEM) to identify and analyze community's position to improve canal's irrigation system and connect the system with other structures in the community
2. Dredge-up 900 meters length of existing canal (Huayba canal) in Moo 6, Khok sa-ad sub-district, Nongsaeng district, Saraburi province, and connect with irrigation system to have

more water for agriculture, and expand the success to opposite side of irrigation canal in Ayudhdhaya province

3. Joint survey within community and cooperate with irrigation agency for water gate management

Benefits gained

1. Allocate water resource to 1,500 rai of agricultural area
2. In the past, there was flood for 40 – 50 days in community every year. After this project, community can prevent flood in 1,000 rai of agricultural area, 5,555,000 Baht
3. Siphon water to Ayudhdhaya province

Negative impacts (direct, indirect)..

1. Adapt production plan to appropriate water level
2. Change production style to integrated agriculture

Conditions for replication

1. Develop existing canal to be useful
2. Link water structure within the area
3. Appropriate water gate management
4. Community harmony

Good Practice Profile NE-4

Good practices on : Water management at community level for off-season rice growing in wet land area, Ban Yang Ngoi	
Name of Contact Person:	1. Mr. Bancha Rasaenprom 162 Moo 10, Ban Yang Ngoi, Si Songkhram sub district, Si Songkhram District, Nakhon Phanom. Village leader, 2. Mrs. Darunee Singkaeg 151 Moo 10, Ban Yang Ngoi, Si Songkhramsub district, Srisongkram District, Nakhon Phanom. Village leader assistant, 3. Mrs. Nikom Bupasiri 22 Moo 3, Ban Yang Ngoi, Si Songkhramsub-district, Si SongkhramDistrict, Nakhon Phanom Village leader
Positioning in Group/network:	Village leader
Address :	Ban Yang Ngoi Moo 3 and Moo 10, Si SongkhramSub district, Si SongkhramDistrict, Nakhon Phanom
Telephone: 085-4550288, 081-0596804, 085-4578393	E-mail: -
Name of group/network/other:	Off-season rice growing farmers
No. of member/ persons involved:	30 people, off-season rice growing 300 rai.
Areas covered:	Ban Yang Ngoi Moo 3 and Moo 10, Si Songkhram Sub district, Si Songkhram District, Nakhon Phanom

Summary on past problems with flood and initiation of problem solving practice:

Ban Yang Ngoi grows seasonal rice on upland (20%) and Natam (wet land) (80%). There's always flood in Natam area every year, the flood lasts about 2-3 months during August – October. The flood is caused by Subsidiary River which flows from Pupan Mountain to Songkhram River and overflow from Mekong River. The water then spread to Songkhram River and its subsidiaries, which then also covers low land area or the area next to the river. The flood lasts for long time which destroys around 80% of the agricultural produces. Farmers can harvest rice about 20% which grown in upper area. Farmers have about 2-3 rai / household for upland rice. This means that there is not enough rice for consumption and also leads to other problems caused by flood. The farmers then have higher risk in seasonal rice growing and affect the living of farmers in the area.

In the past 5 years, farmers that possess land in Natam area and are not too far from water source started to grow off-season rice to avoid the risk from the flood during seasonal rice growing and also because there is insufficient rice for consumption. By pumping water from the water source which are spread throughout the village area, excavate irrigation canals, farmers in Natam area can grow off-season rice at around 5-10 rai / household. Total Natam area in this community is around 300 rai and there are about 30 households growing rice here.

However, farmers do not have title to land in Natam area. The ownership is transferred from generations before. Group formation of the farmers in off-season rice growing area to manage water usage and to set up rules in order for equality in water usage was done spontaneously; there is no solid management structure yet.

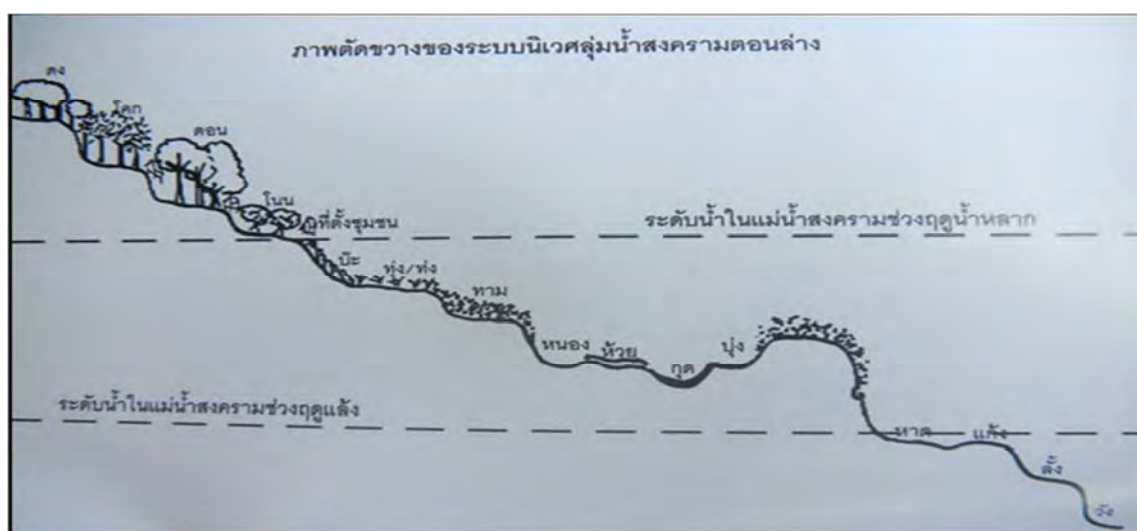


Fig1: Cross section picture of ecological system in Songkhram river in the low area

Meetings are held to set up agreements, labors and fund are exchanged to support canal excavation after flood. They also receive support from government agencies. As a result, farmers in the area afford to grow off-season rice during summer to avoid the risk of growing rice in the seasonal time and be affected by flood and have insufficient rice for consumption.

The cross section picture depicts the area of Songkhram River in the low area showing the height

difference of water during the flood season which is as high as the village settlement area. As for the bush area and wetland forest, the flood remains for long time as a result of the multiple effect from main river and subsidiaries. The water level in Songkhram during summer season is so low that bottom can be seen and is too low that the water cannot be pumped up for usage due to the high cost to pump water to higher level. Farmers gather and collect water in Tam area and distribute to off-season rice growing fields which can ease the flood effect during seasonal rice growing.



Fig 2: Upland rice field



Fig 3: Wetland rice field

Distinct techniques of this case:

In order to really see the effect of water management during summer, many factors are essential to achieve effective management. This then leads to development and expansion. In case of Ban Yang Ngoi, S Songkhram Sub district, Si Songkhram District, Nakhon Phanom, the water management or change in practices during off-season rice growing are as follows;

1. Every year after the water decreases, farmers in Natam area (only the area with irrigation system) would gather together and support each other in money and labor wise, to help excavate the canals to improve the water flow.
2. Collective water management. There are various spots of such water spread around the area and can be used for cultivation purposes throughout the year. Water distribution management has been set up for uses during summer to make sure that there's enough water. Water from larger source are also being transferred as well, via underground piping system in order that farmers can divert water into agricultural plots.
3. Cooperation between responsible agencies such as TAO, PAO and district office to support maintenance, excavation/dredging and expansion of all 3 routes, total length of 1,500 m in order to maximize their capability. As well as support farmers financially, so they can buy gasoline to pump water from Nongjok reservoir to Makjiang reservoir then to canals and to fields.
4. Production planning to avoid insufficient rice for consumption.
 - Farmers grow off-season rice in the area for 5 years already. After flood in Natam area decreases, excavation was carried out to clean up and prepare the soil in November and off-season rice growing in December – March. The species of rice includes Patumthani, Chainat 407, and local specie such as Eelao. The rice are kept for consumption to sustain during the flood in the following year. But the rice produced from Chainat and Pathumthani specie are sold after keeping some to make sure that they have enough for consumption.

- Seed production to be used in farming. The seeds which are to be used for farming are kept. Seeds for off-season rice are grown during seasonal rice in upper land area; the seeds are thus kept for off-season farming. This is done in 2 cycles before buying seeds from government sector or other sources.
- Chemicals cannot be used to weed and pests control. The village has agreed not to use chemicals to kill weed or snails to prevent damages which could happen to crops in rice fields and Tam forest, also to prevent the effect upon the ecosystem. This keeps the ecosystem in Tam abundant and remains the source of food for the people in the community.



Fig 4: Water source



Fig 5: Water distribution



Fig 6: Water management model in Ban Yang Ngoi, Si Songkhram Sub- district, Si Songkhram district



Fig 7: Water distribution canal to plots and picture of flooded Wetland rice field during rainy season

Benefits gained: Water management in group or community level for self-sustaining or risk management purposes yields the following results;

1. Farmers in the area are able to grow off-season rice. Increase in the area for off-season farming, as well as increase in quantity due to sufficient water.
2. Farmers have rice for consumption from the off-season farming, which leads to more security and better quality of life.
3. Saves costs in farming because no chemicals are used and rice seeds can be kept for next season usage.
4. Farmers understand water management, as well as collaboration between community and various agencies in the area.

Negative impacts:

Water management creates stability in food source and income to farmers in Natam area, but the ecosystem in the area has also been affected. As a result of excavations and spreading of farmers into Boongtam area for off-seasonal farming, the ecosystem in waterway is affected (soil and plants removal).

Conditions for replication: For further replication, various conditions should be set;

1. The area should be suitable for water management for cultivation.
 - Location, size, level of the water source should be appropriate.
 - There should be alternative water source to ensure that there will be sufficient water during summer period and drought.
2. As a result of long time flood, the soil structure may change; this must be taken into account as well.
3. Participation and involvement of farmers and various agencies in financial and other aspects.
4. Farmers understand about production/farming planning, environmental factor (flooding), rice stocking for consumption, also seed storage for further usage. Conclusively, awareness and

ability of farmers to reasonably adjust them can prevent and minimize the problems from flood and can improve living standard.

Good Practice Profile NE-6

Good Practices on: Role of Villagers' Network for Kaeng Lawa Wetland Conservation and Rehabilitation	
Name of Contact Person:	Mr. Khongdet Khemnakh
Positioning in Group/network:	Vice president
Address :	73, Moo 7, Ban Chi Kok Kho, Muang Phai, Ban Phai District, Khon Kaen Province
Telephone: 087-8555928	E-mail: -
Name of group/network/other:	Villagers' Network for Kaeng Lawa Wetland Conservation and Rehabilitation
No. of member/ persons involved:	13 villages surrounding Kaeng Lawa
Areas covered:	13 villages surrounding Kaeng Lawa. These villages are in Muang Phai and Ban Phai sub-districts of Ban Phai district, and Khoak Samran sub-district of Ban Haet district, Khon Kaen Province

Summary on past problems with flood and initiation of problem-solving practice:

In 1986, the villagers started to suffer and become affected by the construction of Kaeng Lawa dam and a reservoir in Chi River. After the construction of Kaeng Lawa Dam by the Department of Irrigation, every alternate year, communities and agricultural areas are over-flooded with water. However, farmers can still harvest some yield because the flood remains for about 2-3 weeks before draining into Kaeng Lawa. In some years, flood remains for a long time; so conflict occurs with neighboring community i.e. Ban Chi Wang Woen because each party wants to take water out of its community as soon as possible. This situation of stagnant flood continued to occur every alternate year until 2005. The change as observed by villagers was that, during the last 6 years (2006-2011), every year, flood stagnation was prolonged to 3 months and violent. However, the year agreed by villagers as one that was most severe and caused greatest damage to life and property was 2001. In that year, the water flowed from field and Chi River to flood agricultural area and houses during September to November. Water had red muddy sediments. Its flow was so strong and swift, and under the bridge were wooden scraps and weeds that caused slow draining, that bridge that connected the village with outside world broke. The bumping force of the current and pushing force of dead weeds easily broke the bridge believed by villagers as constructed with low quality and low-standard materials. Every year, budget was wasted for its repair. Flood-current that flows along lanes in community was like waterfall. Villagers could not use boats for travelling around the area. The current was so turbulent that some villagers could not cling to the ropes tied together to serve as walking guide for crossing. In some villages with stagnant water, electricity was cut off to avoid danger from electrical shorts. For preparedness, the network has in place pre-flood, during flood and post-flood rehabilitation management plans. As well, the network has coordinated and, jointly with related organizations and network-villages, solved the continuing problems and the problems that occurred during the flood-crisis period.



Fig 1-2: Kaeng Lawa area and road surrounding the cataract (earthen dyke/dam)

Distinct techniques of this case

1. Analysis of community's problems and ways of solving the problems by community and network:
Regarding the problem of flooding that, for many years, has affected agricultural areas and houses, the affected villagers jointly identified its causes and solutions. Originally, it was prevention and solving of immediate problems, during the flooding period, in each household, and helping one another in community. Later on, it moved to cooperation at community level. Operation is as follows:
 - Key persons of villages met, discussed and identified causes of prolonged flooding surrounding the Kaeng Lawa. Their initial conclusion was that the dam constructed by the Department of Irrigation that surrounds Kaeng Lawa had obstructed the water flow. Even with water gates for water release, the flow of water was not effective, thus causing floods to agricultural area and residence.
 - To solve immediate problems, in September 2006, 400 villagers of Ban Lawa and Ban Chi Kok Kho got together and cut (by digging) the dam believed by them as cause of flooding to the area.
 - Coordination and cooperation with NGOs in the area was made to find solutions; collaboration occurred. NGOs jointly supported grouping of villagers so that they can rely on themselves in their solving of various problems and able to expand learning network to outsiders.
 - Building up of villager organizations: In 2007, after the assembly and fighting of villagers on dam, to magnify bargaining power for group's petition, local NGOs built up a process for villagers to get together, having Chi Kok Kho, Lawa, Pao, and Don Po Daeng as four core villages, with more than 400 members, to work together in the form of "Villagers' Network for Kaeng Lawa Wetland Conservation and Rehabilitation". The joint analysis within the network on the cause, with NGO development workers as advisors, further made villagers believe that the problem of flood had been caused by the construction of the dam, as outcome of government's development that had arranged for resource (water) of villagers surrounding the cataract to benefit the urban people (Ban Phai), leaving problem or impact to owners of the area i.e. villagers surrounding Kaeng Lawa. The villagers of the network got together and pressurized for solution to the problem. For example, they submitted a letter

to the Director of the Department of Irrigation for the latter to solve the problem by, for convenient flow of water, replacing the construction of “block convert” drain that caused slow flow of water and easy blockage, with construction of curved bridge. They as well submitted a petitioning letter to the National Commission on Human Rights, etc.

2. Development of roles of leaders of Villagers’ Network for Kaeng Lawa Wetland Conservation and Rehabilitation. Summary of local NGOs’ support for capability building of leaders of Villagers’ Network for Kaeng Lawa Wetland Conservation and Rehabilitation is as follows:

- Built up learning process for network leaders on community issues, leading to upgrading of bargaining with governmental organizations for practical outcome.
- Provided network members with knowledge on law, environment and livelihood promotion.
- Supported the expansion of network members to cover those, surrounding Kaeng Lawa, whose agricultural land is affected by flood.
- Organized volunteers unit to be on guard for Kaeng Lawa
- Jointly with the Network, submitted a letter on dyke cutting to the Governor of Khon Kaen province
- Jointly with the network, proposed problems to the Department of Irrigation to find ways for minimizing the flood problem such as proposing for intermittent construction of bridges on the dyke area
- Organized study trips for network members to areas that face similar problems such as Surat Thani, Prachuap Khirikhan, Rasisalai dam in Kalasin province
- Sent staff and leaders as representatives to observe the movement of governmental organizations at different places
- Supported in kind and budget for promotion of agricultural occupational group and fishery around Kaeng Lawa
- Built up bird watching tower and constructed natural study road for villagers to observe the change of eco-system as impact from flood
- Served as adviser for group or network in project proposal development

3. Outcomes of activities jointly implemented with the Network:

- Villagers learned and had updated information on development activities implemented by the governmental sector, got prepared and found ways for addressing them.
- Network committee members better understood their roles, adjusted their attitude on working for public interests, self-sacrificing.
- Villagers and network valued and participated in conservation of their wetland.
- Leading members are able to show their leading roles in extending the network to link with other areas facing similar problems.
- Leading members are self-confident and able to present and share knowledge and ideas with groups.
- Villagers, as network, are able to fight and claim for right to compensation from governmental organizations.

- Coordination and cooperation between networks, communities, governmental organizations

3.1 Network level

- Network committee meets every 2 months to report and monitor situations occurred in the cataract.

During flood:

- Network committee acquired for boats for transporting out community children and members and, to save cost, contacted military trucks for further land transportation.
- Organized for patrolling teams for cataract area to ensure safety of community members

After flood:

- Prepared project to be proposed for budget for construction of drains

3.2 Community level:

- For faster drainage, Lam Huai Chic was dredged twice, one in 2005 and the other one in 2009, with financial support from the Provincial Administration Organization.
- During pre-flood period, there were danger warning announcement, monitoring and mutual assistance
- Coordinated and requested funding organizations such as local NGOs for budget to support occupational groups. 10,000 baht was received and used for establishment of “Ban Pao Fishing Group”. The objective is for members to borrow to buy fishing tools. Every 3 months, borrowing members are to pay interests at the rate of 6 percent. Presently, the group has 25 members. The group has a clear administrative structure. Meeting takes place every 3 months. The fund of the group has increased to 30,000 baht.

3.3 Governmental organization (Sub-district Administration Organization)

Pre-flood:

- Big boats of which each can contain 50 persons and small boats of which each can contain 15 persons were prepared to assist villagers particularly children and elderly.
- Support in kind of fuel and expenses for transfers of animals
- Support in kind of 6 big tents

During flood:

- Coordinated and forwarded distribution of aid packages
- Monitored the situation and assisted the villagers as per request

Post-flood:

- Surveyed the damage of agricultural area and residence. Report on damage. Forward the data to related organizations.
- Supported for repair of damaged house at the rate of 20,000 – 25,000 baht per house.

Benefits gained:

- Leading members have developed their capacity e.g. they can present and discuss about problems with other organizations; they can initiate programs, etc.
- Network members from different communities more frequently interact and ask about one another.
- Network members and villagers are more united and cooperative and harmoniously work together.

Negative impacts (direct, indirect):

- Community leaders in the field, functioning as group's middleman in presenting stories and problems that occurred, are oftentimes pressurized by governmental organizations.
- Change of work from fighting on dam to conservation and rehabilitation of ecological system in which bird hunting and intensive fishing is prohibited, etc. is opposed by villagers who used to benefit from the cataract.
- Regulation on caring of Kaeng Lawa that was issued by the group is not powerful enough for enforcement. Therefore, presently, effort is being made for the Governor to participate in the issuance of the said regulation.

Conditions for replication:

In order to develop villager organizations network, people in community have to learn about problems, know the cause of the problems, participate in finding of solutions and be harmonious. Committee members need to have regular meetings, consultation, sharing or collective activities. As well, there must be NGO development workers or supportive organization that provide advice, help create learning process within the group and develop the potentials of network members to be able to demonstrate leading role or create new generation leaders to succeed the concept.

Good Practice Profile NE-12

Good Practices on: Integrated Agriculture for improvement of self-reliance	
Name of Contact Person:	1. Mr. Ponlerd Natanjai 2. Mrs. La-ong Khamlao Position in group/ network: Ban Hinpoon village leader Address: Ban Hinpoon village leader office, Mu 17, Kwao Yai Sub district, Gantarawichai District, Maha Sarakham 3. Mrs. Tongsook Rangsa Position in group/ network: Ban Keelek village leader Address: Ban Keelek village leader office, Mu 10, Kwao Yai Sub district, Gantarawichai District, Maha Sarakham
Positioning in Group/network:	Ban Boong Bao village leader
Address :	Ban Boong Bao village leader office, Mu 9, Kwao Yai Sub district, Gantarawichai District, Maha Sarakham
Telephone: 08-0738-1353, 08-5010-9847	E-mail: –
Name of group/network/other:	-
No. of member/ persons involved:	Population from 3 villages 302 households
Areas covered:	Ban Keelek, Ban Hinpoon and Ban Boong Bao, Kwao Yai Sub

Summary on past problems with flood and initiation of problem solving practice

Past

The area was fertile and had high diversity in plants, fish. Rice yield was high due to good soil quality, as a result of flood, that had brought all kinds of organic matters and deposited them there as fertilizers. The forest nearby rice fields were reserved to be used for livestock and grew trees for usage. High land areas were used for growing vegetables during rice season and other kinds of plants during summer.

Present

Ponds in the lowland were filled up so there would be more areas for farming. Houses were lifted to escape the flood water. More machines were used, for soil preparation, for cultivation, which reduces the number of cows and buffaloes. This is partly because cattle means more burden during flood as there is limited food for animals and no grazing ground. They must prepare fresh or dried grass for the animals. Farmers have given more interest to integrated agriculture in the past 10 years. Emphasis has been given to production for consumption within the family and to reduce living costs. Village leader had played important role in this move, by encouraging community people to learn about the “sufficient economy way of life” at Ban Don Man Center of Knowledgeable Farmer, Kantara Wichai, Maha Sarakham province. Alternative agriculture of Isan Network also had promoted an exchange on production methods to be more eco friendly.



Fig 1: Tam paddy field and vegetables grown on rice field bunds

Distinct techniques of this case:

1. Growing vegetables for consumption. Farmers have 3 areas for vegetables growing;
 - 1) Along Chi river after the water level decreases from January – April: Ban Boong Bao farmers have about 100 – 200 square meter per household for short lived vegetables growing. The land was used since their parents and pass on from generation to generation. Vegetables grown are potato, peas, cucumber, corn, cabbage, spring onion; the main purpose is for domestic consumption. Surplus would be sold within the village. No chemicals are used because the soil is already very fertile.
 - 2) Grow in tires container in the living area for own consumption to reduce living costs, mainly in Ban Keelek and Hinpoon.

- Each family grows plants in tires containers around 3-5 tires per house. The containers should be lifted 1–1.2 m from the ground. The plants grown are mainly vegetables which are consumed regularly.
 - In housing area by filling up the land. Plants grown here are long live plants which can be eaten for long time, easy to take care of, such as papaya, banana, lemon grass, chili etc.
- 3) In farming area includes the paddy field during April – August, plants grown are short live plants such as cucumber, chili.



Vegetable growing in tire container in front of the house



Plants grown in residential areas





Integrated farming in paddy field (vegetable, fruit tree, duck, chicken, cow and ponds)

2. Integrated agriculture

- 1) Some farmers used around Bht 20,000-25,000 for digging farm pond. The soil was used for filling the house area and rice field where the plants will be grown. The ponds were used for fish farming and water preservation for drought and young seedlings.
- 2) Plants grown on the filled up area in paddy fields are such as mango, coconut, tamarind, lime, guava, bamboo, papaya, lemon grass, chili, banana, local vegetables which the seeds can be kept, fruit trees which are able to withstand high water level.
- 3) Animals are taken care of for personal consumption and for sell such as duck, pig and cows.

Benefits gained:

- More diverse crops and more security. Some paddy plots will be modified for other kind of plantation.
- Reduce expenses for food (about 50 Baht per day), sharing with relatives and also earn extra income.
- Safe vegetables, free of chemicals.

Negative impacts (direct, indirect)

- High investment cost for construction of farm pond and filling up land.

Conditions for replication:

- Integrated agriculture is an alternative measure for food production to minimize expenses for food. A clear procedure should be developed.
- Villagers and related agencies should learn from the model cases on how to practice integrated agriculture in flood situation.
- Reduce liabilities, less dependence, the main decision factor is the cost of land modification, in the first period the plants chosen to grow should be short live, animals that can be bred in the area are ducks for eggs, ducks for meat, local chicken (easy to sell and can be consumed), digging pond can also be used for preserving water for rice growing, not for integrated agriculture only.

Good Practice Profile of NE-13

Good practice on Community Water Resource Management on Water Shortages Area	
Name of Contact Person:	Mrs. Sanit Thipnangrong
Positioning in Group/network:	Water Resource Committee's Advisor
Address :	82/1 Moo 4, Nongbode Sub-district, Nangrong District, Buri Ram
Telephone: 08-9846-5660	E-mail: sanit_5@hotmail.com

Name of group/network/other:	-
No. of member/ persons involved:	Limthong Community Water Resource Management Committee
Areas covered:	Ban Limthong community, expand to Nongbode, Chumsaeng, and Tungsangthong sub-district

Summary on past problems with flood and initiation of problem solving practice

1. No knowledge in water management at the community level
2. Water shortages causing loss agricultural production
3. Low incomes, accumulating debts, poverty
4. Emigration, broken family, shattered community
5. No education for younger generation

Distinct techniques of this case

1. Integrating science and technologies such as spreadsheet programs, computers, GPS receivers, or satellite images, to support the use of data in community's water resource management
2. Using regarding data, villagers can create a whole year agriculture plan that is suitable with their current water situation
3. New-theory agriculture, integrated agriculture, and sufficiency economy

Benefits gained

1. More water storages in community which help reducing damages from flood and water shortages over rice farming and agricultural production
2. Accumulating debt decreased and average income increased more than 100%
3. Reduced problem of emigration and strengthen family relation
4. Youths return to work with adults in community work

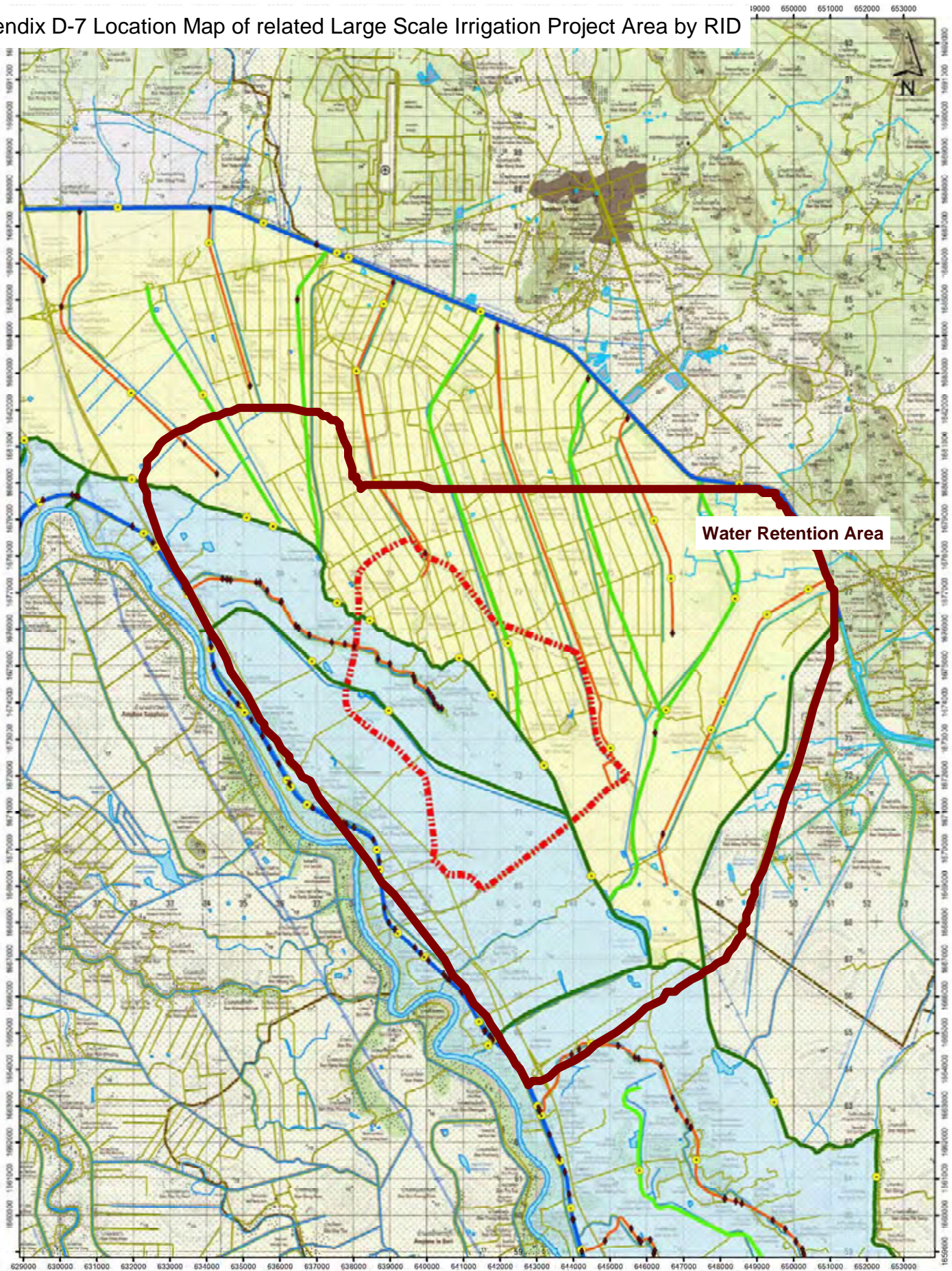
Negative impacts (direct, indirect).


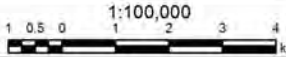
1. With good planning and sufficient water resource, farmers required harder working for yearlong agricultural production.

Conditions for replication

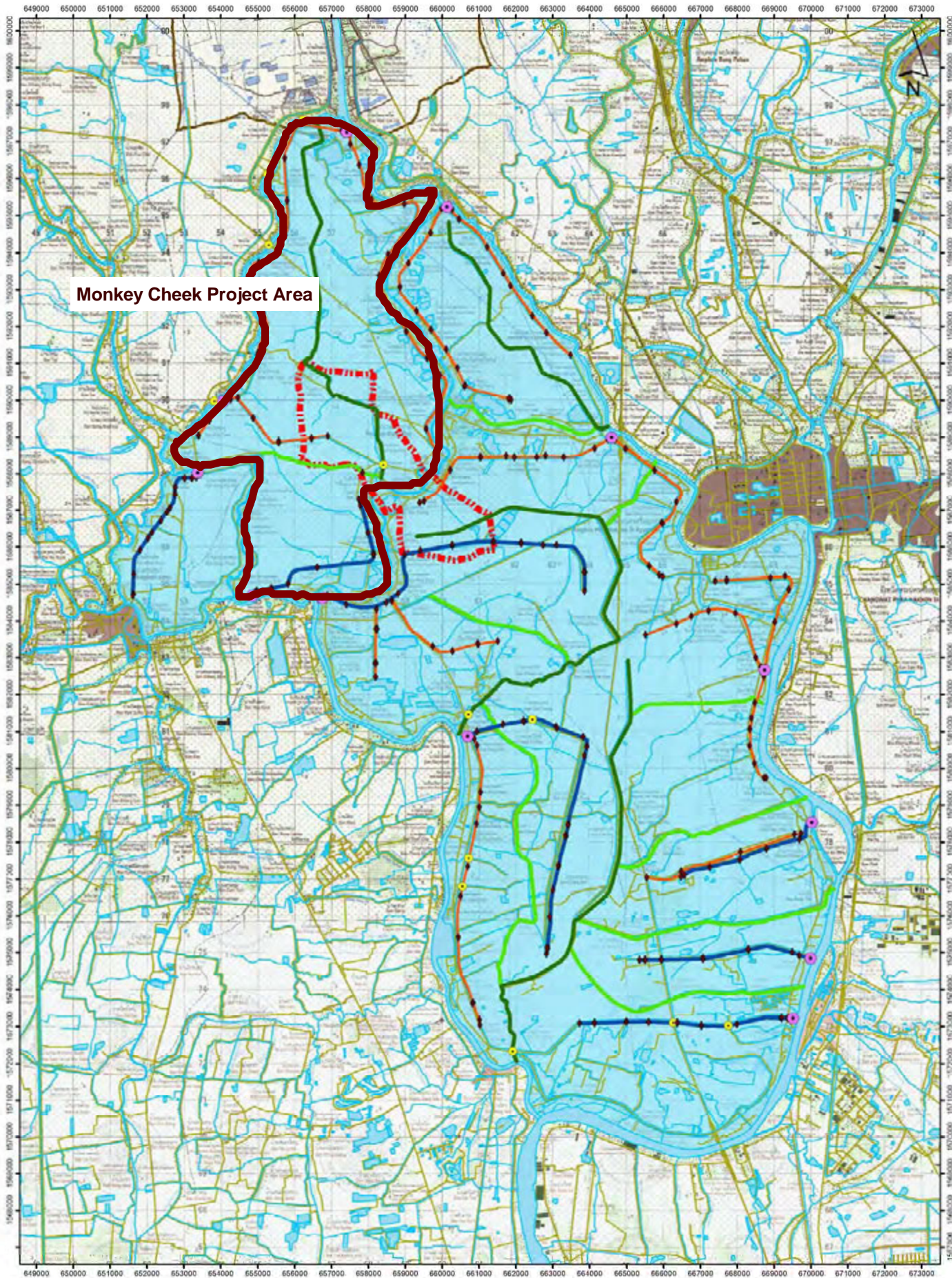
1. Harmony of community
2. Community committee
3. Community rules and regulations

Appendix D-7 Location Map of related Large Scale Irrigation Project Area by RID



Legend	◆ Irrigation Pipe	▨ Tambon Khao Keao	Note Data Source: RID	Project for Flood Countermeasures for Thailand Agriculture Sector 
	● Irrigation Structure	— River		
— Drainage canal	— Road	■ Manorom Project area	Scale 1:100,000 	
— Main canal	■ Maharaj Project area	— Provincial Boundary		Date

(1) Manorom, Maharaj Large Scale Irrigation Project in T. Khao Kaeo, Chainat Province



Legend <ul style="list-style-type: none"> Elec. Pump Sta. Irrigation Pipe Irrigation Structure Bang Ban Project area Main canal Secondary canal Drainage canal Collector drain River Road Water body Tambon Gop Chao Provincial Boundary 	Note Data Source: RID	Project for Flood Countermeasures for Thailand Agriculture Sector
	Scale 	
Date		

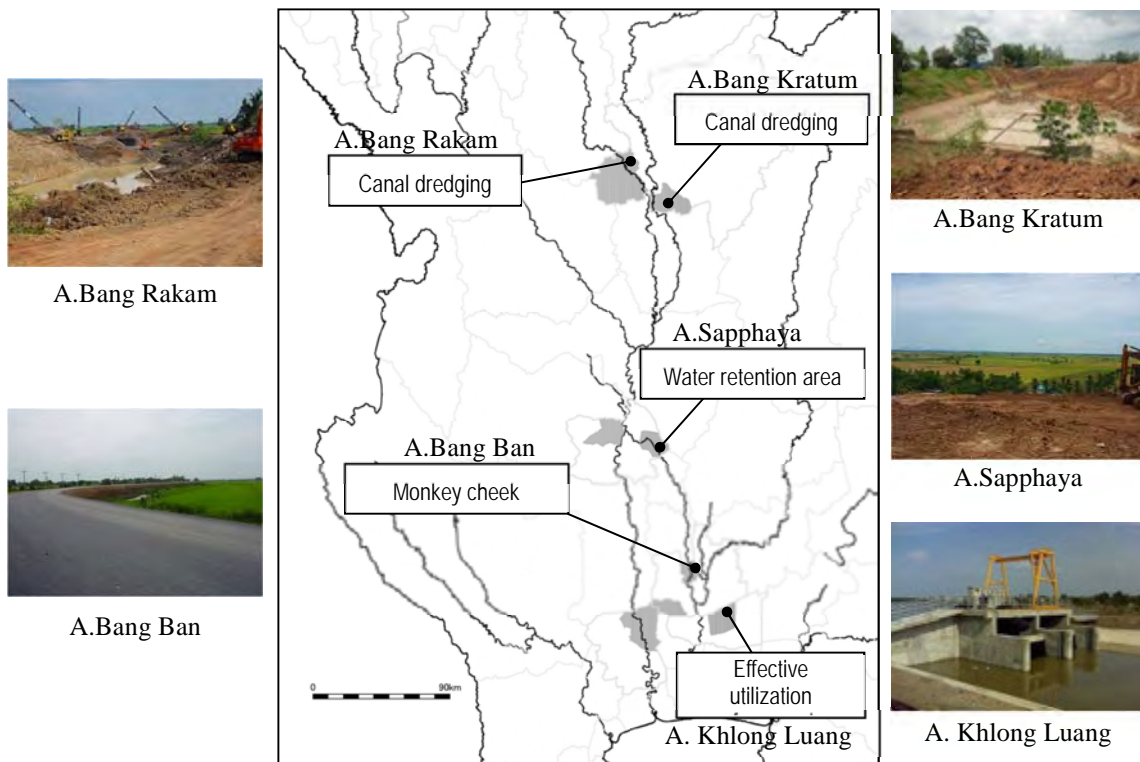
(2) Bang Ban Large Scale Irrigation Project in T.Gop Chao, Ayuttaya Province

Monkey Cheek and Water Retention Project in Chainat Province

Some information for following five projects is available. For those projects, there are some overlapping over the model area. Detailed project information about monkey cheek, water retention and canal dredging are to be gathered in next stage of the Project. In this report, Monkey cheek project in Bang Ban and water retention project in Chainat is described.

Monkey Cheek, Water Retention and Canal Dredging Project

	Province	Amphoe, Tambon	Project
1	Ayutthaya	A.Bang Ban, T.Gop Chao	Monkey cheek project
2	Chainat	A.Sapphaya, T. Khao Kao	Water retention project
3	Phitsanulok	A. Bang Rakam, T. Chum Saeng Songkhram	Canal dredging of existing drain canal Bang Rakam model
4	Phitsanulok	A.Bang Kratum, T. Nakhon Pa Mak	Canal dredging of existing drain canal
5	Pathumthani	A. Khlong Luang, T. Khlong Ha	Effective utilization for existing Rama-IX reservoir



Monkey Cheek, Water Retention and Canal Dredging Overlap with Model Site

1) Bang Ban Monkey Cheek Project

Bang Ban area is a large delta area surrounded by two major rivers namely Chao Phraya River and Noi River. It covers the total area of 170,000 rai in A.Bang Ban, Sena, Bangsai, Bang Pa-In, Phranakorn Sri-Phra Nakhon Si Ayutthaya, Phra Nakhon Si Ayutthaya province including some parts of A.Pa-Mok in Angthong province.

In this total area of Bang Ban, a monkey cheek project is being implemented in separated 2 parts. Bang Ban Monkey Cheek project 1, where T.Gop Chao is included, has a capacity to reserve flood water of 160MCM at the water depth of 3 meter in height. Bang Ban Monkey Cheek project 2 has capacity to reserve flood water of 77MCM at the water depth of 0.5 meter in height.

People who live in Monkey Cheek area will receive financial compensations 2,222 Baht per rai/time for damage to their paddy (for paddy field not harvested yet) and 600 Bart per rai/time for damage to their land (for paddy field that is already harvested). Duration of water reservation will be officially announced by concerned government agency.

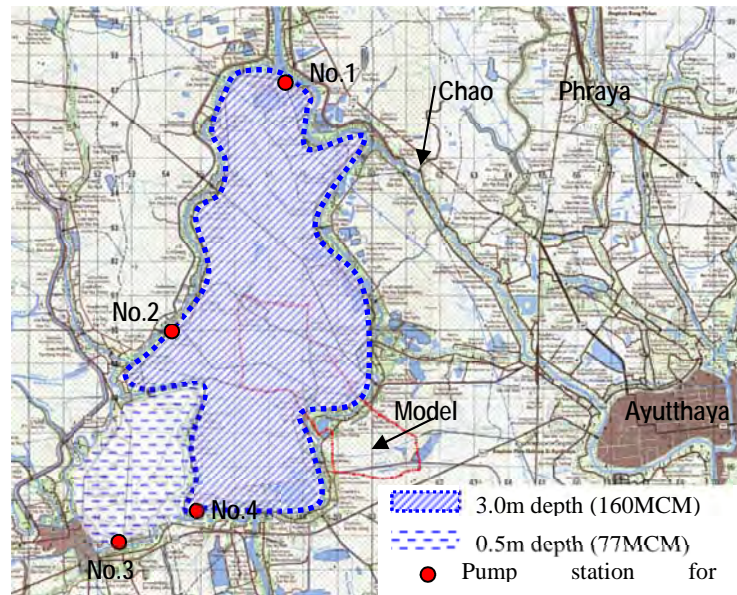
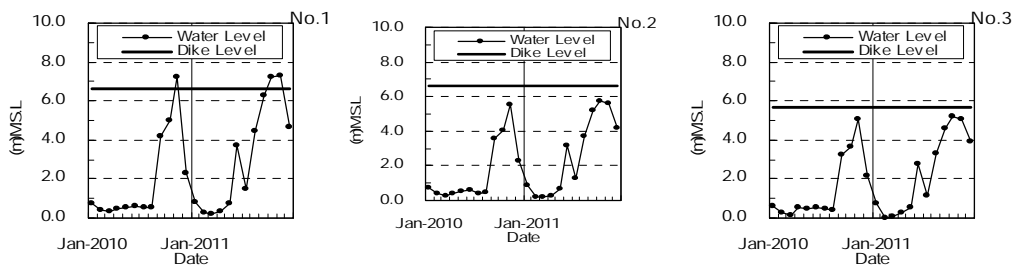
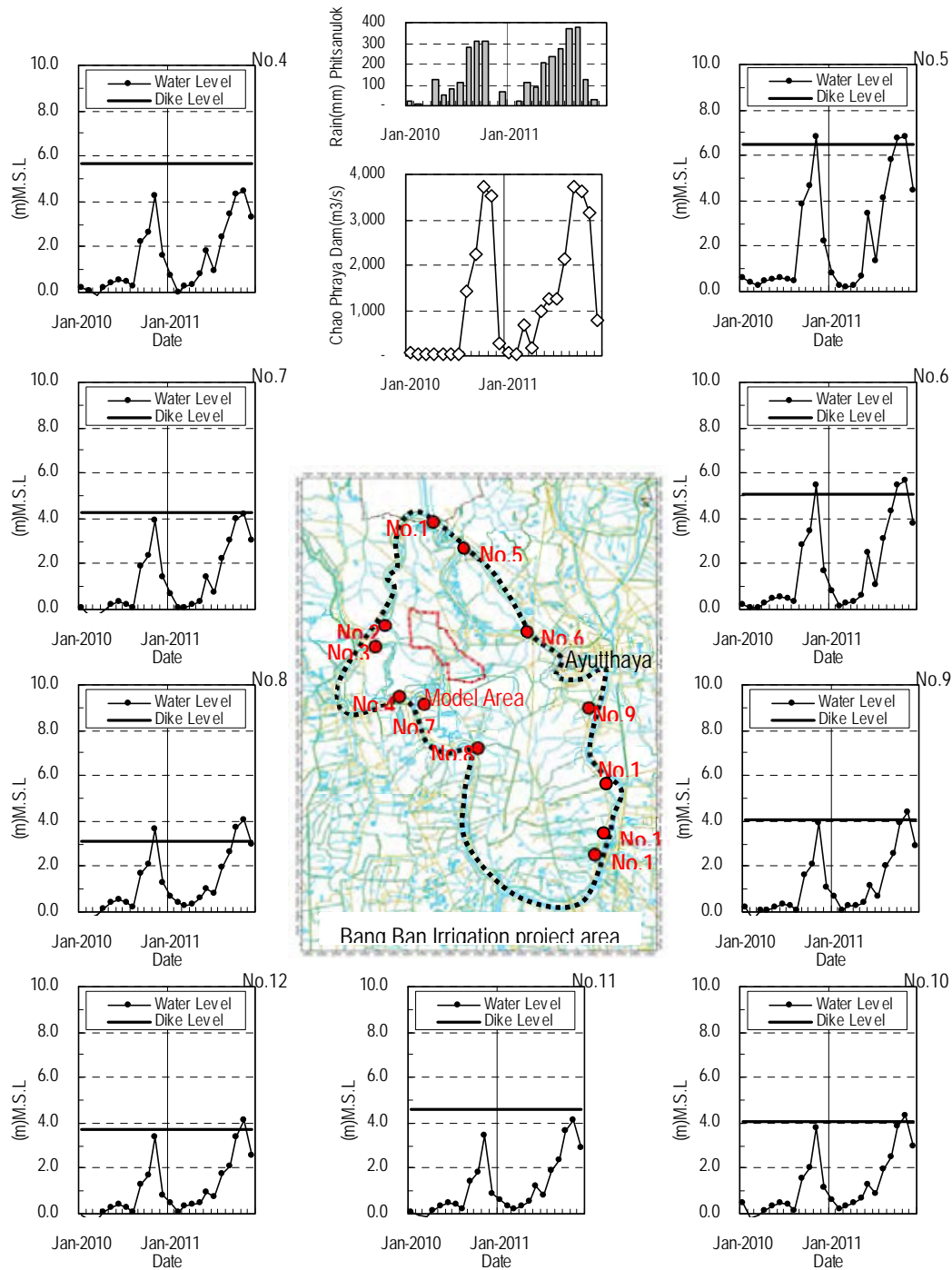


Figure below shows the trend in water level of Chao Phraya River at the existing irrigation pump stations No.1, No.2 and No.3 (Data: RID O&M office). Water levels rise up 3to 5m in rainy season, and decrease in December. Dike improvement and increase in dike height are included in monkey cheek project to store excess water inside the Bang Ban irrigation project area. This information is useful for design and establishment of the operational rule for monkey cheek utilization.



Comparison between Chao Phraya River Water Level and Dike Elevation

The fluctuations of Rainfall in Phisanulok, outflow of Chao Phraya Dam and water level at each pump station belong to Bang Ban Irrigation Project are shown in next Figure (Data source; RID O&M office). Water levels fluctuate in accordance with outflow of Chao Phraya Dam. Water level at each pump station fluctuates from minimum 3m to maximum 6m.



Rainfall, Chao Phraya Dam Outflow and Water Level at Each Pump Station

		
Existing Pump Station No.4	Sluiceway	Existing drainage gate

Irrigation and Drainage Facilities for Monkey Cheek Operation (1/2)

		
Improved embankment	Installation of drain culvert	Installation of new sluiceway

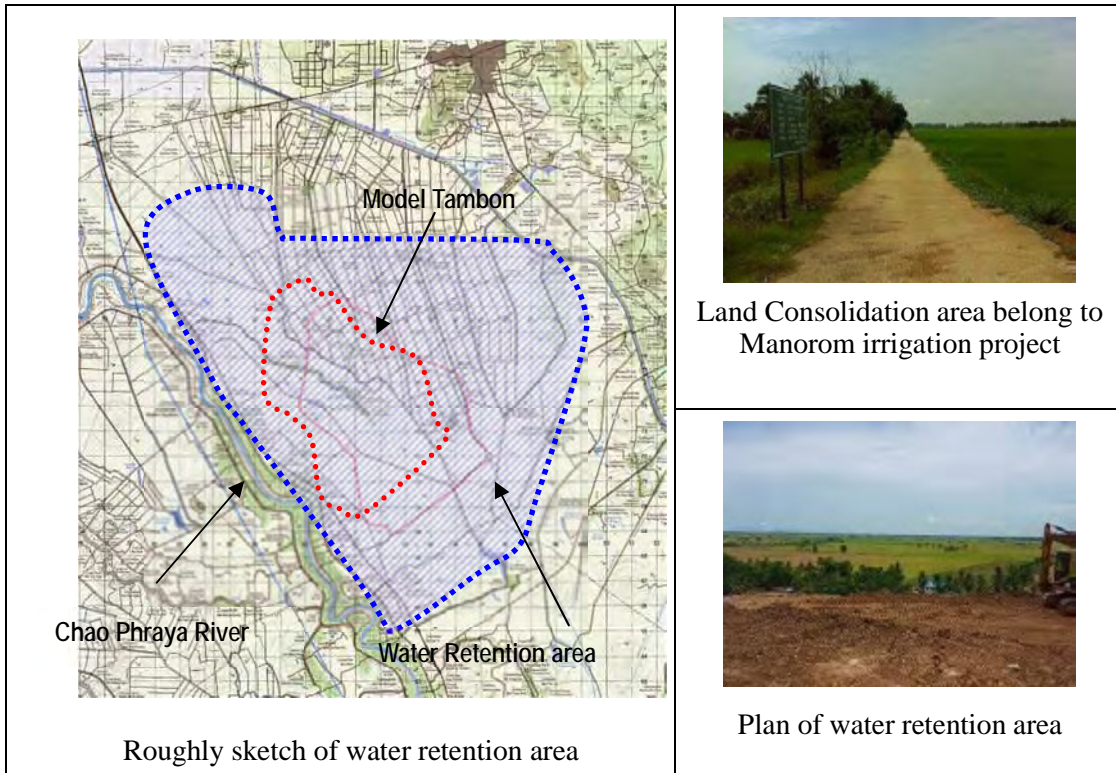
Irrigation and Drainage Facilities for Monkey Cheek Operation (2/2)

2) Water retention project (Tung Chaing Rark area)

Tung Chaing Rark area is a low land area located in the areas under three operation and maintenance projects of Maharaj, Manorom and Ching Khae, covering a total area of about 51,000 rai (Maharaj project;19,700 rai, Manorom project;16,400 rai, Ching Khae projects;15,000 rai) in six Tambon of three provinces. An existing large drain canal called Chainat-Pasak canal 2 runs between Maharaj and Manorom projects. Sidewall of this canal is concrete lined and paved roads are running on the embankments.

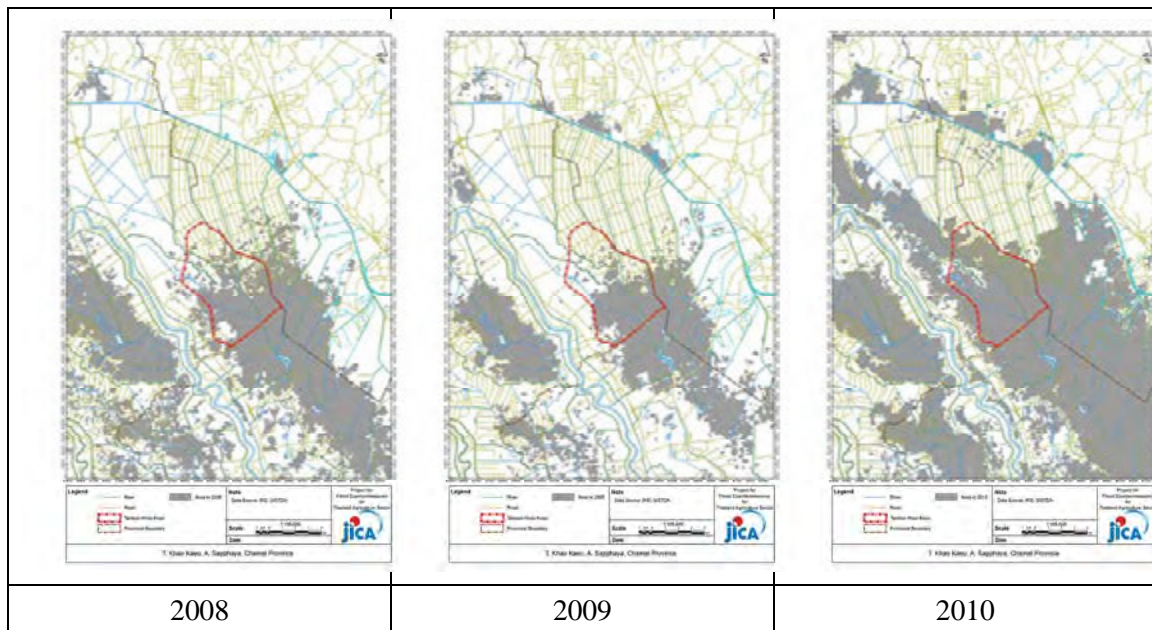
Table 6.4.6 Large irrigation project related to water retention area

Responsible Project	Tambon	Amphoe	Changwat
Maharaj	Chinamrai	Inburi	Singburi
	Khao Kaeo	Sapphaya	Chainat
	East Por Nangdum	Sapphaya	Chainat
Manorom	Khao Kaeo	Sapphaya	Chainat
	Soi Thong	Takli	Nakhon Sawan
	Chinamrai	Inburi	Singburi
	Thong Ain	Inburi	Singburi
Chong Khae	Soi Thong	Takli	Nakhon Sawan
	Thong Ain	Inburi	Singburi
	Poh Chai	Inburi	Singburi



Water Retention Project in Tung Chaing Rark

According to a planning report, the storage capacity volume of water retention area is approximately 50 MCM. Figure below shows the flooding situation from 2008 to 2010 based on GISDA data. This Figure describes that Tung Chain Rark area is always flooded.



Flood Area from 2008 to 2010 in Tung Chaing Rark

Farming System in the Project Area

(1) Overview of Agriculture Sector in the Project Area

The agriculture sector in Chao Phraya river basin is characterized by paddy production. In a broader sense, paddy can be seen throughout the year in the basin as it is normally cultivated two up to three times a year. In fact, paddy land shares 60% of the total agricultural land holding of the five model provinces, as compared to 47% in the nation. Specifically, land holding of paddy land shares 86% in Ayutthaya, which is followed by Chainat (71%), Pathum Thani (69%), and Phitsanulok (53%). Although that of Nakhon Pathom shares only 37%, it is still the biggest share amongst all the categories in the province.

On the other hand, land holding in upland field crops shares 20% in the five provinces, which differs from 0% of Ayutthaya to 34% of Phitsanulok. As Phitsanulok is located at the north most among the five and categorized in Northern region, it maintains more areas of hilly land. In fact, some areas of sugarcane and cassava can be observed in model areas of Phitsanulok, while they are rarely found in other areas.

Agricultural Land Use in Five Model Provinces and Region (2011)

Provinces	Farm Land	Paddy Land	Upland Field Crop	Fruit Tree	Vegetable	Pasture Land	Others
Phitsanulok	3,174,774	1,678,386	1,064,253	263,721	15,315	9,375	143,724
	100%	53%	34%	8%	0%	0%	5%
Chainat	1,118,042	790,535	139,581	69,404	10,758	15,348	92,416
	100%	71%	12%	6%	1%	1%	8%
Ayutthaya	1,145,621	980,218	501	57,048	13,772	2,147	91,935
	100%	86%	0%	5%	1%	0%	8%
Pathum Thani	439,315	303,703	7,558	49,377	27,935	0	50,742
	100%	69%	2%	11%	6%	0%	12%
Nakhon Pathom	912,252	336,248	124,211	137,225	93,140	3,113	218,315
	100%	37%	14%	15%	10%	0%	24%
5 provinces Total	6,790,004	4,089,090	1,336,104	576,775	160,920	29,983	597,132
	100%	60%	20%	8%	2%	0%	9%
Thailand Total	151,922,919	71,652,930	35,096,021	34,621,093	1,522,788	999,839	8,030,248
	100%	47%	23%	23%	1%	1%	5%

Source: Agricultural Statistics of Thailand (2011)

Unit: rai

Note:

1/ "Fruit tree" represents fruit tree and perennial crop

2/ "vegetable" represents vegetable and ornamental plant

3/ "Others" include "residential area," "waste land" and "miscellaneous land" designated in the source.

After all, paddy production is the underlying farming system in those five provinces. In this section of the report, therefore, main focus is put on the salient feature of paddy cultivation.

In general, paddy cultivation in the central plain is largely oriented toward marketing. Farmers commonly sell their whole produces to rice mill or middlemen. Instead of consuming what they produced, farmers purchase rice at grocery shops. It may stem from several circumstances such as: 1) they need immediate cash; 2) drying facilities are not available; and 3) appropriate storage is not available. In this context, their concern is on the productivity of paddy using high-yielding varieties

rather than quality.

Another factor that characterizes the paddy cultivation in this area is that farmers often outsource sowing and harvesting for service providers. Particularly, direct sowing using broadcaster is prevailing over transplanting as the labor is scarce and transplanting machine is not always available and/or applicable. As a result, farmers produce 800 to 900kg/rai, or 5.0 to 5.6 ton/ha.

(2) Cropping Pattern and Variety

1) Cropping Pattern

As shown in Table 6.4-8, cropping pattern of paddy can be categorized in three major types by the number of cultivations per year: 1 cropping per year, 2 cropping per year, and 2.5 to 3 cropping per year. In such areas where irrigation is available and risk of flood is reasonably low, paddy can be cultivated both in wet and dry season. Particularly, if the condition permits, three times of cropping per year or five times of cropping in two year are manageable.

In detail, first cropping usually starts at the beginning of rainy season, which will be harvested at the beginning of flooding season (specific months differ by location). Then, second cropping starts usually at the end of wet season or the beginning of dry season with enough moisture for germination of rice seeds. Third cropping starts in the middle of dry season, which is enabled fully by irrigated water. If all those cropping can be smoothly relayed, three cropping can be managed within 12-month period; if not, five cropping would be managed in two years.

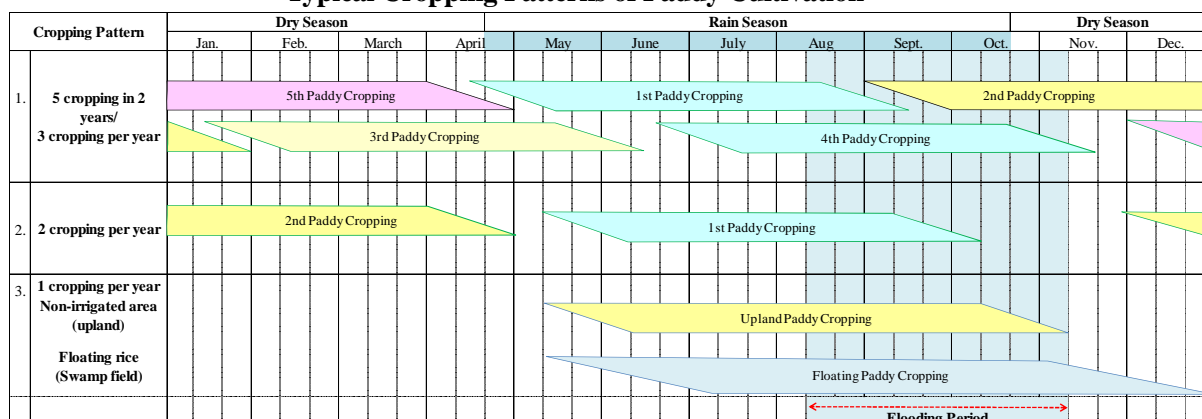
Thus, three cropping can be managed in such areas where all the conditions are satisfactory: availability of water (irrigated area), access to funding, drainage during harvest season, and access to agricultural service providers. Note that as cultivation is continued, one of three cropping, in many cases defined as “third cropping,” is always exposed to a certain risk of flood: called “risk paddy.”

Yet, “two cropping per year” is actually the most common and officially recommended pattern of paddy cultivation. As shown in the Table, first cropping is usually commenced as the rain starts. Sometimes, dry seeds are sown on the ground and left for the first rain, or wet seeds, which are soaked for two days, are sown after enough moisture is given to soil by the first or consecutive rain at the beginning of wet season.

First cropping, or wet season cultivation, is usually harvested before flood comes, provided it was started early enough. Then, second cropping, or dry season cultivation, is managed under irrigation any time after flooding. However, if the cropping of dry season cultivation delays, start of following wet-season cultivation would also delay, enhancing a risk of flood.

Lastly, the most primitive cropping pattern is “one time per year” during wet season. It is a typical cropping pattern in the areas where irrigation is not accessible. Similar to other two cropping patterns, cultivation usually starts at the early wet season when soil holds enough moisture in it. In swamp areas or flood prone areas, floating paddy is also cultivated, although the size of area is quite limited.

Typical Cropping Patterns of Paddy Cultivation



Source: JICA Project Team (2012)

Note: Seasons may differ according to the location: flood comes earlier in upper basin and later in lower basin.

It should be noted that cropping pattern varies by locations due mainly to the timing of flood. Generally, flood occurs earlier, say May, at the middle river basin such as Phitsanulok, while it occurs later, say October in lower basin such as Ayutthaya. Accordingly, cropping season starts earlier in middle river basin than lower basin. Furthermore, cropping pattern is influenced by the availability of resources and by physical/natural conditions at micro level. As a result, there are so many variations of cropping patterns existing in the project area.

Moreover, patterns in farmers' decision making also differ by locations. In T. Bang Rakam, Phitsanulok, for example, majority of people see periodical flood as a threat to paddy cultivation and thus, they do not usually go for the third cropping during flood season. On the other hand, there are a certain number of farmers in Bang Kratum, Phitsanulok, who do not care so much the risk of flood and thus go for the third cropping during rainy season. They certainly know the risk of periodical flood but put on the chance of "risk paddy" at their own risks. Accordingly, even under the same natural condition, there are several types of cropping patterns caused by the risk appetite of farmers.

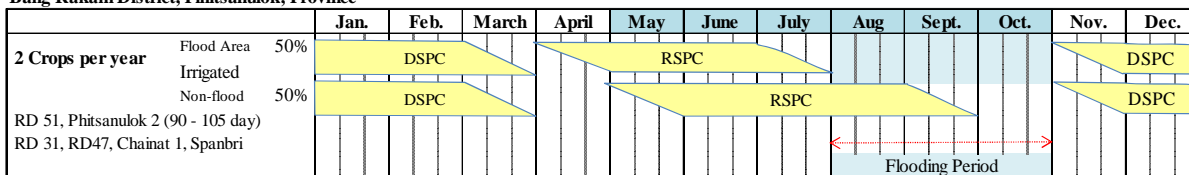
In conclusion, typical cropping patterns of each model area are illustrated in Table 6.4-9. In Bang Rakam district, Phitsanulok, for example, typical cropping pattern is two cropping per year. Here, approximately 50% of the area is categorized as flood prone area, while remaining half is non-flooded area with irrigation. In flood prone area, Dry Season Paddy Cultivation (DSPC) is organized from early November to end of March and Rain Season Paddy Cultivation (RSPC) is organized from beginning of April to end of July, to be harvested before flood comes in August. To keep the cropping period in rainy season, early maturing varieties, RD51¹ or Phitsanulok 2 (PSL 2) are used (to be harvested 90-105 days after sowing).

In non-flooded/irrigated area, on the other hand, the RSPC starts a bit later, at early May, which is then harvested by end of September. In non-flooded area, an entire period of rainy season can be fully utilized, given no risk of flood in ordinary years. Thus, it is not necessary to use high yielding varieties that are often recognized as insect prone or having less quality of taste.

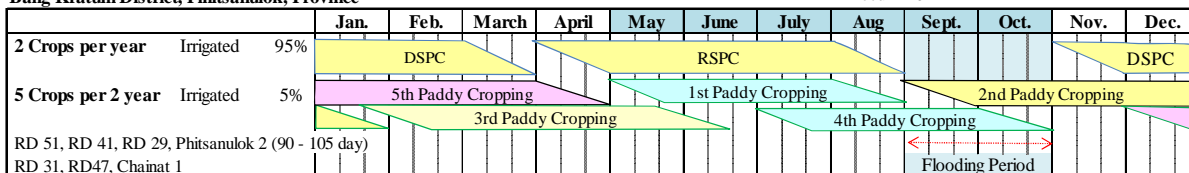
¹ "RD51" variety referred to in this report is not yet officially approved by the responsible agency, Rice Department. As mentioned later, it is accidentally released in a process of experimental cultivation on the farmers' experimental plots.

Typical Cropping Patterns of Paddy in Model Areas

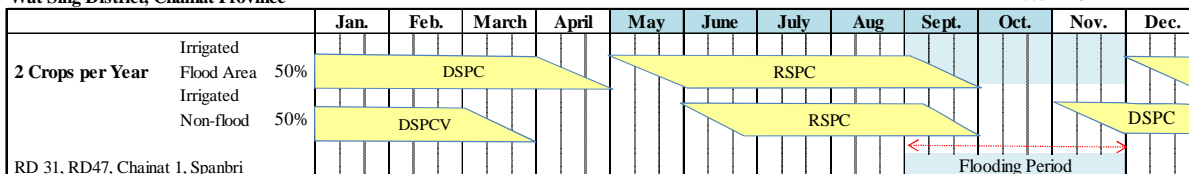
Bang Rakam District, Phitsanulok, Province



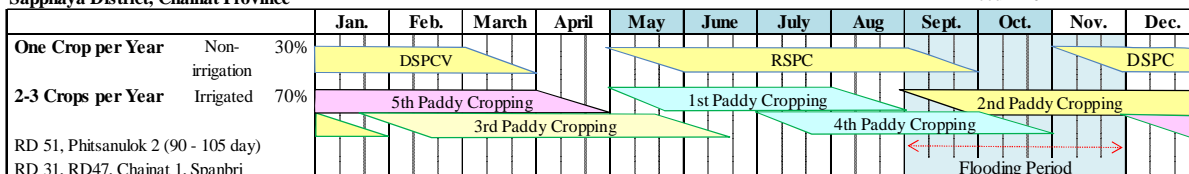
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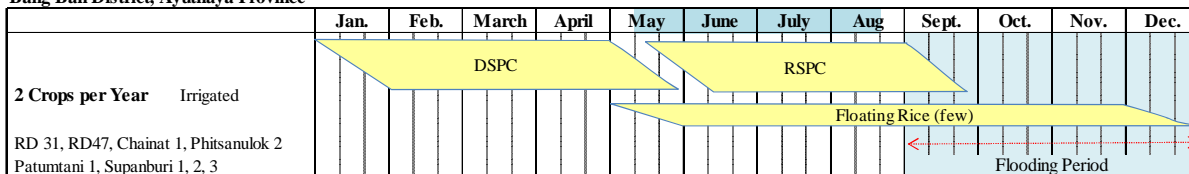
Wat Sing District, Chainat Province



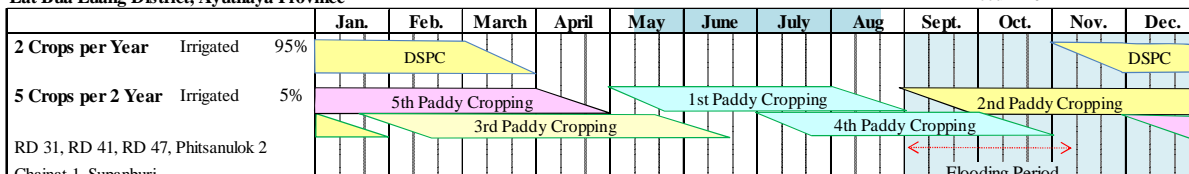
Saphaya District, Chainat Province



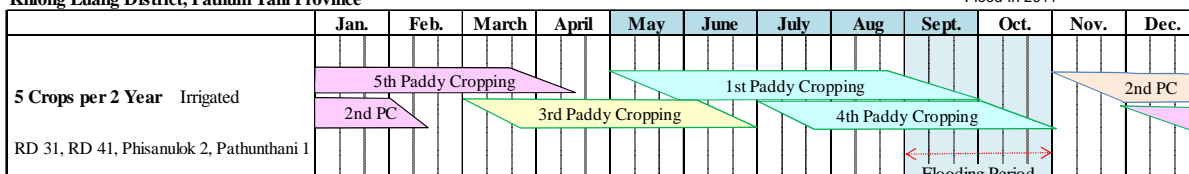
Bang Ban District, Ayuthaya Province



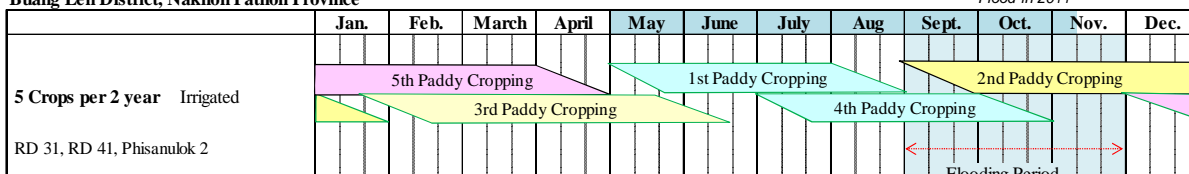
Lat Bua Luang District, Ayuthaya Province



Khlong Luang District, Pathum Tani Province



Buang Len District, Nakhon Pathon Province



Source: JICA Project Team (2012) based on interviews to DOAE Tambon officers, and Rice Research Center.

For another example, five croppings are managed per two years in Bang Kratum, Phitsanulok, although the size of area is only around 5% of the total paddy area. In this pattern, first paddy starts at early May to be harvested by end of August, which is then followed by the second paddy that starts right after the harvest of first paddy. Third, fourth and fifth cropping follow continuously. In principle, no interval is secured in between one cropping and another; as a result, there are always paddy in place throughout the year.

Note that it was recommended by an applied research² that there should be at least two weeks of interval in between the cultivations, by which occurrence of Brown Rice Planthopper (BPH) can be reduced, and also weedy rice, which is a natural crossbred of cultivar rice and wild rice, can be better controlled during the interval. Moreover, for this cropping pattern, short-maturing varieties are also used for rainy season as to avoid periodical flood during September to October.

2) Major Varieties

As aforementioned, various types of rice varieties are being used in the Project area: RD series with code names/ numbers of RD31, RD 41, RD 47 and RD51 for example, and another series which are bred by rice research centers at provincial level with the code names/ numbers of Phitsanulok 2, Chainat 1, Spanburi1, Pathunthani 1 for another example (see Table 6.4-10). In RD series, odd numbers are given to those which are non-glutinous rice, while even numbers are applied to glutinous rice, for which the larger the number is, the newer the variety is.

In general, farmers select varieties based on growing period, yield potential, and adaptability to natural environment such as inundation, water shortage, and damages by weeds, insects, and disease. Aside from two most important traits of variety, growing period and yield potential, farmers' big concern today is centered on damage by Brown Rice Planthopper (BPH). Accordingly, responsible agencies are trying to breed such a variety that is more tolerant to BPH than the previous ones provided same level of yield potential.

In this regard, RD 51, which is now getting some popularity in Phitsanulok, is associated with some problematic issues in variety management: it is not officially approved yet. As a matter of fact, RD 51 is still being developed by the research institute and being tested as a new promising variety. However, in a process of field experiment that was carried out with participation of cooperating farmers, prototype variety, having a temporal name of "RD51" was leaked out from hands to hands.

According to the Rice Department, this variety is not yet given credit at a research level on an aspect of tolerance to BPH and as a result, Rice Department is still developing a new variety with concrete trait against BPH, which will be officially released with a name of "RD51" in the future. That is, the RD 51 to be officially released by the Rice Department will not be same as the one now being spread in Phitsanulok with the same name of "RD51." Characteristics of major rice varieties are shown in Table 6.4.10:

² According to Rice Department (2012) but research itself is not clarified.

Characteristics of Major Rice Varieties

Variety Name	Growing Period (day)	Plant Height (cm)	Glutinous	Dormancy (week)	Unit Yield (Kg/rai)	Cropping Season	Remarks
A. Short Growing Variety							
1. RD 29 (Chainat80)	103 (wet season) 99 (dry season)	104	Non-glut.	4-6	876	Aug to Dec. Dec. to April	Higher yield than Suphamburi 1,3 Not should be grown on Sep. - end of Nov. , Phitsanulok 2, RD29, Phumthani 1, Chainat 1
2. RD 41	105	104	Non-glut.	8 (dry season) 9 (dry season)	904		
3. RD 43	95	103	Non-glut.	5	561		Resistance of BPH, Rice Blast Disease and shot life time
4. RD 47	104-107 (Broadcasting) 112 (Transplanting)	90-100	Non-glut.	7-10			Resistance of BPH more than RD41.
5. RD 51	90-95						
6. Prachinburi 1		170	Non-glut.	7	450		
B. Middle Growing Variety							
1. RD 21	120-130	100-125	Non-glut.	4	700		Resistance of BPH, Bacterial Leaf Blight, Rice Ragged Stunt.
2. RD 31 (Phumthani 80)	110-120	117	Non-glut.		738 (Broadcasting) 745 (Transplanting)		
3. RD 35 (Rangsit 80)		126.87-132	Non-glut.	6-9	650		
4. Chainat 1	110-115	113	Non-glut.	8	740		
5. Phitsanulok 2	105 - 110 (Broadcasting) 119-121 (Transplanting)	114 cm	Non-glut.	8	807		Resistance of White-backed planthopper (WBPH). Resistancy of BPH, , not should be grown on Sep. - end of Nov.
6. Phitsanulok 80		141	Non-glut.	7	637-642	Harvest on Dec	
7. Pathumthani 1	104-114	104-113	Non-glut.	3-4	650-774		Resistancy of BPH, Rice Blast Disease.
8. Suphamburi 1	110-117	125	Non-glut.	3	806		Resistancy of BPH, WBPH, Bacterial Leaf Blight, Rice Blast Disease, Rice Ragged Stunt.
9. Suphamburi 3	110-115 (115-120)	116	Non-glut.	5	772		
10. Suphamburi 90	120	120	Non-glut.		600		
C. Deep Water and Floating Rice Variety							
1. Jasmine 105	120-130 ?	140-150	Non-glut.	8	900-1000	Start from Jul-Aug	Deep-water Rice
2. Prachinburi 1, 2	180	133-240	Non-glut.	7	380	Mtd. June - Mtd. of Jan	Deep-water Rice
3. Kao Tra 60	180	218	Non-glut.	9	449	Mtd. June - Mtd. of Jan	Deep-water Rice
4. Ayuthaya 1	180	142 - 218	Non-glut.	4	546	Mtd. June - Mtd. of Jan	Deep-water Rice
5. Paingam Prachin	180	250	Non-glut.	9	380	Mtd. June - Mtd. of Jan	Floating Rice
6. RD 45	180	170	Non-glut.	9	520	Mtd. June - Mtd. of Jan	Floating Rice
7. Han Tra 60	180	155	Non-glut.	5	425	Mtd. June - Mtd. of Jan	Floating Rice
8. Pin Kaew 56	180	280	Non-glut.	7	350	Mtd. June - Mtd. of Jan	Floating Rice
9. Native Variety	180	>250	Non-glut.	5 - 7	350 - 450	Mtd. June - Mtd. of Jan	Floating Rice

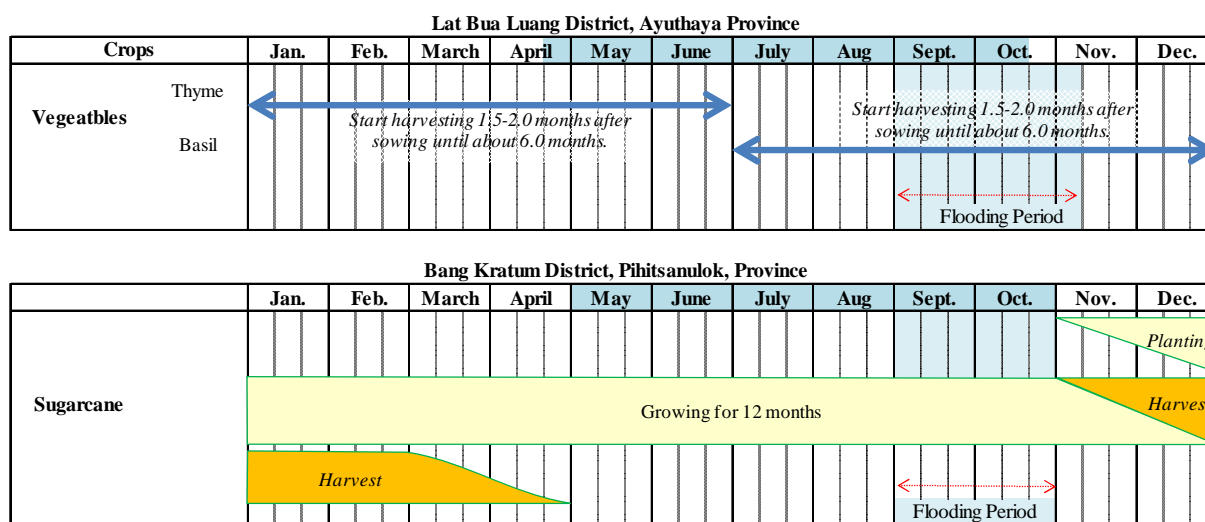
Moreover, there are some limited areas of field crops in the model areas such as sugarcane, banana, and vegetables. Typical cropping patterns of those crops are shown as Table 6.4-11. First of all, vegetables are usually planted in a smaller scale as a form of backyard garden up to 1-2 rai/household of land even for selling. For example, a farmers' group in T. Singhanat, Ayutthaya produces several kinds of herbal vegetables such as Thyme and Basil and sell them to exporters under contract farming.

Thyme, in this case, is planted from January to June, in which harvest can be started about 1.5 to 2.0 months after sowing and continue until about 6 months after sowing. Then, next cropping, Basil in this case, will follow it in a similar routine. Vegetable cultivation is however usually practiced in relatively smaller scales and it is quite rare to have contract farming with a wider point of view.

Furthermore, sugarcane can be found in upland areas especially in Phitsanulok where topography is relatively hilly. Sugarcane is usually cultivated as a contracting system, in which necessary agricultural inputs are provided by sugar processing factory directly or indirectly and then all the harvests are shipped to the factory. As for sugarcane, planting season starts in November to December and growing period continues until November to December in the following year. Then, harvest continues until April, depending on the operation of sugar processing factory contracted as quota.

Currently, profitability of sugarcane production is reportedly higher than paddy production in the areas, and thus planted area is gradually increasing, according to interview to DOAE office in A. Ban Kratum.

Typical Cropping Patterns of Other Crops in Model Areas



Source: JICA Project Team (2012) based on interviews to DOAE Tambon officers, and Rice Research Center.

3) Production cost and Benefit

Estimated production cost and benefit of paddy cultivation is shown in Table 6.4-12 based on interviews made to farmers in the model areas. Although the number of samples is quite limited, this Table shows comparative differences among three major cultivation methods: direct sowing,

transplanting (machine), and transplanting (parachute).

As shown in the Table, an estimated total cost for direct sowing method is as much as 7,750 Bt/rai, which is followed by transplanting with parachuting (8,485 Bt/rai) and with machine (8,561Bt/rai). Production cost for direct sowing is significantly lower than other two methods, due mainly to the difference in the cost for transplanting (listed as a cost of “nursery” in this Table) and fertilizers.

Given the difference of approximately 750Bt/rai between direct-sowing method and transplanting method, coupled with a technical easiness, majority of farmers go for the direct sowing method. It means if the method needs to be changed from direct sowing to transplanting, that change has to generate at least 750Bt/rai of additional income.

Cost and Benefit of Paddy Cultivation by Type of Cultivation

Items	Unit Price (THB/unit)	Direct Sowing		Transplanting (Transplanter)		Transplanting (Parachute)		Remarks
		Quantity (per rai)	Amount (THB)	Quantity (per rai)	Amount (THB)	Quantity (per rai)	Amount (THB)	
A. Farm Input								
A.1 Paddy Seed	650 THB/25Kg	30 Kg	780	20 Kg		12.5 Kg	325	
Nursery for Transplanter for Parachute	26 THB/Kg THB/Box THB/Box			50 Boxes	1,400	45 Boxes	1,000	* cost of transplanting is included here
		Sub-total	780	Sub-total*	1,400	Sub-total*	1,325	
A.2 Fertilizers								
Urea (46:0:0) 2 top dressing	850 THB/50Kg	80 Kg	1,360	100 Kg	1,700	100 Kg	1,700	
NPK (16:8:8)	850 THB/50Kg	40 Kg	680	40 Kg	680	40 Kg	680	
Compost, organic fertilizer								
		Sub-total	2,040	Sub-total	2,380	Sub-total	2,380	
A.3 Agro-chemical								
Herbicide	450 THB/lit	40 ml	18	25 ml	11	50 ml	23	
Insecticide	900 THB/bottle	50 ml	90	50 ml	90	45 ml	81	
Pesticide	400 THB/bottle	40 ml	32	50 ml	40	45 ml	36	
		Sub-total	140	Sub-total	141	Sub-total	140	
B. Machinery Cost								
B.1 Water Pump by hand tractor	60 THB/lit	25 lit	1,500	25 lit	1,500	25 lit	1,500	
B.2 Plowing by tractor	240 THB/rai		240		240		240	
B.3 Harrowing by tractor	200 THB/rai		200		200		200	
B.4 Rotavator by tractor	200 THB/rai		200		200		200	
B.5 Combine Harvester	450 THB/rai		450		450		450	* cost of transplanting is included in "nursery"
		Sub-total	2,590	Sub-total	2,590	Sub-total	2,590	
C. Labour Cost								
C.1 Field maintenance	250 THB/rai	2 times	500	2 times	500	2 times	500	
C.2 Broadcasting (Seed)	150 THB/rai	1 time	150	0 time	0	0 time	0	
C.3 Manual Weeding	250 THB/rai	2 times	500	2 times	500	2 times	500	
C.4 Fertilizer Application	250 THB/rai	2 times	500	2 times	500	2 times	500	
C.5 Chemical Application	200 THB/rai	2 times	400	2 times	400	2 times	400	
C.6 Harvesting (Field assistant)	150 THB/rai	1 time	150	1 time	150	1 time	150	
		Sub-total	2,200	Sub-total	2,050	Sub-total	2,050	
Total Production Cost			7,750		8,561		8,485	
D. Farm Income								
D.1 Selling Products (Paddy)	12 THB/rai	800 Kg/Rai	9,600	900 Kg/Rai	10,800	850 Kg/Rai	10,200	
E. Net Farm Income (Benefit) (B/C)			1,850 1.24		2,239 1.26		1,716 1.20	

Source: JICA Project Team (2012) based on interviews to farmers in the model areas.

Note: 1) Land rental cost is not included; 2) machinery cost for transplanting and labor cost for parachuting are included in the cost of "Seed" in A.1.

Note that the required input cost may vary by season. In an area where periodical flood occurs every rainy season, required amount of fertilizer may be relatively small for the cropping after flood as flood delivers some nutrition to soil. On the other hand, much more fertilizer may be necessary for the following cropping because soil nutrition is essentially depleted during the previous cropping (quantitative data on utilization of fertilizer yet available).

This fact further implies a higher risk of cropping for the said pattern. Although this cropping pattern in some setting is always associated with the risk of flood, conceivable amount of loss incurred by flood is rather bigger than other cropping seasons.

Furthermore, production cost also differs by region as well as by the method of data collection. It is generally said that the paddy cultivation in central plain along Chao Phraya River is quite intensive involving a lot of inputs for repeated cultivation that entails relatively higher cost. On the other hand, paddy cultivation systems are relatively extensive in other areas such as northeastern areas.

Also, different results may be approximated by the type of sampling. Data shown in Table 6.4-12 was based on quite a limited number of samples, while the government maintains a broad-based database. For example, the OAE provides data on paddy production cost which was indeed used as a basis to establish the standard amount of compensation to the damages incurred by the 2011 flood. Specifically, the standard amount of compensation was set as 2,222Bt/rai for the full damage of paddy field, which was one third of the total cost of production that OAE maintains—6,666Bt/rai (based on the estimation for the year 2006).

In this regard, PRA survey and a number of unstructured interviews revealed that farmers in central plain or Chao Phraya River basin claim standard amount estimated by the government is lower than what they actually disbursed. This gap is caused probably because the standard cost represents the national average notwithstanding the fact that average cost in Chao Phraya River basin is significantly higher than other areas.

(3) Issues and Problems associated with flood

Major issues and problems associated with flood are as follows. Note that general damages caused specifically by the flood of 2011 are summarized in Chapter 6.3.

a) Damage by periodical flood

Paddy farmers often suffer from damage by periodical flood. Although periodical flood is anticipatable to some extent, several factors lead farmers to cultivate paddy in an inappropriate timing of the year; as a result, flood occurs during the middle of harvest season. In typical case, farmers cultivate paddy during flood season to maximize the number of cropping to be three cropping per year. In this case, farmers practice it at their own risk as “risk paddy.” In T. Ban Kratum, Phitsanulok, for example, success rate of risk paddy is estimated approximately 60%; this case is a quite intentional risk taking.

In another case, paddy cultivation during rainy season is exposed to a risk of periodical flood due to delay in timing of sowing paddy. The start of rainy season sometimes delays or there happened to be a dry spell at an early stage of rainy season. In those cases, farmers are forced to delay the cultivation or replant (re-sow) paddy. As a result, timing of harvest is scheduled in flooding season. This is not usually the case when supplemental water (irrigation) is available during early rainy season.

b) Securing seeds for the cultivation after flood

Effect of floods is not limited just to a direct damage to crops but there is a consequential effect as well. For example, PRA revealed that farmers had suffered from the lack of paddy

seeds after the flood of 2011. Farmers would have liked to restart paddy cultivation as soon as flood ebbed. However, even if credit can be arranged, farmers had quite a difficult time to secure seeds for re-planting.

c) Overcapacity for milling

Due to the practice of 2.5 to 3.0 cropping per year, cropping pattern in the area is usually quite diversified, resulting in diversified timing of harvest. After the 2011 flood, however, a numerous number of farmers restarted paddy cultivation almost at the same time and as a result timing of harvest had also become quite simultaneous. As the demand for service providers to do harvesting suddenly hiked up, it was difficult to manage the harvest in an appropriate timing. Furthermore, oversupply of paddy overreached the immediate capacity of rice millers in the area; as a result, some farmers also had to wait or look for other millers outside the area.

(4) Common Issues and Problems in Paddy Cultivation

Major issues and problems associated with farming systems especially on paddy are as follows:

a) Damages by weed and insects

In the project area, weeds and insects are the prevailing problems in paddy cultivation. Aside from flood, those two problems bring about significant loss in production. Specifically, weedy rice, which is a hybrid between paddy cultivar(s) and wild rice(s) now exercise an overwhelming influences in paddy cultivation sector as it is essentially a rice variety and difficult to control by selective herbicides.

Outbreak of Brawn Rice Planthopper (BPH) is also given so much attention as it brings about significant damage on paddy plant at young stage. The occurrence of BPH is rather accelerated when paddy is cultivated continuously. In fact, almost all the rice research centers for the project provinces claimed those two issues as central issues of paddy cultivation.

Thus, especially in flood prone areas where farming system is already adapted to flooding condition, farmers concern weeds and insects as priority issues much more than flood. So, when any countermeasure is to be proposed, flood issue and those two issues should be equally and altogether considered.

b) Lack of water (water shortage in rainy season)

As discussed earlier, it is recommended to start paddy cultivation early as to complete harvest before periodical flood comes. However, even with two-cropping-a-year system, flood occurs before harvest as sowing is delayed by the lack of water. It is ironic that flood damage is caused by the lack of water. In other word, if cropping pattern has to be shifted earlier, water should be first of all secured.

Difficulty in securing water at an early rainy season was pointed out in T. Gop Chao as an example. Irrigated area of T. Gop Chao is surrounded by polder dikes and thus farmers need to convey water from outside by pumping. If water is not much available in the canal or river outside the dikes, it would be quite difficult to secure water inside the dikes. Thus, securing water in an appropriate timing is as important as preventing flood damage.

c) Distorted incentive by the compensation/ price guarantee schemes

Contrary to its well-intended objectives, paddy price guarantee scheme, or paddy mortgage scheme, of Thailand is repeatedly objected by international communities in a context of international trade³. On top of that, it was also challenged by practitioners in agricultural sector in the country, saying that paddy price guarantee program may enhances farmers' moral hazard, that is, farmers can easily go for the third cropping of paddy, or "risk paddy," during flood season due to unreasonably high price of paddy stems from the scheme.

Price guarantee program on the one hand provides resource poor farmers with a security of income. On the other hand, it also gives farmers an incentive to take risks of third cropping. This would be even worsened by the implementation of compensation program for flood damage. Under this program, farmers are not taking any risk of "risk paddy" as the damage incurred by flood is to be compensated by the government. As a result of those two schemes, therefore, more numbers of farmers reportedly practice three cropping per year even if third cropping is associated with the risk of flood. Thus, the price guarantee scheme may have to be tuned to avoid such an unwanted consequence.

d) Purchasing period set for price guarantee scheme/ paddy mortgage scheme

To avoid periodical flood, it is recommendable shifting the cropping pattern of rainy season paddy as early as possible. However, it was claimed that farmers in some areas, such as T. Singhanat, Ayutthaya, are not likely to shift the pattern because shifted pattern would not fit to the purchasing period of paddy under the price guarantee scheme or paddy mortgage scheme.

The story is however totally different in other areas, A. Ban Rakham for example; majority of farmers in this area already adapted their farming systems into two cropping per year to avoid flood. They establish rainy season paddy as early as possible but they do not claim any problem of purchasing period of price guarantee program.

This difference between the two cases could have been caused by either misunderstanding of the program or improper design of the program. In fact, price guarantee program was reformed from "paddy price guarantee scheme" of the previous administration to "paddy mortgage scheme" of current administration in August 2011. It is a possibility that this transition caused some confusion among the participating farmers.

(5) Proposed Countermeasures and Activities

1) Relevant government policy, plan and project (opportunity)

Relevant government policies, plans, and projects associated with farming systems, especially on paddy cultivation, are as follows:

a) Two cropping per year

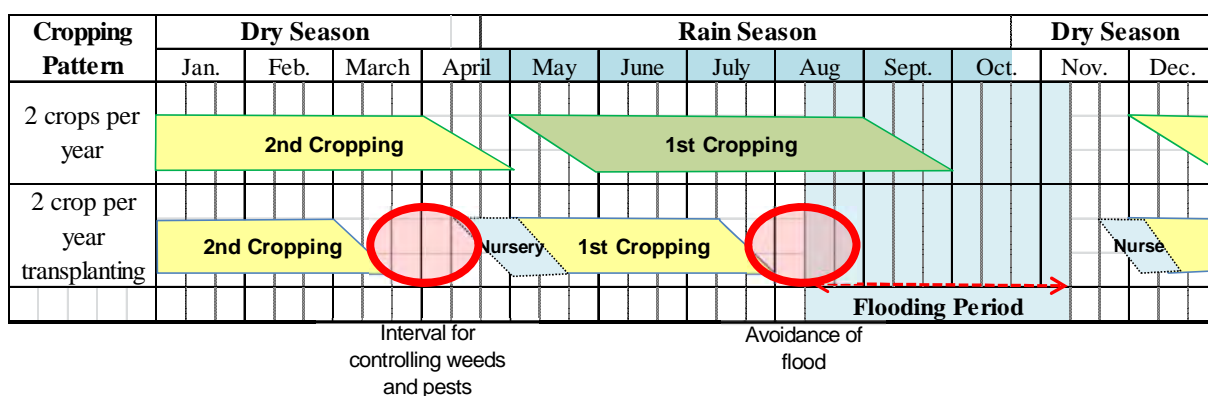
Rice department and its 27 branch offices of rice research centers at province level are the responsible agency for research in paddy and its cultivation. Department of Agricultural

³ <http://www.usarice.com/doclib/193/186/5474.pdf>

Extension (DOAE) on the other hand is playing a pivotal role in extension of relevant technologies and improved seeds. According to interviews to those institutes, both departments strongly recommend farmers to practice two cropping per year rather than three cropping.

By the practice of two cropping, there will be enough room for the adjustment of cropping calendar by which flood season can be better avoided. Furthermore, it is reported that at least two weeks of furrow period (interval) should be secured by which lifecycle of Brawn Rice Planthopper is to be disconnected (it does not mean the complete eradication though). Also, using this furrow period, organic matters incorporated into the soil will be partly decomposed, through which some seeds of weeds are also sterilized. Furthermore, by once letting weeds germinate during the interval, those weeds can be controlled.

Conceptual Cropping Pattern on Two Cropping per Year with Enough Intervals



b) Parachute transplanting

Parachute transplanting has been introduced in Thailand in the past couple of years. It is being promoted in some areas such as Pathum Thani with its lower cost of transplanting (1,325Bt/rai) as compared to machine or human transplanting (1,200-1,500 Bt/rai),⁴ According to Rice Research Center in Pathum Thani, experimental trials in other provinces showed higher net income derived from parachuting than that of direct seeding (statistical data yet available).

Some experienced farmers and officers insisted that parachuting is not technically attractive as it requires a bit complicated arrangement for seedling preparation and parachuting. But the expected total cost, which is lower than conventional method based on experiences in other areas, is quite attractive, they concluded.



⁴ Based on a brochure on parachute planting (DOAE, year not known), cost of parachuting is only 50 Bt/rai. Here, larger amount is applied based on the interviews considering the current appreciation of labor cost.

c) Extension on cost reduction in paddy cultivation

Responding to the voices from farmers that high production cost always distresses them, the DOAE is now promoting an improved practice of paddy cultivation that reduces the cost. In general, this approach is to reduce the cost of fertilizer which usually shares 25% of the total production cost. To reduce the application of fertilizer, organic fertilizer is introduced which is made with the application of microorganisms for soil improvement. This type of soil improvement agents are being promoted by the Land Development Department (LDD) as “Por Dor” series.

d) Prototype of seeding machine (paddy)

Recognizing the effectiveness of planting paddy in line, Rice Seed Production Center of Phitsanulok had developed a prototype machine of seeder specifically for paddy cultivation. As shown in the picture, the machine is composed of two parts: tractive machine and seeder. Tractive machine is controlled by remote controller, by which operator does not have to sit on the machine and go into the paddy field. Then, seeder is attached to this tractive machine, from which paddy seeds are dropped in a set interval: about 20 cm in between the row and about 5 cm in planting distance.



Paddy seeder developed by Rice Seed Production Center in Phitsanulok

Using this seeder, amount of seeds can be reduced from current 25-30kg/rai to 8kg/rai, through which cost can be significantly reduced. Moreover, expected yield can reach as much as 1,000kg/rai as compared to 900kg/rai in conventional method (based on the weight of wet paddy). As a result of this innovative effort, this machine was awarded the best award by the Agricultural Technology Road Award in 2011. From the technological point of view from the Project team, however, it is doubt if this machine can drop the seeds as precisely as designed because seeder is set approximately 50cm in height from the ground; seeds may be scattered.

e) Promotion of Giant Napier Grass

As an alternative crop to paddy during dry season, Giant Napier Grass, also called as “Giant King Grass, has drawn some attention recently. Several varieties of Giant Napier Grass, such as Pak Chong 1, are developed by the Department of Livestock Development Animal Nutrition Center. It can be used both as feed for livestock and as energy crop for power generation.



Giant Napier Grass being harvested six months after transplanted (Pilot Plot in Pakchong).

Once planted, Giant Napier Grass can be harvested for five consecutive years, in which first harvest can be done in 2-3 months as feed and in six months as energy crop. As a feed crop, Giant Napier Grass can feed approximately nine heads of cattle per rai (protein content is however lower than common Hamata grass which maintain 10% in protein content).

It can be sold at an average price of 16Bt/kg as silage, 7.07Bt/kg as fresh feed and 4 Bt/kg as energy crop. One of the challenges in Giant Napier Grass cultivation is found in harvest. It requires as much as nine person-day/rai of labor or 2 hours of operation by tractor. With relatively higher amount of expected income, however, it can be seen as a good potential crop as an alternative to paddy especially during late dry season because, once established, it can resist during flood.

f) Paddy Mortgage Scheme (ex-Paddy Price Guarantee Scheme)

Paddy mortgage scheme is being implemented to help farmers coping with paddy price fluctuation. In principle, the government provides farmers with loans upon paddy as mortgage. In so doing, farmers can get benefit as if paddy is sold at designated price (amount of loan) by not redeeming paddy. So, the paddy mortgage scheme is essentially same as paddy price guarantee scheme.

To get benefit, farmers are required to be registered at agricultural office of Tambon and to have a bank account at BAAC. In addition, farmers are required to ship their produces to rice mill within the same province. Rice mills, on the other hand, function as deposit points of paddy and they issue a document to farmers upon the receipt of paddy so that farmers can receive mortgage from BAAC by showing it. Rice mill can benefit 55 Bt/ton/month from depositing the paddy for the government.

To be registered under paddy mortgage scheme, rice mill has to satisfy the following:

- 1) Rice mill has to down the collateral at 50% of paddy price.
- 2) Rice mill may not deposit paddy before mortgage scheme starts.
- 3) Must have equipment and tools necessary for deposit and milling.
- 4) If rice mill keeps paddy more than 90 days, rice mill must record the mortgage information and report online to the rice committee every day.
- 5) If the paddy or rice must be transferred, rice mill must report one day before.
- 6) Rice mill send the rice to the government's warehouse or buyer in designated time.
- 7) Rice mill must deposit paddy 30 times as much as its milling capacity.

Table 6.4.14 shows the duration and price of paddy in mortgage scheme from 2004 to 2012. As shown in the Table, mortgage price has varied from 6,600 Bt/ton (2004/2005 wet season and 2007 dry season) to 15,000 Bt/ton (2010/2011 wet season and 2012 dry season) with an increasing trend.

Price and Period of Mortgage Scheme (2004-2012)

Crop year	Duration	Mortgage price (baht/ton)	Remark
<u>Wet season rice</u>			
2004/2005	N/A	6,600	
2005/2006	November 2005 – June 2006	7,100	
2006/2007	November 2006 – October 2007	6,500	
2007/2008	November 2007 – April 2008	6,700	
2008/2009	November 2008 – June 2009	12,000	
2009/2010	N/A	N/A	Price guarantee scheme
2010/2011	October 2011 – February 2012	15,000	
2011/2012	N/A	N/A	Wait for announcement
<u>Dry season rice</u>			
2005	N/A	6,700	
2006	March – July	7,100	
2007	March – October	6,600	
2008	N/A	N/A	
2009	March – October	12,000	
2010	N/A	N/A	
2011	N/A	N/A	
2012	March – September	15,000	

Source: Interview to OAE (2012).

2) Development Strategies as Countermeasures against Flood

In general, to enhance resilience of agricultural and rural communities against periodical and unprecedented flood, every single aspect of agricultural and rural communities should be improved.

The following briefly explains the main idea of proposed projects:

a) Preparation of preservative food

During evacuation, securing a life-line, especially food, is the foremost concern for everyone. In related to farming sub-sector, preparation of preservative foods such as processed foods, beans, and sweet potatoes, can help respond to such a situation. During ordinal years without severe flood, those foods can be sold as a source of income and then, once severe flood occurs, they can be consumed at the evacuation center.

b) Early preparation of paddy

As the government promotes, establishment of paddy at an early stage of wet season is basic but important practice to complete harvest before flood comes. Yet, several factors prevent farmers from starting early timing, which include: availability of irrigated water, and target period of paddy mortgage scheme. Therefore, to effectively promote this activity, other activities, including structural measures, should be orchestrated.

c) Shortening of paddy cultivation period

To avoid flood, shortening the cultivation period is of the most effective countermeasures in paddy cultivation. In so doing, two major approaches should be taken: use short-maturing

varieties that can be harvested 90-100 days after sowing, and transplant seedlings. In some areas, short-maturing varieties are not applied for the negative traits those varieties may entail. Thus, while waiting for more attractive short-maturing varieties to be developed, more focus should be placed on the potential of transplanting.

Particularly, transplanting can be managed by machine and parachuting method. Transplanting machine can be applied where service providers are prevailing and the physical condition of paddy field is stable enough (machine cannot be operated where soil is too soft). If machine is not suited, parachuting is then recommended.

By transplanting, problems of BPH and weedy rice can be also addressed. As the growth stage of paddy is already on progress at the time seedlings are transplanted, they can easily surpass the growth of weeds. Also, as paddy plants are established with enough space to each other, application of herbicide and pesticide is easier and more effective than densely-established paddy under broadcasting method.

Applicability of transplanting may be challenged by its high cost both by machine and by parachuting. However, there are some empirical studies that have proved the improved cost effectiveness of transplanting. So, based on practical evidence, it should be widely promoted.

d) Introduction of short cycle crops

Once damage is incurred, recovery process should be commenced as soon as possible. Aside from social impact, starting-up of new cultivation is the central issue for farmer households. Although it is desirable to restart paddy cultivation for most of paddy farmers, it also entails several issues. First of all, upon the failure of harvest, it is anticipated that farmer households lost an income source one time, implying there remains a certain amount of debt that should have been repaid by the harvest that they lost.

Therefore, before restarting the cultivation of paddy, seed money need to be secured. In this context, short-cycle crops such as vegetable, which also require relatively lower investment cost, can provide farmers with a good opportunity to earn quick cash. By revolving such small but quick cash, farmers can strengthen their capital for re-cultivation. Note that introduction of vegetables can be a good source of income even during ordinal years and help diversifying the farming system of the household.

e) Introduction of high-value crops for quick cash

Concept of this approach is basically the same as “introduction of short-cycle crops” that is mentioned above. On top of that, emphasizing the value of crops would further help farmers improve their livelihood both during ordinal years and flooded year. Potential ones may include hydroponic vegetables cultivation and mushrooms culture, both of which can be managed in relatively small plots even during flood.

This can be further organized, if applicable, in the factories in the industrial estate where vegetables are to be consumed at factories’ dining in a usual year and can be a supplemental

source of food supply at an isolated condition during flood.

f) Preparation of seed bank

As mentioned in “5) Common Issues and Problems in Paddy Cultivation” of this sub-chapter, a lack of seeds for replanting was specifically a big problem after the 2011 flood in many areas. Thus, it is proposed to keep a certain amount of quality seeds for the purpose to replant them in the event of big flood in the future. Those seeds are also used usual years and, in an emergency case, it can be consumed at evacuation center.

g) Diversification of crops

As a means to reduce the risk of flood damage, it is recommended to diversify the farming portfolio of farmer household in terms of type of crop or income source itself. It is well known that mono-cropping entails a significant level of risks, which may be sometimes incurred by a price fluctuation, outbreak of pest and disease, or natural calamities. Diversification of crops is therefore generally recommended for paddy farmers too. In such a circumstance in which paddy price guarantee scheme is attacked by national and international communities⁵, current high price may not necessarily consist until foreseeable future. Thus, farmers are better prepared not just for flood but for the possible change in surrounding conditions.

h) Cost reduction in paddy cultivation

Generally, higher yield can be expected when as much amount of farm inputs are applied to the extent that paddy can perform its genetic potential. However, once any disastrous event happens, the value of loss proportionally increases. For example, required amount of fertilizer for second or third cropping is usually higher than first cropping after flood and the conceivable loss of those cropping would increase.

Therefore, in light of risk diversification, cost of production should be minimized to an extent expected level of production is kept at reasonable level. Today, DOAE is promoting an improved practice in paddy cultivation by which cost of production is reduced: use of bio-fertilizer coupled with the application of microorganisms is the main component of it. Thus, cost reduction approach should be solely introduced or combined with other project activities that may require additional investment so that the total cost can be moderated.

i) Introduction of flood tolerant varieties

It is desirable that the farming system in ordinal year is also adapted to the condition of unpredictable flood. Typical countermeasure is to introduce flood tolerant varieties during rainy season, by which damage of flood can be reduced. This approach is applicable especially in such an area where periodical flood occurs. Although expected amount of production from flood tolerant varieties may not be appreciable enough, it can provide farmers with an alternative opportunity at lower risk.

⁵ For example, <http://www.thaivisa.com/forum/topic/551479-rice-pledging-scheme-drives-out-thai-businesses/>

j) Introduction of pro-water commodities/method

According to the good practice survey, it was reported that floating raft was being used to cultivate certain types of vegetables that are relatively tolerant to water such as Pak Bun—a type of aquaponics. Based on that successful practice, therefore, use of floating raft can be recommended as for vegetable cultivation during flood and even during ordinal time especially on any water surface like farm pond. To be more practical suited to Thailand context, raft should be made of locally available materials such as bamboo.

In this kind of arrangement, solid removal at around the root systems of vegetables is a decisive factor that influences the growth of vegetable. Here, various types of materials such as gravel, expanded clay, and bamboo charcoal can be used not just for solid removal and also for bio-filtration that harnesses effective microorganisms (need validation of the system). Economic return can be maximized when it is combined with fish culture in fishponds.

k) Promotion of fishing and fish processing

Typical approaches in flooded condition are to avoid or minimize the damage of flood. However, it should be also considered making use of any resources enabled or became accessible by the flood. According to TAO officers in T. Khao Kaeo of Chainat, community people were able to catch a plenty of fish during the flood in 2011, those which are drifted from upstream areas. Some of them even dug fishponds after the flood as to seek for a next opportunity.

During flood time, however, it is not always easy to deliver the fish and sometimes price of fish go down due to suddenly increased supply. Therefore, it is further recommended to process those fish for strategic marketing and as conservable food for evacuation center. Traditional fermentation, as known as “Pra Som,” and pre-cooked fishcake/fish paste, and canned foods can be potential examples.

l) Promotion of feed crops for livestock

Although damaged areas of flood are physically restricted to such areas where elevation is lower than others, countermeasures should be implemented in cooperation with communities in other areas. During the 2011 flood, for example, evacuation of livestock was organized through inter-provincial arrangement; herds of cattle in flooded areas in Ayutthaya were reportedly transferred to Suphanburi. Thus, securing evacuation place for livestock, preferably nearby places, is also an issue.

Moreover, availability of feeds for livestock should be taken into account. Usually, cattle are grazed along canal or paddy field after harvest, wherein cattle take natural plants or residual plants in the field. However, during the flood, all those plants are under water, and so, security of feeds becomes to be quite a serious problem.

Therefore, as an approach toward agricultural and livestock interrelation, production and stock of feed crops are recommended. Today, Giant Napier Grass and Pangola Grass are

being promoted by Livestock Development Department, and they are given attractive prices. Thus, it can be promoted especially elevated areas close to flood prone areas so that feed supply becomes more stable and elevated area can be an evacuation place for cattle in emergency cases.

m) Promotion of crop insurance

The government maintains a set of crop insurances in cooperation with Bank of Agriculture and Agricultural Cooperatives (BAAC). In addition to ad hoc type of compensation scheme which may be considered upon the occurrence of flood, use of existing insurance scheme would be a potential means of self-protection for a certain types of farmers who invest relatively large amount of money and/or who can make rational decisions based on proper understanding on benefit of the insurance.

One of the challenges in promotion of crop insurance scheme is that scheme is not clearly understood by the beneficiary farmers. Before the incident, farmers tend to focus only on the premium—it should be as low as possible for farmer. After the incident, however, many beneficiary farmers claim that the insurance payment is lower than they have expected. In some case, farmers think all the input cost for paddy cultivation should be covered. This kind of miscommunication could lead to a big reputation risk.

Also, crop insurance is still an emerging service and thus an established system is yet available in Thailand. Different from life insurance, risk analysis and actual calculation on crop insurance entail a lot of variable factors such as variety of crop, soil type, micro-climate, and availability of irrigation. So, while promoting existing crop insurance for proper understanding of the services, establishment of better method should be simultaneously conducted.

n) Improvement of paddy price guarantee scheme

As aforementioned, paddy rice guarantee scheme, or paddy mortgage scheme, still entails some problems and issues. This scheme even influences the implementation of other project activities: for example, farmers may not shift cropping season to avoid the risk of flood because expected timing of harvest may not be the time when mortgage scheme purchase their paddy.

Also, it is repeatedly claimed that farmers are not sure when details of the scheme is to be announced as the period and condition of the scheme is subject to political consideration each year: fiscal arrangement, capacity of stockyard, and public circumstances for example. Thus, purchasing period should be announced as soon as possible and also it should be in line with early cropping of paddy, if at all.

Fishery

Inland fisheries sector plays an important role in sustaining the livelihood of rural communities along Chao Phraya River basin. According to an FAO report¹, participation rate of rural people in inland fishery activities is as high as 14% of the total number of household in nation, as they catch fish mainly for home consumption, although it is carried out in traditional way.

It is claimed that statistical figures in inland fishery sector, especially on production, are often underestimated due to its difficulty to collect primary data. Under this background, some data are introduced based on the Agricultural Statistics of Thailand 2011.

First, number of farms and area of freshwater fish culture is shown in Table 6.4-15. As shown in the table, 533,547 farms engage in fishery based on pond culture, which accounts for 97% of availed data. As a form of pond culture, aggregated area of the ponds reached 945,734 rai or 92% of the total area. Thus, aside from catching in rivers, pond culture characterizes the freshwater fish culture in Thailand.

Number of Farms and Area of Freshwater Fish Culture (2009)

Type of Culture	No. of Farms		Area (rai)	
Pond culture	533,547	97%	945,734	92%
Paddy-field culture	6,372	1%	73,601	7%
Ditch culture	4,250	1%	12,677	1%
Cage culture	6,462	1%	549	0%
Total	550,631	100%	1,032,561	100%

Source: Agricultural Statistics of Thailand (2011)

Furthermore, major types of freshwater fish species are shown in Table 6.4-16 in a descending order of value. The most popular type of species is Nile tilapia that had been caught at the total of 258,500 ton per year, generating a value of 9,881.5 million Bt. It was followed by walking catfish (144,200ton, 6,029.4 million) and giant freshwater prawn (27,500 ton, 3,689.4 million Bt).

¹ <http://www.fao.org/docrep/011/i0573e/I0573E03.htm>

Quantity and Value of Annual Catch of Freshwater Fishery (2009)

Rank	Species	Quantity (1,000t)	Value (million Bt)
1	Nile tilapia	258.5	9,881.5
2	Walking catfish	144.2	6,029.4
3	Giant freshwater prawn	27.5	3,689.4
4	Common silver barb	93.2	3,330.8
5	Striped snake-head	33.3	2,476.4
	Others	172.0	7,003.1
	Total	728.7	32,410.6

Source: Agricultural Statistics of Thailand (2011)

In this context, the flood in 2011 brought about a significant impact on inland fishery sector. First of all, it had caused significant loss of fish from fishponds that are the major type of fish culture. As a result, fish farmers having fishponds underwent much economic loss. On the other hand, there are some areas where community people enjoyed catching fish in flooded area (see PRA report). Especially, flooded area in Ayutthaya received crowds of fish from upstream mainly from Lake Bung Boraphet in Nakhon Sawan.

Ironically, it showed that flood also has some positive impact to some group of community people. It further implies that fish can be a good source of income in such areas. As a matter of fact, there are some people in T. Gop Chao, Ayutthaya who constructed additional fish ponds after having enjoyable catching during the flood.

In relation to fishery sector, in addition, it was reported that group of fish famers in Phitsanulok area claimed that they were not able to enjoy catching fish as long as they usually do because the government hurried draining flooded water in the area and actually drained much faster than ordinary years—it is quite a new insight to water management sector.

Value Chain/ Marketing Channel of Agricultural Product

(1) Agricultural product value chain/marketing channel in model area

Current situation of agricultural product value chain/marketing channel was studied through the participatory rural appraisal (PRA) workshops and interview survey for marketing related organization in the project model area. Target crops for the survey are 1) rice, 2) sugarcane, 3) vegetables, and 4) orchid which were selected from major crops in the project area as shown in the following table. One of the main objectives of the study on current situation of agricultural product value chain/marketing channel is to reveal the main stakeholders of marketing and to know the characteristics of distribution channel as basic information in flood damage survey.

Major Crops in Eight Model Areas

Tambon	District	Province	Major crops cultivated in the model area
Chum Saeng Songkhram	Bang Rakam	Phitsanulok	Rice
Nakhon Pa Mak	Bang Kratum	Phitsanulok	Rice, Sugarcane
Wang Man	Wat Sing	Chainat	Rice, Sugarcane, Cassava
Khao Kaeo	Sapphaya	Chainat	Rice
Gop Chao	Bang Ban	Ayutthaya	Rice, banana
Singhanat	Lat Bua Luang	Ayutthaya	Rice, fruit tree, vegetable
Khlong Ha	Khlong Luang	Pathum Thani	Rice, mango, banana
Naraphirom	Bang Len	Nakhon Pathom	Rice, orchid

Source: JICA Project Team

Major stakeholders and characteristics of marketing/value chain channel of major crops in the model area are summarized in the following table.

Major Stakeholders and Characteristics of Marketing/Value Chain Channel

Crops	Major stakeholders of distribution	Characteristics of marketing/value chain and crop cultivation in the model area
Rice	<ul style="list-style-type: none"> ● Paddy collector ● Rice mill ● Whole seller ● Distributor ● Retailer ● Exporter 	<ul style="list-style-type: none"> ● Private sector is main stakeholder for rice distribution. ● There are two ways of distribution channel under mortgage scheme and under no mortgage scheme ● Price stabilization policy (Paddy mortgage scheme) by government makes rice prices stable.
Sugarcane	<ul style="list-style-type: none"> ● Sugarcane factory 	<ul style="list-style-type: none"> ● Sugarcane factory is main stakeholder for sugarcane distribution. ● There are three quota amount based on oversea and domestic market.
Vegetables	<ul style="list-style-type: none"> ● Vegetable collector ● Thai market in Pathum Thani ● Distributor ● Retailer ● Exporter 	<ul style="list-style-type: none"> ● Most of vegetables are trades through Thai Market (Tarad Thai) in Pathum Thani near Bangkok. Vegetables traded in local market are relatively less. ● In the model area, vegetables are exported to oversea countries such as EU. Exporter is a main stakeholders of vegetable export.
Orchid	<ul style="list-style-type: none"> ● Private orchid distributor ● Merchants in local and Bangkok ● Flower market in Bangkok ● Retailers ● Exporter 	<ul style="list-style-type: none"> ● Private orchid distributor is main stakeholders for orchid distribution. ● 50% of orchid production is brought to domestic market and rest of that is for oversea market. ● Major flower market is located in Bangkok. It is also major distribution channel of orchid.

Source: JICA Project Team

1) Rice

Rice is the most major crops both in the model area and whole of Thailand. Especially, Phisanulok and Chainat Province of model area are the granary in Thailand and the supply center of Rice to both domestic and oversea consumers. Rice Distribution in the model areas has 2 types and mortgage scheme, government intervene in paddy price, is the main factor to make distribution channels different. Two types of distribution channel are distribution under Mortgage Scheme (Figure 6.4.20) and distribution under market mechanism with no price intervention . The details of each distribution channel are shown in the following figures;

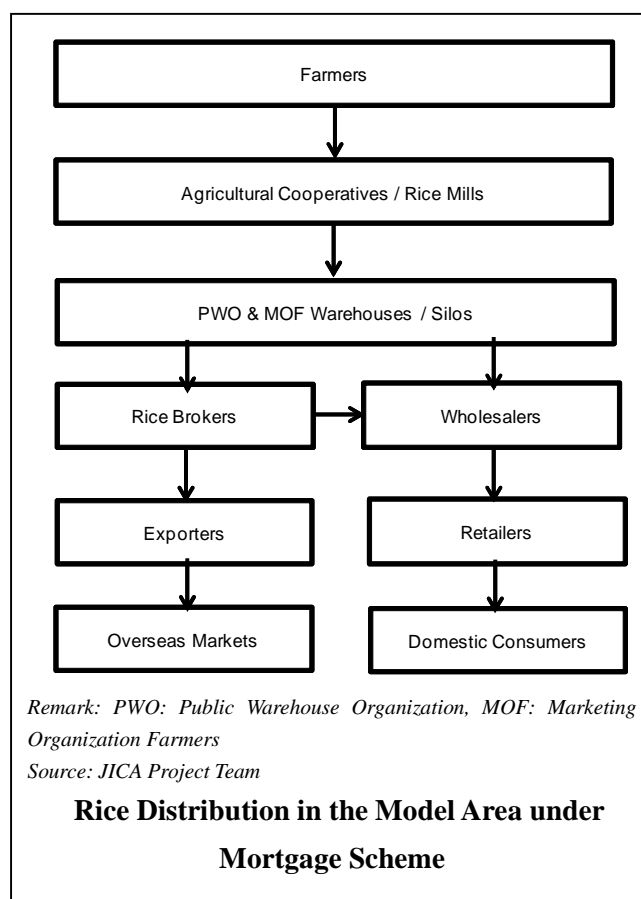
a) Rice distribution channel under Mortgage Scheme

Due to crop year of rice, wet season and dry season, mortgage scheme launches 2 times, for paddy in wet season and dry season. After harvesting farmers will bring their product to mortgage at rice mills or agricultural cooperatives which participated in mortgage scheme and from interview from stakeholders, it was found that after harvesting all farmers did not dry or keep paddy then they received money less than mortgage price defined because the moisture content was over 15%.

At the rice mill paddy will be milled and sent to PWO and MOF warehouse or silos that rented by PWO and MOF. Afterwards all rice in PWO and MOF warehouse are distributed to consumer by 2 channels

1. For domestic consumer, rice will be distributed through wholesalers and end at retailers

2. For oversea markets, will be distributed through rice brokers and end at exporters.



b) Rice distribution channel in normal situation, no price intervention

For this distribution channel, there is no price intervention. Most of farmers sell their product to 2 places, central markets or Agricultural Cooperatives, the distance and price are the main factor

to decide where they sell their product. Afterwards all product will be sold at rice mills. In this step some farmers will sell paddy to middlemen or primary collectors who come to buy their product regularly at their farm gates.

After milling, all rice will be distributed to customers in 2 ways:

1. For domestic consumer, rice will be distributed through wholesalers and end at retailers
2. For overseas markets, will be distributed through rice brokers and end at exporters.

Rice distribution channel can be divided into two parts, paddy distribution and rice distribution before and after rice milling. At both paddy and rice distribution channel, it is mainly distributed through the private sectors. The most major stakeholder of rice distribution is rice millers.

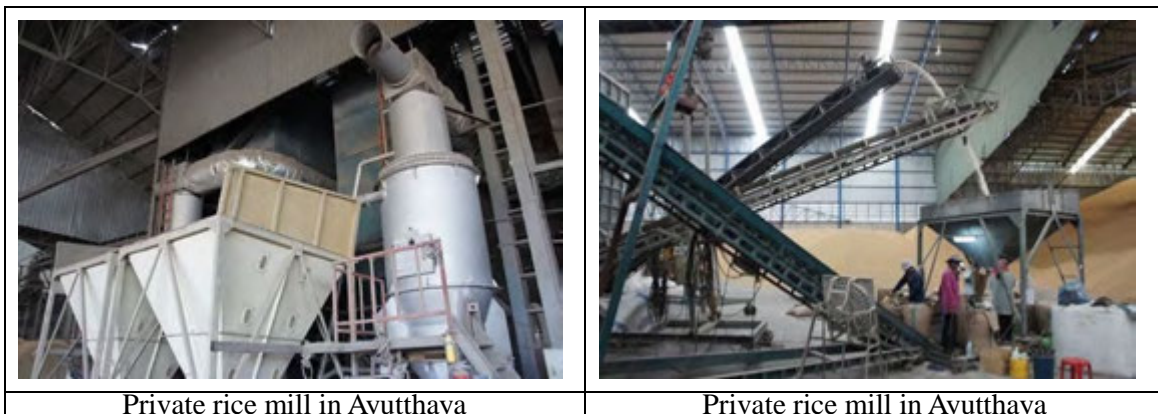
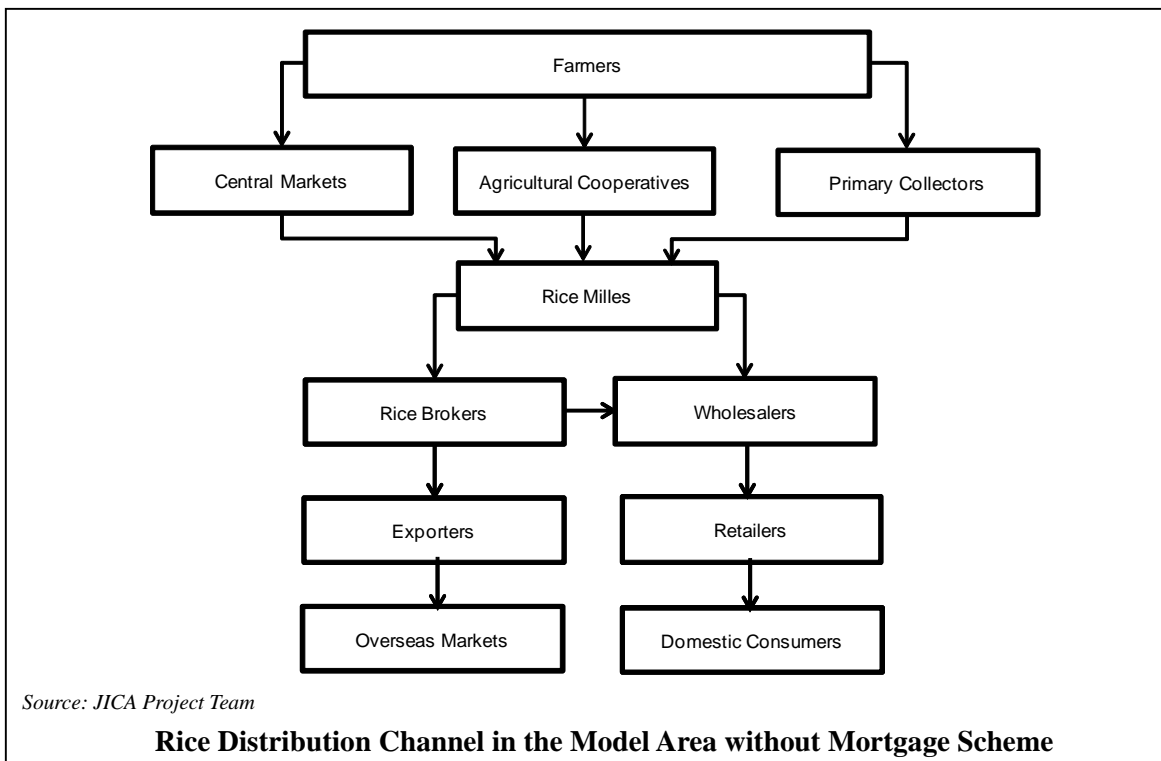
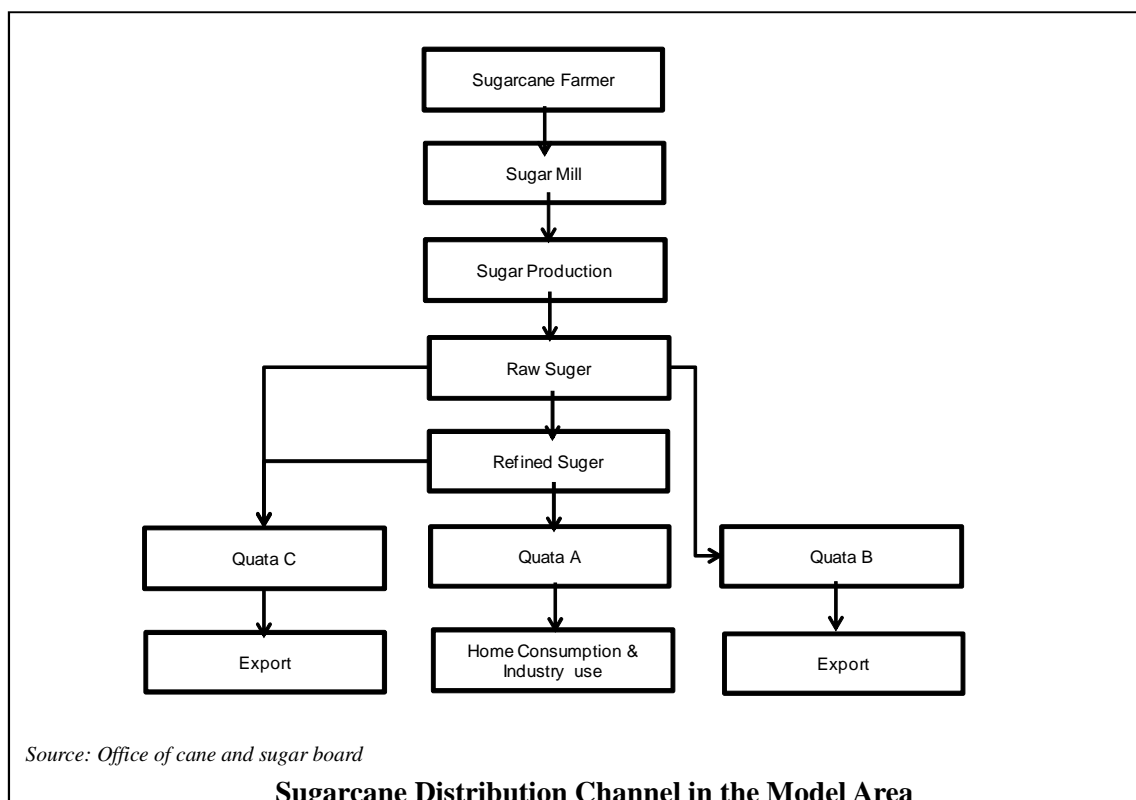


Photo by JICA project team

2) Field crops (Sugarcane)

The following figure shows sugarcane distribution channel in the model area, Nakhon Pa Mak Tambon, Bang Kratum District, Phitsanulok Province.



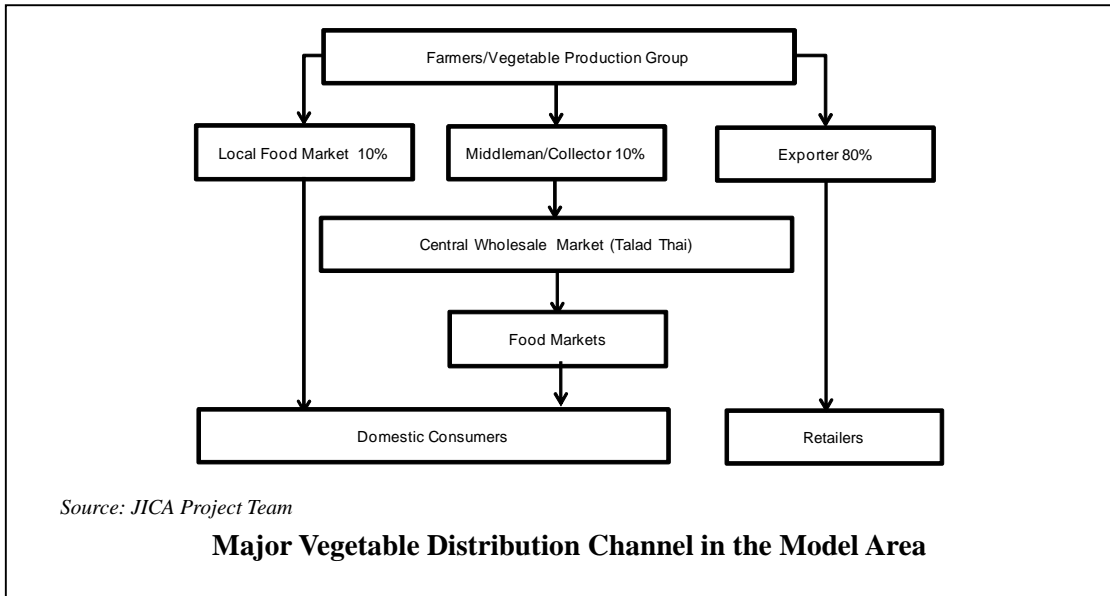
After harvesting, farmers should send sugarcane to sugar mill immediately in order not to lose weight and to preserve the quality. At the sugarcane mill, at first all sugarcane must be measured sweetness level and quantity of sugar in sugarcane (in case of Commercial Cane Sugar: CCS). Afterwards, it will be transferred to sugar production which has 5 steps in process and the sequence including mill, clarification, evaporation, crystallization and centrifugation. Raw Sugar is produced through these processes. The final stage and final product at the sugarcane mill is Refined Sugar, which is distributed to domestic customer and oversea markets.

From the interview, sugar product is divided into 2 types namely Raw Sugar and Refined Sugar and distribution channel depend on quota which allocated to 3 quotas. The details of each quota are as follows;

- Quota A: product is Refined Sugar for domestic consumption both in household and industry.
- Quota B: product is Raw Sugar and this quota is for export
- Quota C: products are Raw Sugar and Refined Sugar and this quota are also for export

3) Vegetables

The following figure shows a specific distribution channel in the model area, Singhanat Tambon, Lat Bua Luang District, Ayutthaya Province based on the results of interview in the area regarding distribution.



At first, year 2000, vegetable cultivation is the supplementary occupation of farmers in this area and in the year 2001 vegetable group was established and started growing vegetables with Good Agriculture Practice certificate (GAP), then at the present time vegetable is the main income source for them. All products are distributed to customers through the following 3 ways.

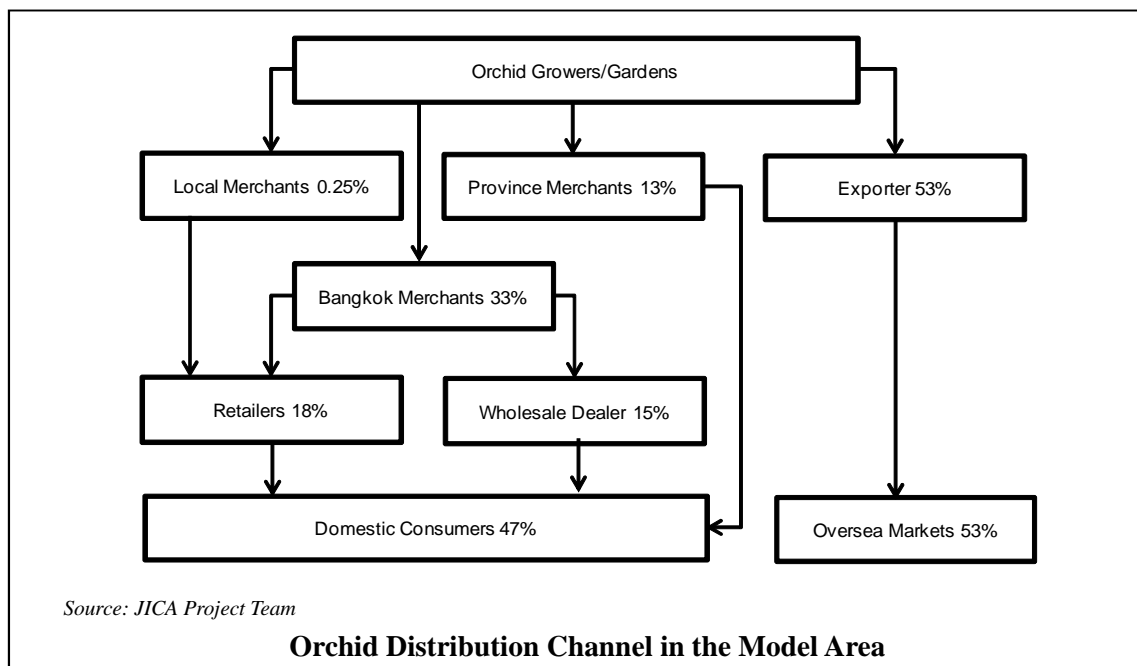
1. 10% of the product was sold directly to customers at local food market. In this way farmer group sell their product by themselves.
2. 10% of the product was sold to middlemen and resold to Talad Thai, Central wholesale market, before transfer to retailers in food markets.
3. 80 % of the product was sold to exporters for overseas markets especially EU market. In this way exporter will contract with vegetable group and has price guarantee each year.



Photo by JICA project team

4) High value crops (Orchid)

Distribution Channel of orchid in the model area, T. Naraphirom, Bang Len District, Nakhon Pathom Province are as follows based on the result of interview in the area about distribution channel ;



The distribution channel starts from orchid gardens and all products are distributed to domestic consumer around 47% and overseas markets 53%

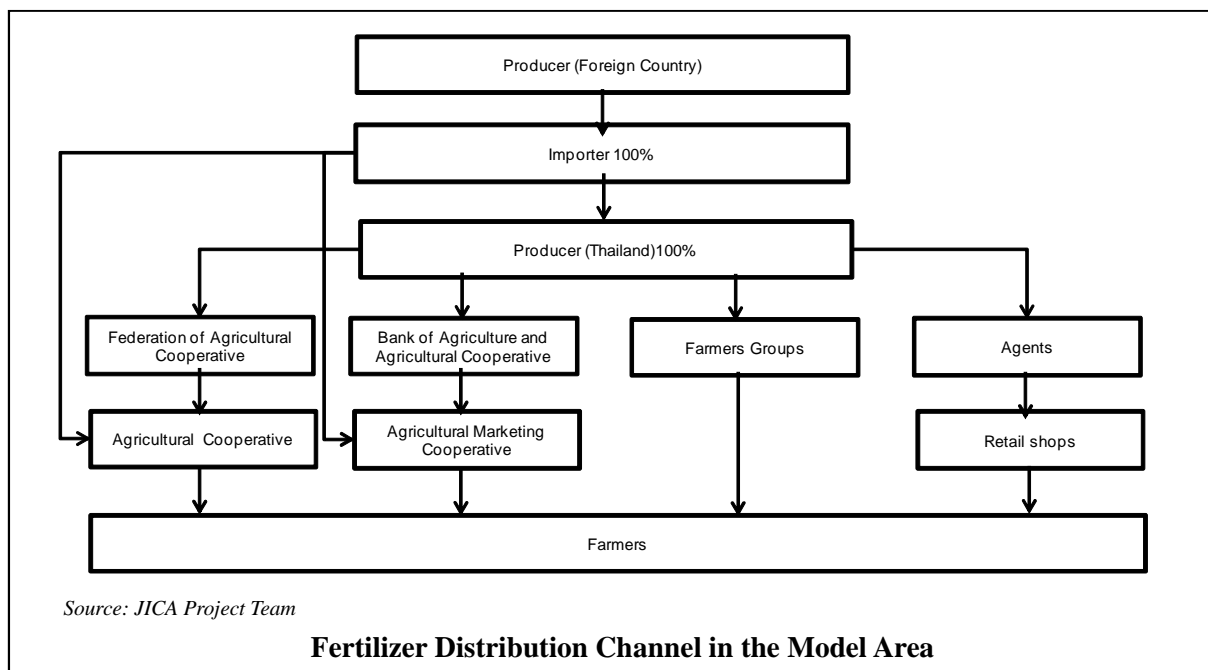
For domestic consumers, 0.25% of total products is for distribution to local merchants and retailers before distributed to customer. 33% of total products will be distributed to Bangkok merchants afterwards 18% will be sold to retailers and 15 to wholesale dealer. 12.85% of total products will be distributed to others province merchants and sell directly to customers. For overseas markets, 53.47% of total products will be sold to exporters.



Photo by JICA project team

(2) Agricultural input distribution channel

The Project Team surveyed fertilizer distribution channel as an agricultural input distribution channel. The following figure shows fertilizer distribution in the model area, 8 Sub-Districts in 8 District and 5 Provinces.



Stakeholder of fertilizer distribution consists of Producer in foreign country, importer, Domestic producer, and Federation of Agricultural Co-operative, Bank for Agriculture and Agricultural Cooperatives, Farmer Groups, Agent, Agricultural Cooperative, Agricultural Marketing Cooperative and retail shops.

For inorganic fertilizer, initial substance must import 100% afterwards they will be distributed to farmers through 3 channels;

1. Through Federation of Agricultural Cooperative, Bank for Agriculture and Agricultural Cooperative, Farmer Groups and Agent in each province afterwards they will send to Agricultural Cooperative, Agricultural Marketing Cooperative and retail shops respectively before sending to farmer at the end. In this channel farmer Groups will send directly to farmer.
2. Start from importer through Agents to farmers
3. Start from importer through Agricultural Cooperative to farmer

(3) Issues and problems related to flood

Direct impacts on agricultural marketing/value chain for four categories such as facilities, distribution channel, marketing information, and market price by the flood in 2011 surveyed

through the study in eight model area is summarized in the table below.

Impact by the Flood in 2011 Related to Marketing/Value Chain

Category	Damage by flood	Impact on agricultural marketing/value chain	Degree of impact
Facilities	<ul style="list-style-type: none"> • Agricultural marketing facilities were partly flooded but there were no severe direct damage to facilities and equipment. • There were damages to community marketing facilities in the model area because lack of flood information. 	<ul style="list-style-type: none"> • Distribution function have stopped during the flood but it was quickly recovered after the flood. 	small
Distribution channel	<ul style="list-style-type: none"> • Access road to market were flooded ; due to this the facilities could not operate even facilities had no damage. 	<ul style="list-style-type: none"> • Distribution of agricultural products have stopped during the flood period. 	small
Marketing information	<ul style="list-style-type: none"> • Confusing of market information were observed. 	<ul style="list-style-type: none"> • Due to the rumors, volume of trades in markets were decreased. 	small
Market price		<ul style="list-style-type: none"> • No great fluctuation of agricultural product price was observed. 	small

Source: JICA Project Team

Damage for marketing related facilities

According to the interview to stakeholders for marketing in the model area, damage for marketing related facilities such as rice mill, agricultural product market, distribution center of supermarket, community collection center was observed in the model area but the impact by the flood was limited.

Major important marketing facilities such as vegetable markets, rice mills etc. took a countermeasure to protect their facilities by construction of dikes based on the advance notice of flood. As a result, they could keep their flood damage to the facilities minimum though several facilities were flooded partly. After the flood, these facilities were quickly recovered to operate normally because they had only limited damage to important equipment of the facilities.

In the model area, community market facility such as refrigerator for vegetable storage was submerged and broken. According to interview, they did not have enough information regarding flood and time to prepare for flood.

Regarding impact for marketing related facilities, it can be concluded that direct damage on facilities and equipments were limited, and information about flood has an important role for protection of marketing facilities. Major marketing stakeholders such as rice mill, market etc. could take countermeasures for protection based on the information but farmers community could not do so because of lack of information and fund for protection. It might be important to support community for providing accurate information and cost for protection of their facilities.



Photo by JICA Project Team

Damage for distribution channel

During the flood in 2011, access roads to the marketing facilities such as vegetable markets were blocked partly by flood water; due to this several facilities could not operate though facilities and equipments had no damage during the flood period in the model area. Blocking of access road to markets was one of the reasons to stop the agricultural product distribution channel.

Confusing information of marketing

It was observed that there was confusing of information regarding market operation. For example in Talad Thai (Thai market in Pathum Thani), All kind of media including radio, TV and newspapers provided incorrect information on water level and flood situation of Talad Thai and it effected on the trade in the market. During this period, the trade amounts in the market were dropped to about 50%.

Impact for price of agricultural product and inputs

According to the interview from several stakeholders in the model area, rice, other field crops and vegetable market price was not fluctuated greatly during the flood period, though consumer price of some agricultural products have been increased. Regarding rice and other field crops, it is because price guarantee policies by government such as rice mortgage scheme have been keeping the prices stable. Meanwhile, regarding vegetable in the Talad Thai market, both demand and supply were decreased because of flood.

As a demand side, major traders such as supermarkets could not operate normally because of the flood. And as a supply side, vegetable cultivation and production amount also decreased because of the flood. Therefore no great price difference was observed during the flood. After

the flood and recovering from flood situation, price of agricultural product became higher than the usual because cultivated area were damaged and that reduced the harvest not enough for market demand. But this situation has got back normal after several months.

Though the flood makes traded amount of agricultural product decreased, it had no serious impact on agricultural prices. Farm gate price for major agricultural crops from 2010 to 2012 and change of farm gate price for major crops (Jan. 2010 = 100) are shown in the following table and figure.

Farm Gate Price for Major Agricultural Crops from 2010 to 2012

Month/Year	Major Rice 1/ Baht/ton	Second Rice 2/ Baht/ton	Maize Baht/kg	Cassava Baht/kg	Sugarcane Baht/ton
Jan-10	10,052		6.93	1.93	839
Feb-10	9,608	9,209	7.17	1.78	851
Mar-10	8,673	8,692	7.61	1.88	938
Apr-10	8,295	7,891	8.16	2.10	1,009
May-10	8,032	7,808	8.32	2.16	
Jun-10	8,102	7,956	8.46	2.28	
Jul-10	8,291	8,189	8.74	2.61	
Aug-10	9,078	8,220	8.34	2.95	
Sep-10	9,618	8,193	8.09	2.55	
Oct-10	10,402	8,200	7.89	2.40	
Nov-10	10,623		7.94	2.57	775
Dec-10	10,441		8.00	2.73	899
Jan-11	9,455		8.21	2.82	911
Feb-11	9,088	9,031	8.38	2.96	948
Mar-11	8,425	8,384	8.36	2.93	939
Apr-11	8,063	8,026	8.87	2.77	949
May-11	8,126	7,982	8.62	2.55	910
Jun-11	8,723	8,591	8.13	2.20	
Jul-11	9,125	8,993	8.02	2.02	
Aug-11	10,102	9,523	7.22	2.00	
Sep-11	10,681	9,949	7.43	1.92	
Oct-11	11,549	10,217	7.76	1.73	
Nov-11	11,863	10,305	8.39	2.22	1,024
Dec-11	11,933	10,322	8.54	2.45	928
Jan-12	10,562	9,641	8.61	2.25	950
Feb-12	9,880	9,645	8.67	1.88	958
Mar-12	9,956	9,921	8.48	1.75	958

Source: Office of Agricultural Economics, MOAC

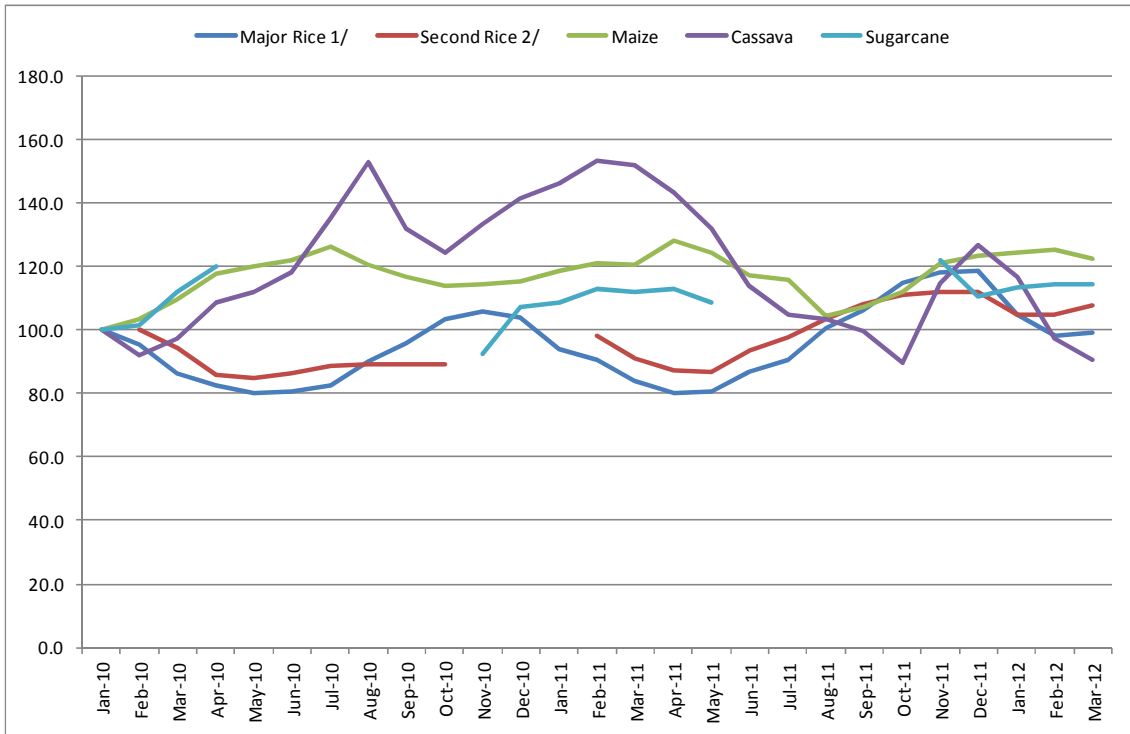
1/ Major Rice: Planting between May-Oct. and harvest on Aug.-Apr.

2/ Second Rice: Planting between Nov.-Apr. and harvest Feb.-Oct.

Note:

1) Major and second rice price around Oct. 2011 was higher because of rice mortgage scheme by Thai government.

2) Cassava price may be affected by international market price.

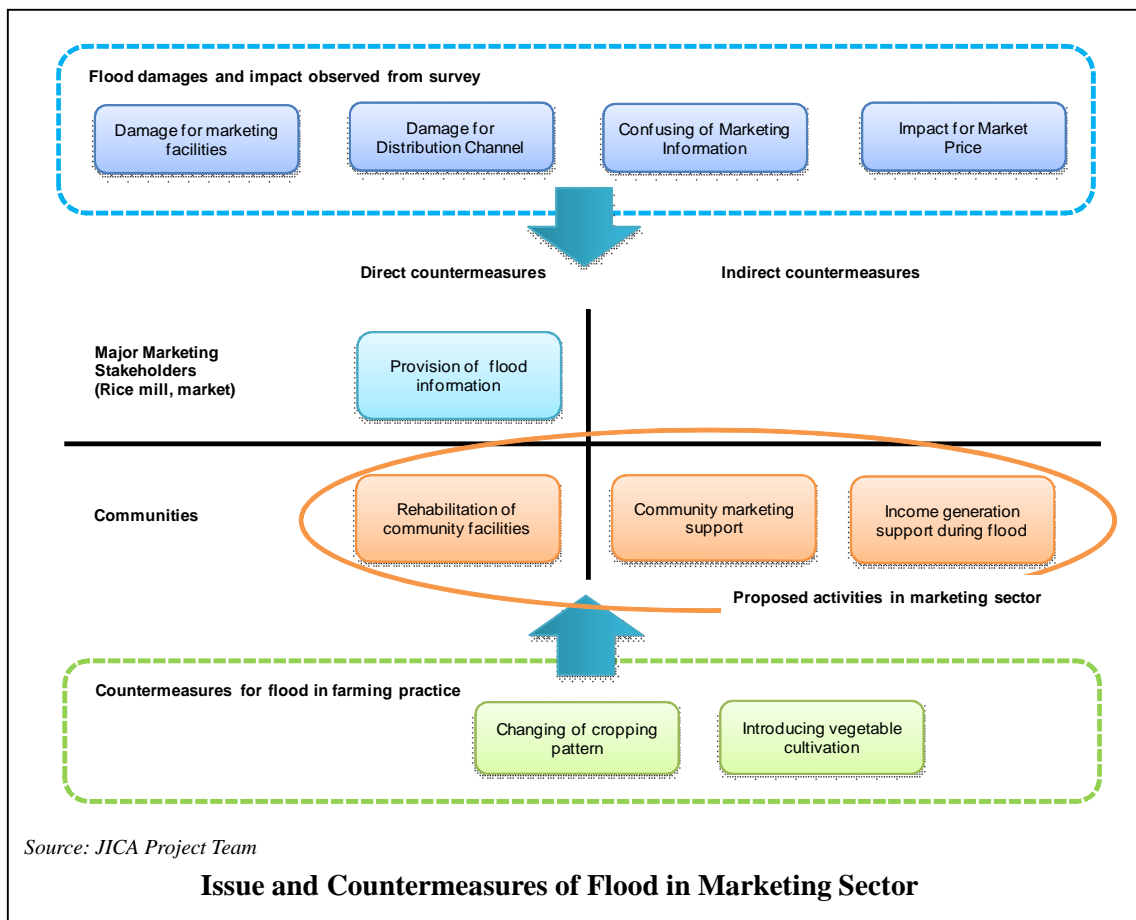


Source: Prepared by JICA Project Team based on the data from Office of agricultural economics, MOAC

Change of farm gate price for major crops (Jan. 2010 = 100)

(4) Proposed activities for value chain and marketing support

Based on above mentioned flood damage surveyed through a series of PRA workshops and interview from stakeholders of agricultural product marketing, it can be concluded that direct flood damages for marketing facilities and distribution channels were relatively small. Therefore, the project team proposes not only direct damage mitigation and recovery measures from flood damage but also indirect assistance for rehabilitation and improvement of community resilience as pilot activities of agricultural marketing sector. Proposed activities of marketing sector are summarized in the figure below.



1) Direct damage mitigation and recovery measures from flood damage

Provision of flood information to protect important marketing facilities

It was observed from interview survey for agricultural marketing that major marketing facilities such as rice mill etc. took a measure to protect their facilities from flood damage based on the advanced information. Provision of advanced flood information for marketing related facilities has an efficacy for taking measure to protect their facilities. It is necessary as a countermeasure to reduce damages for marketing facilities by flood to establish a system to provide advanced and reliable information of flood for stakeholders of agricultural distribution channels. Especially, minor stakeholders such as community organization of agricultural product distribution are vulnerable against damage of natural disaster. Thus, it is important to provide information of natural disaster timely and certainly for communities. It is also necessary for community to provide support for rehabilitation cost of damaged facilities to help their recovery.

Rehabilitation of community marketing facilities

In order to support recovery from flood damage in 2011, to support their cost for rehabilitation of community marketing facilities could be effective. As a community facilities in the project

area, collection center for vegetable collection, selection and shipping, storage facility, refrigerator were found. As a pilot activity of the project, the project team proposes recovery support including financial aspect for community marketing facilities.

2) Indirect assistance for rehabilitation and improvement of community resilience

Support for marketing of agricultural product changed from other crops

As a pilot activities of farming practice for flood damage, it was proposed to adjust their cropping pattern in conformity to flood period, especially in area where flood occur every year, and to introduce vegetables or other cash crops in order to reduce risks from natural disaster. From PRA workshops there is a demand for supporting activities for marketing when they introduce new crops such as vegetables. Introducing new crops makes increase their work to sell products compared to rice and other field crops. Therefore the project team proposes marketing support activities for farmers who introduce new crops.

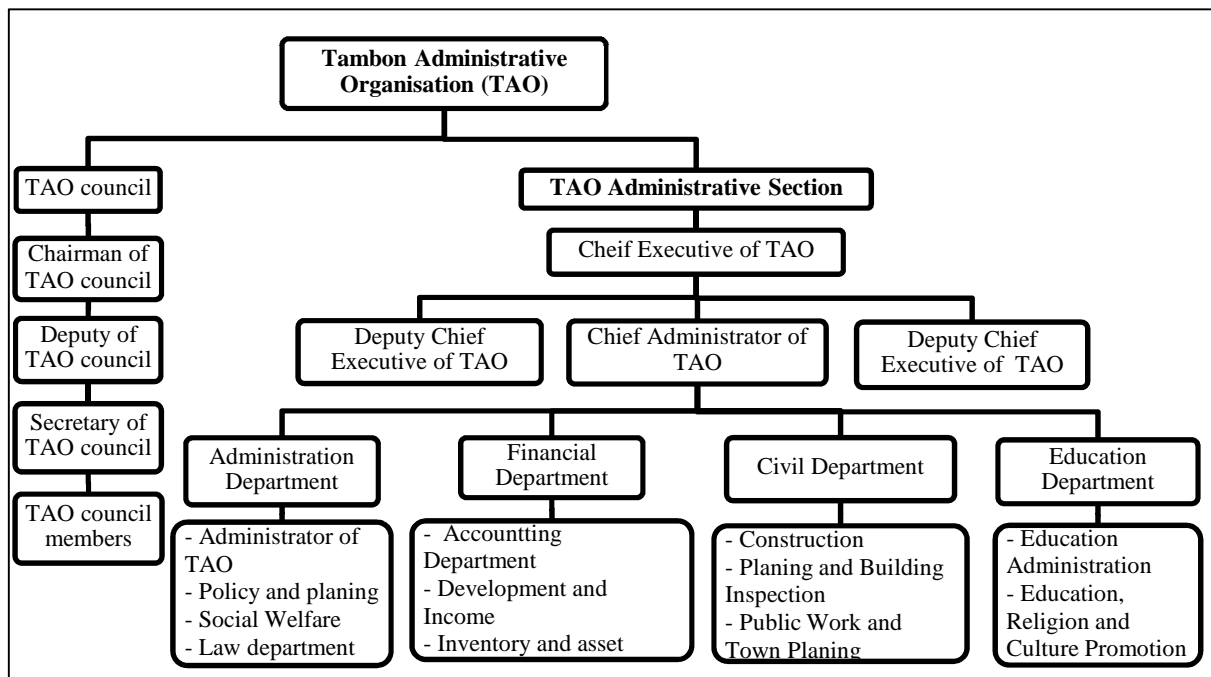
Support for cash income generation during flood period

One of the problems during flood period for farmers is lack of opportunity to obtain cash income because of flood in farm land for several months. As a countermeasure to ensure community resilience for flood in marketing related sector, the project team proposes to introduce agricultural product processing to generate their cash income during flood period. In eight project model area, there are several OTOP (One Tambon One Product) groups supported by Thai government. It might be effective to extend these OTOP activities to income generation activities during flood period as pilot activities proposed by the Project.

Tambon Administrative Organization (TAO)

1) Introduction of TAO

TAO is a decentralized local government unit with an elected two representatives from each administrative village (or ‘moo’ in Thai) in the Tambon. Within the TAO, there is one chief executive and two deputy chief executives elected out of and by the TAO members. Besides, there is one non-elected permanent chief administrator appointed by the Ministry of Interior. These executive members and chief administrator are the core of the organization being in charge of the stipulated activities by law and of projects approved by the District office. TAO’s sources of revenue are derived from local taxes and fees, state support budget, and others. The structure of the TAO is provided below.



Structure of the TAO

Each TAO has two main functions namely; 1) obligatory functions; and 2) optional functions as presented below.

<Obligatory Functions>

- Construction and maintenance of water and land transport infrastructure
- Management of public cleansing, such as roads, waterways, walkways and public spaces, and the disposal of waste
- Prevention and eradication of epidemic diseases

- Surveillance of public safety
- Promotion of education, religion and culture
- Promotion of the development of women, children, youth, elderly people and people with disabilities
- Protection and preservation of the environment and natural resources
- Assignments from government agencies

<Optional functions>

- Provision of water for consumption, utilities and agriculture
- Provision and maintenance of electricity, or of light by other means
- Procurement and maintenance of sewage systems
- Procurement and maintenance of meeting places, parks, and sports, leisure and entertainment facilities

2) Expected Role of TAO in disaster management

TAO is the center of disaster management at community level and has comprehensive roles during each stage of the disaster summarized as below¹.

<Prevention and mitigation>

- Appointment of personals and volunteers to take appropriate actions for disaster prevention and mitigation ahead of the disaster
- Supervision and support to the personal and Civil Defense Volunteer during the operation
- Appointment of a committee responsible in making the disaster prevention and mitigation plan for the area

<Preparedness and Emergency response>

- Appointment of some personals and officer to act on appropriate assistant
- Use of any communication device or vehicle to communicate with concerned parts
- Request to other neighboring TAO for certain assistant
- Forbidding of the entering or exiting of any appropriate place due to certain situation
- Arrangement for effective and rapid response to mitigate impacts
- Arrangement for temporary shelter, first aid service and belonging safety place

¹ Source: Tambon Administration Organization and the Disaster Management, T. Kongsomkong, Office of Disaster Prevention and Mitigation, Khonkaen (translated by the Project Team)
(available at <http://www.kknontat.com/wp-content/uploads/2011/03/บรรยายแผนป้องกันและบรรเทาสาธารณภัย-อปท.1.pdf>)

- Provision of traffic direction in crisis area
- Preparation for any requested assistances, including medical care and urgent transportation

< Post-disaster management >

- Examination of the damage
- Registration of affected people for damage of belonging
- Publish of the proving document for affected people for further compensation
 - Publish of other official documents

3) Actual Role of TAO in the 2011 Flood

Within the constraint including lack of information and limitation in budget and manpower, TAO took various roles from the construction of preventive sand-bag wall to the post-inundation cleaning before, during, and after the inundation during the 2011 Flood. Cases identified during the PRA survey conducted by the project team are provided below. These activities are relatively common at PRA survey sites.

- Construction of the water prevention facilities in collaboration with village leaders and volunteers
- Dissemination of the notice for flooding to villagers by orally either word of mouth or other broadcasting equipment
- Dissemination of information with various tools, including the use of modern technologies such as social media and internet, to publicize the support
- Coordination for assistance from other TAOs in the same and other provinces
- Coordination with concerned agencies and organizations, including the local health station, police, private companies, and social or voluntary groups, for the procurement of boat and other rescue tools
- Arrangement of temporary shelters as well as safety place for people's belonging such as cars and cattle at school, temple health station, and temporary shelter under the tent
- Coordination for Civil Defense Volunteer, medical team, and other supporters
- Management of donation, both in financially and in kind
- Coordination for emergency services in the area, including arrangement of transportation to medical facilities
- Registration of the damage and issue of documents for compensation
- Initiative for cleaning activities after the inundation, including set-up of a "cleaning day" for people to participate, hiring of a private cleaning company, and asking for external support from volunteers through internet network.

The Project Team also collected cases of good practice for disaster management during the 2011 flood at Tambons from non-model areas of the Project. One example of TAO at Pichit Province is provided below.

Good Practice on Local Authorities' Cooperation for Controlling Water Level

Place: Tambon Rangnok, Samngam District, Pichit Province

Villagers decreased water flow and controlled water level to protect the rice which had not been harvested yet. Leaders of the Tambon played a crucial role for this under the coordination of TAO by mobilizing pumps from villagers, water management users' group, and government sectors, controlling the discharge of water from up-stream, and solving the problem of clogged drainage pipe. Eventually, water level was controlled and, according to the interview with the

Judging from the result of the PRA survey, it is fair to say that TAOs at model areas did their best to prevent and mitigate the impact of the flood as well as to lead the recovery from the damage. However, without experience for such a big flood in the recent history and without clear guidelines for community disaster management, it can be said that their actions fell behind. The 2011 Flood was beyond the imagination of TAOs, and they also did not have appropriate tool/equipment to deal with the crisis in time.

TAOs at model areas are aware of necessity of better disaster management and have come up-with various ideas of actions, including development of community mapping of vulnerable persons, development of evacuation plan, procurement of necessary equipment to mitigate the impact, such as boat, set-up of communication network with concerned organizations, and others.

(2) Community Volunteer Organizations

1) Civil Defense Volunteer (อปพร. Ao-Po-Po-Ro)

Civil Defense Volunteers are the legitimate volunteer in coherent with the Civil Defense Act issued in 1979. The Civil Defense Volunteers is designated to assist general public defense work of the government under the supervision of Department of Disaster Prevention and Mitigation (DDPM), Ministry of Interior. Five volunteers from each administrative village are selected as Civil Defense Volunteers and receive trainings for civil defense, such as basic rescue and fire fighting techniques. Procurement of necessary materials and equipments for the volunteers' operation, including uniforms, communication devices, vehicles and others, are supported by each TAO. The volunteers are re-trained annually by the supervision of concerned authorities, including police, army, and DDPM officers.

The Civil Defense Volunteers have to make sure of public peace and support any emergency situation in general, including responsibilities to prevent and mitigate disaster for life and belongings of the people in the area responsible. They are expected to respond to the request from authorities, mainly by each TAO, to help in certain situations where trained personals with basic rescue knowledge are required, such as in case of fire, flood prevention, accident or traffic direction in important public events. The volunteers also take related tasks such as patrolling the responsible areas and maintenance of criminal record as well as development of a community map for vulnerable locations.

According to the information provided during the PRA survey at model areas, the Civil Defense Volunteers supported the disaster management work during the 2011 Flood based on the instruction mainly from TAOs. Their works include following works.

- Construction of water prevention facilities
- Dissemination of notice to the people by using the provided communication devices
- Provision of assistance to the people for evacuation and placement of belonging
- Support to the operation of police authorities
- Support to the dissemination of donated items
- Other requested tasks such as assistance for emergency medical service

Civil Defense Volunteers can be identified as a main voluntary force for disastrous situations in the community. However, although Civil Defense Volunteers were mobilized to support the people in the area during the 2011 Flood, it appears from the result of the PRA survey that their capacity was not fully utilized due to the lack of manpower and proper equipment as well as clear guidance and command center, and other constraints.

2) OTOS (One Tambon One Security Rescue Team)

OTOS is a program initiated by DDPM in 2007 under Ministry of Interior and associated with TAOs and Civil Defense Volunteers. In general, ten volunteers from one tambon is sent to the OTOS training which has more advanced curriculum compared to the Civil Defense Volunteer training with the involvement of more professional agencies in many areas. People can get the service of OTOS team via hot line number. Set-up of OTOS is included in a main activities under the 'Prepared and Response Capacity Enhancement' in the 'Strategic National Action Plan (SNAP) on Disaster Risk Reduction 2010-2019 (Thailand)'. According to the plan, all tambons have the OTOS by 2019.

PRA survey identified some of Civil Defense Volunteers have been trained under OTOS program. However, it also found that the concept of OTOS is still new and understood by the community people, including TAO members, as a training program rather than an organizational set-up in the

community.

3) Mr. Warning

‘Mr. Warning’ is a program initiated by DDPM in 2007 aiming to give warning people around the person in the community for enabling people to deal with emergency situation. In principle, community leader is nominated as ‘Mr. Warning’ and provided training by DDPM officers. ‘Mr. Warning’ is still a new concept and was not well-recognized by the community people during the PRA survey. In the survey, information routes through village leaders and Civil Defense Volunteers, and oral communication tools were identified as effective communication devices.

4) OSOS (One School one Security Rescue Team)

DDPM initiated training for student in schools in 2007 to prepare for urgent situations. The trained students form OSOS to help other students before the arrival of professional help. However, OSOS is still new and not well-recognized by the community. There were no schools with OSOS at the Tambons where PRA survey was conducted.

5) Other Community Volunteer Organizations

There are other community volunteer organizations which were not formed for the purpose of community disaster management but provided emergency services during the inundation, such as Village Health Volunteer (ฉสพ. Ao-So-Mo). The Village Health Volunteer scheme was initiated decades ago by the Ministry of Public Health to strengthen the health care system of the community people in rural area in association with the health center (currently renamed as Tambon Health Promotion Hospital) established at tambon level.

Village Health Volunteers played an essential role in assisting public health service during the 2011 Flood. They were responsible to ensure that people with diabetes, high blood pressure and those classified as chronicle disease, get their monthly medication. Also, they had to provide special care for the vulnerable group, such as disabled, injured, and elderly, during the inundation. They also supported the service of the public health personnel from all institutes to get in touch with the people, coordinate between the patients and the health station or hospital depending on the seriousness of the cases. Village Health Volunteers also provide service to patients with minor illness or first aid services with their medical kit.

Task Force in Phitsanulok Province

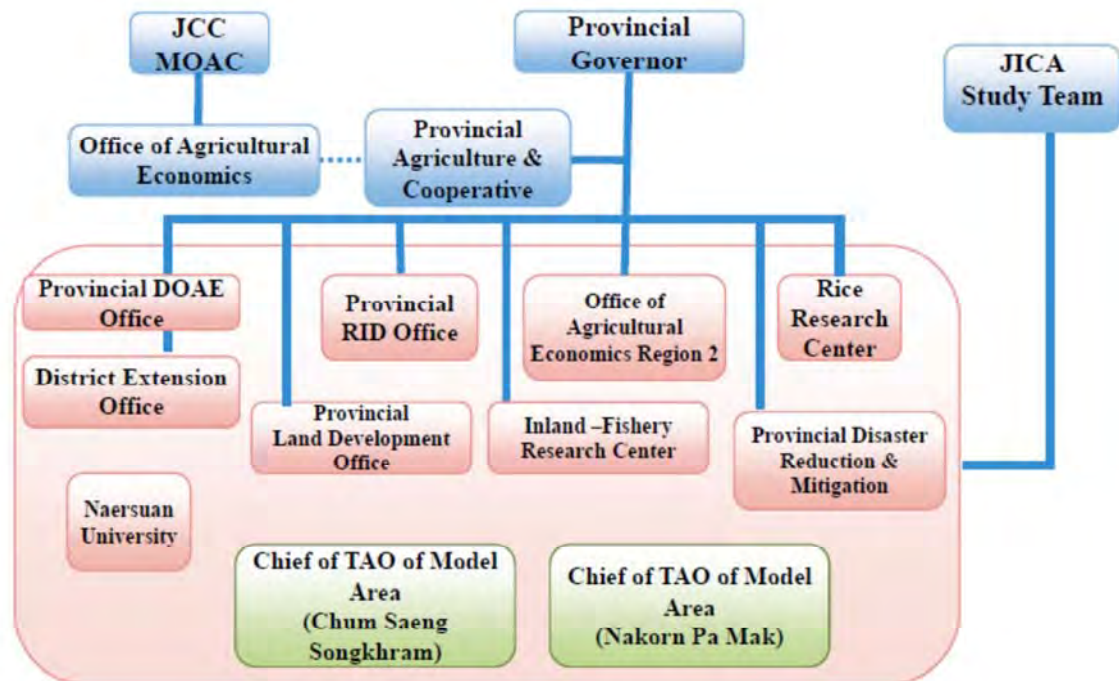


Figure: Task Force in Phitsanulok Province

Chairman: Governor

Secretary: Provincial Agriculture and Cooperative Office

1. Office of Agricultural Economics Regional 2
2. Provincial Office of Agricultural Extension
3. District Office of Agricultural Extension (Bang Rakham, Bangkrathum)
4. Provincial Irrigation Office
5. Rice Research Center
6. Provincial Land Development
7. Inland Fishery Research Center
8. Provincial Disaster Reduction and Mitigation
9. Chief of TAOs (Chum Saeng Songkram, Nakorn Pa Mak)
10. Naresuan University

Task Force in Chainat Province

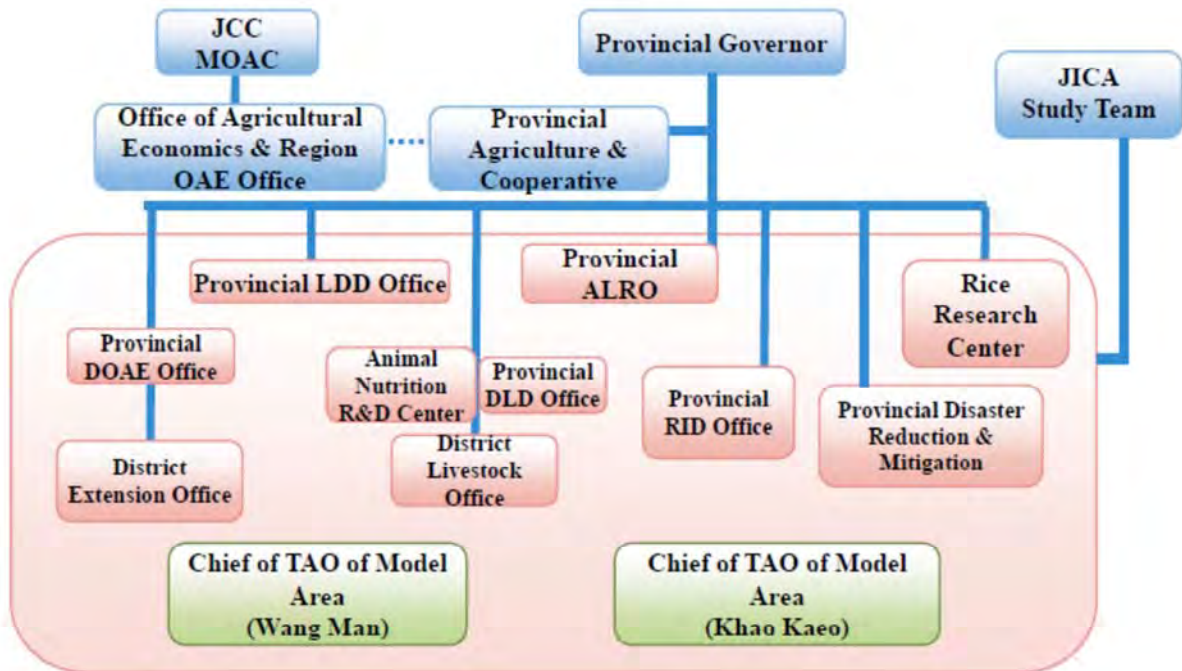


Figure: Task Force in Chainat Province

Chairman: Governor

Secretary: Provincial Agriculture and Cooperative Office

1. Office of Agricultural Economics Regional
2. Provincial Office of Agricultural Extension
3. District Office of Agricultural Extension (Wat Sin, Sapphaya)
4. Provincial Irrigation Office
5. Rice Research Center
6. Provincial Land Development
7. Provincial Livestock Office, District Livestock office
8. Animal Nutrition R&D center
9. Provincial Disaster Reduction and Mitigation
10. Chief of TAOs (Chum Saeng Songkram, Nakorn Pa Mak)

Task Force in Pra Nakorn Si Ayutthaya Province

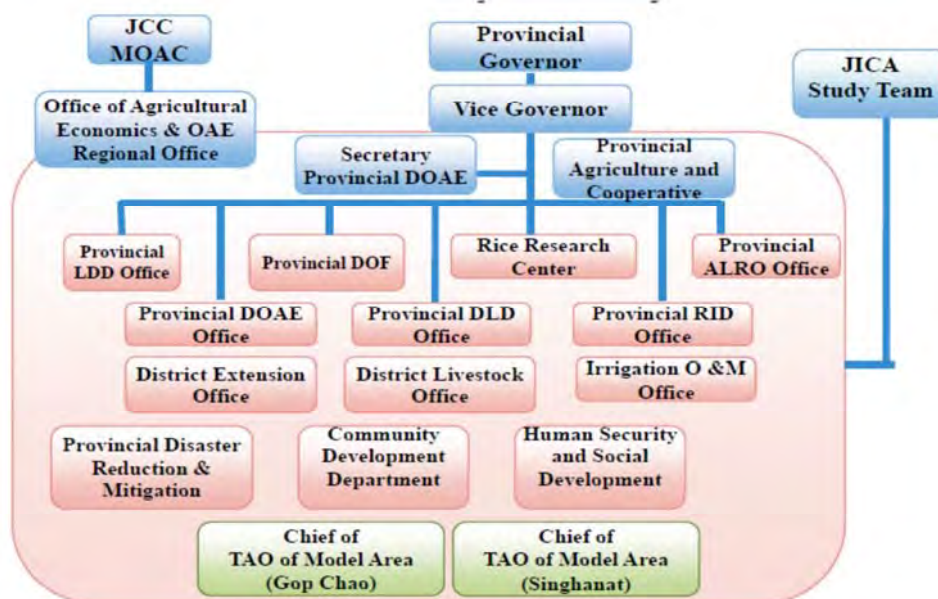


Figure: Task Force in Pra Nakorn Si Ayutthaya Province

Chairman: Governor, Vice-Chairman: Vice Governor

Secretary: Provincial Agricultural Extension Office,

1. Office of Agricultural Economics Regional 2
2. Provincial Agricultural Cooperative Office
3. District Office of Agricultural Extension (Bang Ban, Lat Bua Luang)
4. Provincial Irrigation Office, Bang Ban OM office
5. Rice Research Center
6. Provincial Land Development
7. Provincial ALRO office
8. Provincial Livestock Office, District Livestock office
9. Provincial Community Development
10. Provincial Disaster Reduction and Mitigation
11. Provincial Social Development and Human Security
12. Chief of TAOs (Chum Saeng Songkram, Nakorn Pa Mak)

Task Force in Pathumthani Province

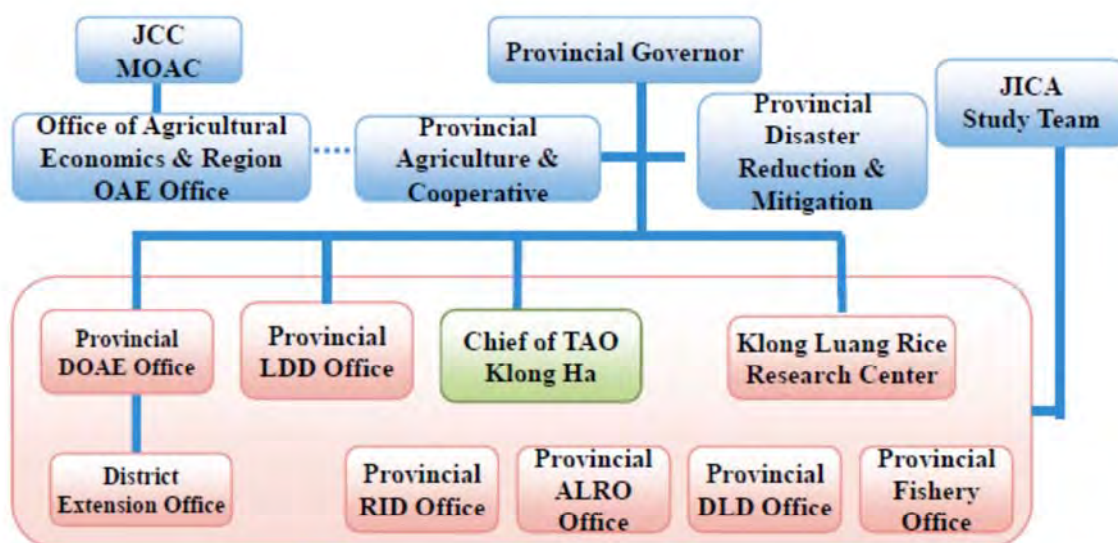


Figure: Task Force in Pathumthani Province

Chairman: Governor

Secretary: Provincial Agriculture and Cooperative Office

1. Office of Agricultural Economics Regional
 2. Provincial Office of Agricultural Extension
 3. District Office of Agricultural Extension (Klong Luang)
 4. Provincial Land Development
 5. Klong Lueng Rice Research Center
 6. Provincial Disaster Reduction and Mitigation
 7. Chief of TAOs (Klong Lueng)
(Advisor)
- Provincial Irrigation Office
 Provincial Fishery Office
 Provincial Livestock Office
 Provincial ALRO Office

Summary Definition about Self Sufficiency Economy in Thailand

What is Sufficiency Economy? As it is known widely, the concept/philosophy of sufficiency economy is derived from His Majesty King Bhumibol Adulyadej, The Great King of Thailand. Since the 1970's, the King had frequently given talks on the learnings from several thousand Royal Projects implemented for local development for his people. The King observed that successful projects tended to be those which evolved gradually, and which were driven by an inner dynamic, especially the accumulation of knowledge and expertise. Such projects did not rely heavily on outside assistance, especially loans, which tempted people to blunder beyond their own capability.

The philosophy of sufficiency economy was adapted as the basic principle in formulating the 10th National Economic and Social Development Plan(2007-2011) by NESDB and the same idea has been continuously applied to the presently on-going 11th NESDB Plan(2012-2016). For the Ministry of Agriculture and Cooperatives, promotion of “The New Theory” agriculture was one of the important policies under the 10th NESDB plan as well as under their own 5 years agricultural development plan implemented during the same period of the 10th plan. In the MOAC's 5 year development plan for 2012-2016 too, wider and accelerated application of new theory agriculture based on the self-sufficiency economy concept is emphasized as the basic policy.

In view of the above, it is considered quite necessary and important to have a correct understanding on the concept and philosophy of sufficiency economy as a basis for any development planning under the present study, especially for those rural development involving agriculture and people in the rural communities in Thailand. Accordingly, in this report, the full text of definition concerning “The Concept, The Principle of Self-Reliance and The New Theory” of “Self Sufficiency Economy in Thailand” shall be quoted hereunder by referring the web-site by UNEP RRCAP resources, UN ESCAP (2006).

SELF SUFFICIENCY ECONOMY IN THAILAND

The Concept

His Majesty King Bhumibol Adulyadej developed the philosophy of the Sufficiency Economy to lead his people to a balanced way of life and to be the main sustainable development theory for the country. The theory is based upon a Middle Path between society at the local level and the market in the global context. By highlighting a balanced approach, the philosophy allows the nation to modernize without resisting globalization, but provides a means to counteract negative outcomes from rapid economic and cultural transitions. The Sufficiency Economy became critical during the economic crisis in 1997, in which Thailand needed to maintain stability to persist on self-reliance and develop important policies to recover. By creating a self-supporting economy, Thai citizens will have what they need to survive but not excess, which would turn into waste.

His Majesty proposed that it was not important for Thailand to remain an “economic tiger,” or become characterized as a newly industrialized country. Instead, His Majesty explained that sufficiency is living in moderation and being self-reliant in order to protect against changes that could destabilize the country. The Sufficiency Economy is believed to adapt well within existing social and cultural structures in a given community, if the following two factors are met:

- subsistence production with equitable linkage between production/consumption
- the community has the potential to manage its own resources

As a result, the Sufficiency Economy should enable the community to maintain adequate population size, enable proper technology usage, preserve the richness of the ecosystems and survive without the necessity of intervention from external factors. The concept is now commonly included in many government projects.

The Principle of Self-Reliance

Furthermore, His Majesty has recommended a secure balance in the five following aspects to achieve the principle of self-reliance:

- **State of Mind:** One should be strong, self-reliant, compassionate and flexible. Besides, one should possess a good conscience and place public interests as a higher priority than one's own.
- **Social Affairs:** People should help one another, strengthen the community, maintain unity and develop a learning process that stems from a stable foundation.
- **Natural Resource and Environmental Management:** The country's resources need to be used efficiently and carefully to create sustainable benefits and to develop the nation's stability progressively.
- **Technology:** Technological development should be used appropriately while encouraging new developments to come from the villagers' local wisdom.
- **Economic Affairs:** One needs to increase earnings, reduce expenses, and pursue a decent life.

As His Majesty has stated, "If we contain our wants, with less greed, we would be less belligerent towards others. If all countries entertain this - this is not an economic system - the idea that we all should be self-sufficient, which implies moderation, not to the extreme, not blinded with greed, we can all live happily."

The Self Sufficiency Economy theory has led to diverse interpretations by many different groups. However, His Majesty has rejected extreme perspectives on his ideology, stating that self-sufficiency does not require families to grow food and make clothes for themselves. But, each village should have some quantity of sufficiency. For instance, if agricultural production exceeds the amount needed for the village they should sell the remaining amount to a nearby village, close in distance, to avoid unnecessary transportation costs.

The New Theory

His Majesty's self-sufficient ideology has a strong linkage to his New Theory, initiated in 1992. Seeking ways to help the people engaging in agriculture, His Majesty introduced the New Theory, to be implemented at the Royally-initiated Wat Mongkol Chaipattana Area Development Project, to serve as a model of land and water management for the farmers. According to the theory, the land is divided into four parts with a ratio of 30:30:30:10. Based on this ratio, 30% is set aside for pond and fish culture, 30% for rice cultivation, 30% for growing fruit and perennial trees, and the remaining 10% for housing, raising animals and other activities.

The New Theory consists of the three following phases:

- Phase 1: To live at a self-sufficient level which allows farmers to become self-reliant and maintain their living on a frugal basis.
- Phase 2: To cooperate as a group in order to handle the production, marketing, management, and educational welfare, as well as social development.
- Phase 3: To build up connections within various occupation groups and to expand businesses through cooperation with the private sector, NGOs and the government, in order to assist the farmers in the areas of investment, marketing, production, management and information management.

In short, the Self Sufficiency Economy and its expected outcomes are best summarized, by His Majesty himself; "Sufficiency Economy is a philosophy that guides the livelihood and behavior of people at all levels, from the family to the community to the country, on matters concerning national development and administration. It calls for a 'middle way' to be observed, especially in pursuing economic development in keeping with the world of globalization...At the same time we must build up the spiritual foundation of all people in the nation, especially state officials, scholars, and business people at all levels, so they are conscious of moral integrity and honesty and they strive for the appropriate wisdom to live life with forbearance, diligence, self-awareness, intelligence, and attentiveness. In this way we can hope to maintain balance and be ready to cope with rapid physical, social, environmental, and cultural changes from the outside world."

MOAC's Preparedness Plan for Agricultural Disaster in the Budgetary Year 2012

- Flood Prevention and Troubleshooting Measures

Prevention

Task	Plan/Project/Activity	Target	Responsible agencies
1. Monitoring and alarming	1.1 Monitoring and following up the situation from agencies, estimating the situation, publicizing information and alarming the concerning agencies via mass media	77 provinces	MOAC and provincial following up centers
	1.2 Estimating and close following up meteorological/hydrological conditions for effectiveness of water management and alarming concerning agencies to get ready for prevention and helping the victims	do	RID
	1.3 Estimating, monitoring and alarming of flood, flash flood and landslide in risk areas	76 provinces (except Bangkok)	DLD
2. Water resources development for flood prevention and mitigation	2.1 Development of 'Kaemling' projects	399 sites	RID
	2.2 Construction of water resources and drainage systems	676 sites	
	2.3 Construction of medium irrigation project	125 sites	
	2.4 Safety improvement of dams and reservoirs	65 sites	
	2.5 Setting up water hazard prevention and mitigation projects	471 sites	
	2.6 Construction of water resources and distribution systems: - pond excavation - weir construction - water distribution system	56 sites	ALRO
	2.7 Pond excavation in farmlands out of irrigation areas	20,000 sites	DLD
2.8 Construction of small water resources	140 sites		
2.9 Construction of community water resources	7 sites		
3. Dredging and weed elimination to increase storage and drainage of existing water resources	3.1 Dredging and elimination of weeds in RID open channels and reservoirs, sand-bag walling and ridge strengthening to prevent flood water intrusion	76 provinces (except Bangkok)	RID
	3.2 Dredging and rehabilitating water resources in ALRO areas	53 sites	ALRO

4. Development of IT data for forecasting and alarming	4.1 Landslide and flood risky area mapping project (scale 1:4000)	45 subbasins	DLD
	4.2 Flood, flash flood and landslide area estimation project (scale 1:4000)	45 subbasins	
	4.3 GPS and remote survey data applications project for improvement of the flood repetitious area map	1 region (central)	
	4.4 IT network project for alarming	1 project	
	4.5 Management project on land use development in flood, drought and landslide areas	76 provinces	
	4.6 Plantation system development project in flood and drought critical areas	5 main basins	
5. Telemetric system arrangement for forecasting flood and basin alarming	Systemization and installation of telemeters to forecast water crisis and alarming of their hazards	17 projects	RID

Preparedness

Task	Plan/Project/Activity	Target	Responsible agencies
1. Preparation of disaster risk area data	Project on flood and drought alarm mapping for pre-cultivation season of farmlands - Flood probability mapping for agricultural areas - Landslide probability mapping for agricultural areas	76 provinces (except Bangkok)	DLD
2. Preparation of farmer registration data	2.1 Preparation of farmer registration data in plantation, fisheries and livestock	Over the country	DAE, DOF, DS
	2.2 Preparation of obligation data of cooperative members/group members	do	DCP
3. Preparation of provincial operation plan	Aid preparation for agricultural victims in each province	76 provinces	Provincial following up centers
4. Planning for flood management	Planning for flood management in the basins in order to set up monitoring and alarming outlines in disaster risk areas and finding out appropriate approach to prevent and solve flood problem in each basin	Over the country, 25 basins	RID
5. Planning for cultivating rainy-season plants in irrigation areas	Planning for water allocation and cultivating rainy-season plants in irrigation areas - Water demand - Cultivation areas	... million m ³ ... million rai	RID
6. Seed reservation	6.1 Paddy stock	800 tons	RD
	6.2 peanut and green bean seed stocks	30 tons	

	6.3 Maize seed stock for livestock	2 tons	DOA
7. Reservation of animal provisions and medicines	7.1 Stock at livestock provision development centers/stations 7.2 Medicine Stock	3,624 tons (29 stations) ... doses	DLD
Task	Plan/Project/Activity	Target	Responsible agencies
8. Planning for animal evacuations	Planning for animal evacuations or construction of permanent evacuation areas for livestock in case of disaster	... sites	DLD
9. Technical guidance and public relations	Information of related situations and practices of plants, livestock and fisheries shall be publicize to agriculturists by mobile units to prepare coping with the coming flood	Over the country	DAE, RD, DA, DLD, DF
10. Preparedness of vehicles, machineries and equipment	10.1 Preparation of database of machineries and equipment available at agencies and list of responsible persons in each province	76 provinces	Provincial following up centers
	10.2 Preparation of vehicles, machineries, equipment: - Water pumps - Water pushers - Amphibian cars/boats - Backhoes - Dredgers - Tractors - Trucks - Water trucks - Patrol boats - Barges	1,611 87 16/17 73 22 46 48 249 83 7	RID, ALRO, DOF

Response

Task	Plan/Project/Activity	Target	Responsible agencies
1. Alarming & public relations	Following up, estimating the situations and alarming concerning agencies, people and farmers of the coming disaster via mass media	Over the country	MOAC and provincial following up centers
2. Water management for flood control	2.1 Adjusting drainage plan from reservoirs to reduce flood impacts downstream 2.2 Draining water into irrigation systems of agricultural areas to reduce the overflowing water 2.3 Improving efficiency of the irrigation building if it is not sufficient to the magnitude of imminent flood by heightening the banks of dikes/open channels or temporary shutting the culverts 2.4 Urgently repair of damaged irrigation	Flood-affected areas	RID

	buildings for temporary use		
3. Sending mobile units to affected areas	3.1 Visiting officers shall provide aids and suggestions to farmer victims and assess the primary impacts	Disaster-affected areas	DAC, RD, DAE
Task	Plan/Project/Activity	Target	Responsible agencies
	3.2 Mobile units shall evacuate livestock to safe places and heal the sick or injured ones	Disaster-affected areas	DLD
	3.3 Fisheries offices who station at the following up centers shall control the aquatic life epidemics, supply water pumps and equipment to transport the aquatic life from places of culture as per the agriculturists' requests	do	DOF
4. Support of machineries, tools and equipment	Water pumps, water pushers, machineries, materials and equipment shall be supported for helps in flooded areas	do	RID
5. Support of animal provisions	The provincial fisheries office shall coordinate with its neighboring center/station in transporting livestock and providing animal provisions in inundated areas	do	DLD

Recovery

Task	Plan/Project/Activity	Target	Responsible agencies
1. Surveying and assessment of farmer victims' damages	The concerning agency shall urgently assess the damages of the farmer victims once the situation becomes better	Within 30 days if the access is permissible	DAE, DLD, DOF, DAP
2. Financial aid for mitigation	2.1 Providing official advances pursuant to Ministry of Finance regulations 2.2 Aids with central budget 2.3 Aids to farmer victims in special case according to Cabinet resolution 2011	Within three months as from the first day of disaster	MOAC Office of Permanent Secretary, DAP, DLD, DOF
3. Rehabilitation of agricultural areas and career	3.1 Agricultural career rehabilitation projects for the victims: - Plants <ul style="list-style-type: none"> • For farming area recovery (5 rai/victim x THB 400/rai = THB 2,000/victim) • For cultivation career recovery <ul style="list-style-type: none"> * farm plants (10 rai/victim x THB 500/rai) * Perennial plants (3 rai/victim x THB 1,667/rai) * For vegetables (1 rai/victim x THB 5,000/rai) 	1,018,155.00 victims	DAE, DOA

	<ul style="list-style-type: none"> • For vegetation promotion (THB 300/victim) - Livestock Poultry lineage (20/victim and poultry food 30 kg/victim + equipment and medicines) - Fisheries <ul style="list-style-type: none"> • Fish lineage (4,00/victim and fish food 40 kg/victim) 	<p>200,000 households</p> <p>131,299 victims</p>	<p>DLD</p> <p>DOF</p>
	3.2 Urgent recovery project for farmer victims' high cost plants in 2011 (orchids/ornamental plants/bagged mushroom)	3,850 victims/30,00 rai/ 11 provinces, 14.66 million rai, 7.7 million tons of produces	DAP
	3.3 Remedial project for medicine registered rice farmers (yearly crop) of production year 2011/2012 in case of damage due to flood and sale of produces in anticipation of the pawn project (THB 1,437/ton)		
	3.4 Paddy subsidy project for remedying yearly rice farmer victims due to flood in cultivation year 2011/2012 <ul style="list-style-type: none"> • Subsidy due to actual loss of paddies more than 50% of the registered and damaged paddy field area, not exceeding 10 rai/10 kg/victim 	69,482 tons	RD
	3.5 Recovery and survival opportunity project for cooperative members/group members <ul style="list-style-type: none"> • Subsidy for shortage of payment to members via cooperative/group of farmers, each THB 2,000, as living allowance and residence/property repair expenses 	142,300 victims/ 64 provinces	DCP
	3.6 Animal health recovery and post-flood epidemic control project	1.5 million animals	DLD
	3.7 Animal's provision preparedness for pot-flood aids to cattlemen	10,000 tons	
	3.8 Flood plain utilization project for freshwater aquatic life breeding	Khong, Yom, Chao Phraya, Thachine basins	DOF
	3.9 Flood prevention project for aquatic life of inner Gulf of Thailand <ul style="list-style-type: none"> • Survey and follow up aquatic life status • Monitoring water and soil qualities in aquatic life resources of inner Gulf of Thailand 	5 provinces (Chachoengsao, Samut Prakan, Samut Songkram, Samut Sakhon, and Petchaburi)	

	<ul style="list-style-type: none"> • Project management plan 		
	<p>3.10 Crisis-Opportunity fisheries project (coastal fisheries)</p> <ul style="list-style-type: none"> • Subsidy for loss of aquatic life (THB 1,840/victim) and for loss of production requisites (THB 1,000/victim) 	14,750 victims/ 7 provinces	
	3.11 Landslide prevention and recovery projects in Uttaradit and Chiangmai	4,430 rai	DLD
	<p>3.12 Soil quality improvement and flooded area recovery projects</p> <ul style="list-style-type: none"> • Soil quality improvement and flooded area recovery • Soil and water conservation 	1,689,350 rai/ 19 provinces	
4. Obligation subsidy to members of farmers' institutions	<p>4.1 Obligation subsidy measure for members of farmers/group of farmers' institutions:</p> <ul style="list-style-type: none"> - In case of death. The obligation shall be deleted from the account of the cooperative/farmers' group and the government will repay instead. - In case of severely injured: <ul style="list-style-type: none"> • The cooperative/farmers' group shall extend the repayment of loan for another 3 years with grace period. The government will compensate the interest as per the rate collected from the borrower. • Loan under new contract for career recovery and life quality development of THB 100,000/victim, interest 3% per annum, shall be repaid by the government within 3 years. 	165,074 victims/ coop members	DCP
5. Building & property repair	5.1 Damage survey and repair of irrigation buildings	1,547 items	RID
	<p>5.2 Repair projects of agricultural machineries due to flood 2011:</p> <ul style="list-style-type: none"> • Repair service of agricultural machineries • Repair training to farmers 	6,000 units 4,500 men	DAP, DCP, DOA
	5.3 Aids for actual loss/damage of properties owned by cooperatives/groups of farmers due to flood, not exceeding THB 700,000/site	786 sites/ 30 provinces	DCP
6. Environmental recovery	Flood wastewater treatment and disposal projects by producing EM liquid (formula LD. 6) for wastewater treatment in flooded areas	1 million rai/ 22 provinces	DLD

Remark: Recovery plans/projects in clauses 3-6 are under budget request process

Attachments

The Plan is compiled with the number of official letters exchanged among concerned agencies including of the higher authorities evidencing as the ready reference to authorize the MOAC to take necessary actions as proposed. Of the official letters as mentioned, the letter addressed to the Secretary-General to the Cabinet as signed by the Minister of MOAC dated on 24 August 2011 and approved as proposed, titled as Subject: Aids to agricultural flood victims in 2011 (special case) shall be attached herein for ready reference for grasping the MOAC's planned actions for flood victims.

Thai - English translation

MOST URGENT
No. AG 0212/2460

Official Thai
Emblem

Ministry of Agriculture and Cooperatives
Ratchadamnoen Nok Road
Bangkok 10200

24 August 2011

Subject: Aids to agricultural flood victims in 2011 (special case)

To: Secretariat-General to the Cabinet

Enclosures: 1. Criteria and rates for aids to agricultural flood victims in 2011 (special case), one copy.
2. Estimation of financial limit for aids to agricultural flood victims in 2011 (special case), one copy.

1. Background

Due to frequent, heavy and very heavy rainfalls under the influences of tropical storms Haima and Nokten, and monsoon channels with relatively severe forces passed the north and the northeast of the country in many areas in the beginning of cultivation season 2011, which enormously caused sudden flood, flash flood and intrusion of riverbank overflows into agricultural areas, including places of aquatic life culture and livestock farms, by which suffered the agriculturists since lots of their produces were damaged or lost.

2. Rationale for the Cabinet's approval

As the agriculturists were in trouble and their produces of farm, fishery and livestock were damaged due to the flood in 2011, thus the criteria, rates of financial aids and procedures are prescribed for the said aids to correspond with the present situation and exact damages.

3. Urgency of the matters

Flood farmer victims shall be mitigated and rapidly helped in time.

4. Substances/facts and matters of law

The Ministry of Agriculture and Cooperatives has prepared the criteria, rates of financial aids and procedures for aids to agricultural flood victims in 2011 (special case):

4.1 The aids to agricultural flood victims in 2011 (special case) started in the beginning of rainy season as from 1 May 2011 and the incurrence of the flood accumulatively caused damage since then. Such aids will be applied merely to farmers registered with the Department of Agricultural Extension, aquatic life culture with the Department of Fisheries, and livestock culture with the Department of Livestock Development.

4.2 Rates of financial aids (special case)

Plants

55% of the total production cost/rai in 2011 and according to the exact damage of 100%:

- Rice: THB 2,222/rai

- Farm plants: THB 3,150/rai

- Orchard plants and others: THB 5,098/rai. In case the plants can be recovered the aid

shall be given at THB 2,549/rai, and in case the farming areas are overlaid with sludge, the aid shall be THB 7,000/rai and not exceeding 5 rai/victim.

Fisheries

- All kinds of cultured fish: THB 4,225/rai and not exceeding 5 rai/victim;

- Shrimps, crabs and shellfish: THB 10,920/rai and not exceeding 5 rai/victim;

- Floating baskets, concrete ponds etc.: THB 315/m³ and not exceeding 80 m³/victim.

Additional aids for areas exceeding the criteria limit shall be a half of the rate limits.

Livestock

The excess of damage other than the minor procedures regarding the agricultural victims in emergency case of 2009 shall be more subsidized for another half (see attachment 1);

4.3 The total amount of financial aid is THB 8,174.5458 million which is divided into three parts:
For plant damage: THB 7,741.8994 million
The estimated damage area is 3.18 million rai: rice 2.71 million rai, farm plants 0.38 million rai, orchard plants and others 0.09 million rai, and the total damage is THB 7,717.8702 million.
The estimated sludge-overlaid area is 3,433 rai and the total damage is THB 24.0292 million.
For fisheries damage: THB 331.4864 million
The estimated aquatic life culture area is 71,901 rai (69,555 rai of fish ponds, 2,346 rai of shrimp, crab and shellfish ponds) and 79,008 m² of aquatic life floating baskets.
For livestock damage: THB 101.1600 million
The estimated death/loss of aquatic life is 1.368 million and grass plots of 3,500 rai.

Requisition and payment shall be taken from the budget of the budgetary year 2012, the central budget, and the reserve fund in case of emergency and necessity. The Bureau of Budget shall directly remit the budget to the Bank for Agriculture and Agricultural Cooperatives (BAAC) for further distribution to the flood victims (see attachment 2.)

4.4 Appointment of community damage inspection subcommittees

For quick, transparent and correct helps to farmers, the district disaster victim aids committees (DDAC) to appoint the sub-district damage inspection subcommittees composed of a sub-district headman or village headman as the chairperson, two members of the sub-district administration organization, village agricultural volunteer, two representatives of farmer flood victims as sub-committee members, the relevant DAE officer as the secretary who has the duty to inspect the damages of plants, fisheries and livestock according to the application form for aid (Form AG 01) and organize the community stage to check the received damage data and report to the DDAC for further consideration.

4.5 Procedures of application for aids

- 1) The farmer shall fill in the application form for aid (Form AG 01) and submit it within due time specified by the relevant province for convenience and quickness in compiling data and inspecting the damage;
- 2) The agricultural damage village subcommittee checks the damage and certifies the correctness of data;
- 3) The assigned officers of district agricultural/livestock/fisheries offices crosscheck with his register and satellite photos or any other technical information;
- 4) The said officers shall process pursuant to Form AG 02 and post it at the relevant official offices or at sub-district Administration Organization office, or the sub-district headman/village headman's place of work, and community center within five official workdays;
- 5) The district agricultural, fisheries and livestock officers shall present the results to the DDAC for approval;
- 6) The provincial agricultural, fisheries and livestock officers shall present the results to the provincial disaster victim aids committees (PDAC) for approval and submit the evidence documents to their departments;
- 7) The Department of Agricultural Extension, the Department of Fisheries, and Department of Livestock Development shall inspect the evidence documents and submit them to the BAAC head office;
- 8) The BAAC head office then requests for approval of installment payments from the Bureau of Budget; and
- 9) Upon receipt of the installment payments the BAAC head office shall transfer the amount to its branches and retransfer to the farmers' accounts.

5. Government agencies' proposals

We approve the criteria, rates, financial limits and procedures for aids to agricultural flood victims as mentioned in Clause 4.

This is for your perusal and further presentation to the Cabinet for finalization.

Very truly yours,

(Signed)

Mr. Thira Wongsamut
Minister of Agriculture and Cooperatives

Office of the Permanent Secretary
Ministry of Agriculture and Cooperatives
Planning and Special Projects Bureau
Tel/Fax 0 2629 9660
Email: disas_moac@hotmail.com

Attachment 1

**Criteria and Rates for Aids to Flood Victims 2011
(Special Case)**

Plants

Full aids (100%) of damaged areas shall be given:

- Rice: THB 2,222/rai
- Farm plants: THB 3,150/rai
- Orchard plants and others: THB 5,098/rai. In case the plants can be recovered the aid shall be given at THB 2,549/rai, and in case the farming areas are overlaid with sludge, the aid shall be THB 7,000/rai and not exceeding 5 rai/victim.

Fisheries

Type of aquatic life	Aid limit	Aid criteria/victim
All kinds of fish	THB 4,225/rai	Not exceeding 5 rai
Shrimps, crabs and shellfish	THB 10,920/rai	Not exceeding 5 rai
Ponds/floating baskets	THB 315/m ³	Not exceeding 80 m ³

Remark: Additional aids for areas exceeding the criteria limit shall be a half of the rate limits.

Livestock

Types of animal	Rate/life (THB)	Aid criteria/victim
1. Cattle (bull/water buffalo)		Not exceeding 2
- Younger than 6 months	3,600	
- 6 months to one year of age	7,800	
- 1-2 years of age	10,500	
- Older than 2 years	15,800	
2. Hogs		Not exceeding 10
- 1-30 days of age	1,200	
- Older than 30 days	2,500	
3. Native chickens		Not exceeding 300
- 1-21 days of age	20	
- Older than 21 days	40	
4. Egg chickens (in farms)		Not exceeding 1,000
- 1-21 days of age	15	
- Older than 21 days	60	
5. Meat chickens		Not exceeding 1,000
- 1-21 days of age	15	
- Older than 21 days	35	
Types of animal	Rate/life (THB)	Aid criteria/victim
6. Egg ducks		Not exceeding 1,000
- 1-21 days of age	15	
- Older than 21 days	40	
7. Meat ducks		Not exceeding 1,000
- 1-21 days of age	15	
- Older than 21 days	40	
8. Partridges		Not exceeding 1,000
- 1-21 days of age	5	
- Older than 21 days	10	
9. Goats	1,400	Not exceeding 10
10. Sheep	1,400	Not exceeding 10
11. Ostriches	2,000	Not exceeding 10
12. Geese	50	Not exceeding 300
Breed seeds	220	Not exceeding 200 rai
Breed seedlings	625	

Remark: Additional aids for the number of animals exceeding the criteria limit shall be a half of the rate limits.

Extracts from the MOAC Manual for Aids to Disaster Victims in Agricultural Sector (June 2008)

Phase 1---Before disaster

The phase I covers preparation for the coming disaster including 1. the estimation of situation and 2. the operation planning which details on plants, livestock and fisheries mainly and 3. the management. 4. the area of disaster risk and 5. the water resources, wherein the note on livestock and technical advice provision under fisheries category and the description on water resources are to be extracted hereunder for reference.

2.2 Livestock

Preparedness planning to prevent and reduce losses of livestock due to disaster shall be done in parallel with epizooty control planning in order to monitor the diseases and investigate the causes and sources of epidemics. Through these approaches, farmers, citizens and relevant agencies will be quickly informed of the determination of appropriate control measures:

(1) Preparation of personnel. Responsible personnel in central administration office, the Animal Health and Hygiene Bureau and all offices of regional livestock shall publicize and advise livestock farmers to follow official warning and preparedness; establish ad hoc units and responsible personnel; clarify, train and assign them the tasks, and build up conceptual models to test operational readiness as well as communication system of the concerning agencies.

(2) Hardware preparation. Equipment and vehicles shall be supplied to effectively and promptly help the victims once the disaster incurs. Inventory, warehouse and responsible persons shall be clearly specified in each operations area.

(3) Livestock database. The database shall include livestock farmer registration, collection of animal population data, pastureland, and areas of risk that may affect animal domestication, livestock evacuation planning, preparation of reserve water storage for domesticating animals as well as fodders at the Plant Protection Research and Development Bureau and/or all fodder research stations over the country, and with preliminary assistances and supports from livestock and breeding centers, livestock research stations, quarantines, technological research and transfer centers, and all agencies under the Department of Livestock Development near to places of disaster.

(4) Surveillance of disease. Combination of monitoring shall be done: active and passive surveillances, serumological surveillance, farmland visit, inspection of disease situation report, and acknowledgment of disease information.

1.3 Fisheries

Fisheries provincial offices shall prepare action plans to reduce losses due to disasters: flood, drought, and aquatic life epidemics which cause damage to farmers' aquatic life and fishing boats. The action plans shall cover the following scopes:

(1) Public warning to aquatic life farmers of the imminent disaster period in order to cope with the situation and find the best way to avoid or troubleshoot the damage e.g. information through community leaders, broadcasting via radio, television and other media. This would arouse farmers to closely follow up the official weather forecast news.

(2) Technical advice provision.

Flood	Drought
<ul style="list-style-type: none"> • Water consumption control and maintain the existing volume of water in the pond at least two-third. • Dredging to eliminate sediments in the ditches 	<ul style="list-style-type: none"> • Control water consumption and maintain the volume of water in the cultivation pond to evaporate as least as possible by plugging their seepage/leakage.

<p>and facilitate flow of water.</p> <ul style="list-style-type: none"> • Preparation of standby aerators to help aquatic life's respiration in case sudden flow of external water into the pond. • Get ready to gradually distribute or consume sizeable aquatic life in the pond in order to reduce the population of aquatic life therein. • Heightening the pond ridge above the maximum flood water level marking in the past. • Preparation of necessary equipment: seines, water pumps, aerators, antibiotics and chemicals. • Reservation of some lime for acidic soil to neutralize the pH of water in the pond (recommended mixture: 50-60 kg/rai). • Aquatic life cultivation planning appropriately to area environ and seasonal changes in order to distribute them prior to the next flood season. 	<ul style="list-style-type: none"> • Finding reserved water resources in case of shortage. • Distribution/eating aquatic life in the cultivation pond to reduce aquatic life population therein. • Reduction of the aquatic life's food, especially fresh food, to avoid the increase of wastewater. • It's better to keep aquatic life population below the pond's normal capacity by leaving only the big ones in the pond to shorten the feeding time. • It is good to refrain from relocating aquatic life from their pond. If necessary, the relocation shall be made with care because it directly affects their appetite and growth. • More attention and close observation shall be paid to aquatic life's behavior. In case of abnormal symptom remedy and healing can be done in time. • Planning for periodic domestication shall be done in order to dry the pond in the sun and maintain the pond and prepare it for the next round of domestication.
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2.5 Water resources

2.5.1 The Royal Irrigation Department (RID) shall be responsible for agricultural water management, follow up, forecast and closely monitor water situation so as to allocate water in the basins pursuant to water allocation plans and designate water consumption control measures of activities corresponding to the said plans:

(1) Inspecting and forecasting the dead storages of all reservoirs; planning to allocate water from reservoirs; and planning to prevent flood/drought and solve such problems;

(2) Increase of drainage efficiency by dredging and eliminating water hyacinths; inspecting the strength of irrigation buildings and the durability of dams; preparation of standby personnel, machineries, equipment, materials, mobile water pumps, and water trucks; and planning to help transport the said mobile water pumps and mobilize the water trucks;

(3) Planning to allocate, convey, drain and use water with utmost effectiveness corresponding to the dead storage of water;

(4) Establishing water situation evaluation and analysis centers in at the Royal Irrigation Department and its regional offices to follow up the situation and command helps to farmers, as well as publicizing people and relevant agencies of the current water situations through hotline 1460 and RID website (www.rid.go.th); and

(5) Campaign for water consumption via all means of mass media and the Internet.

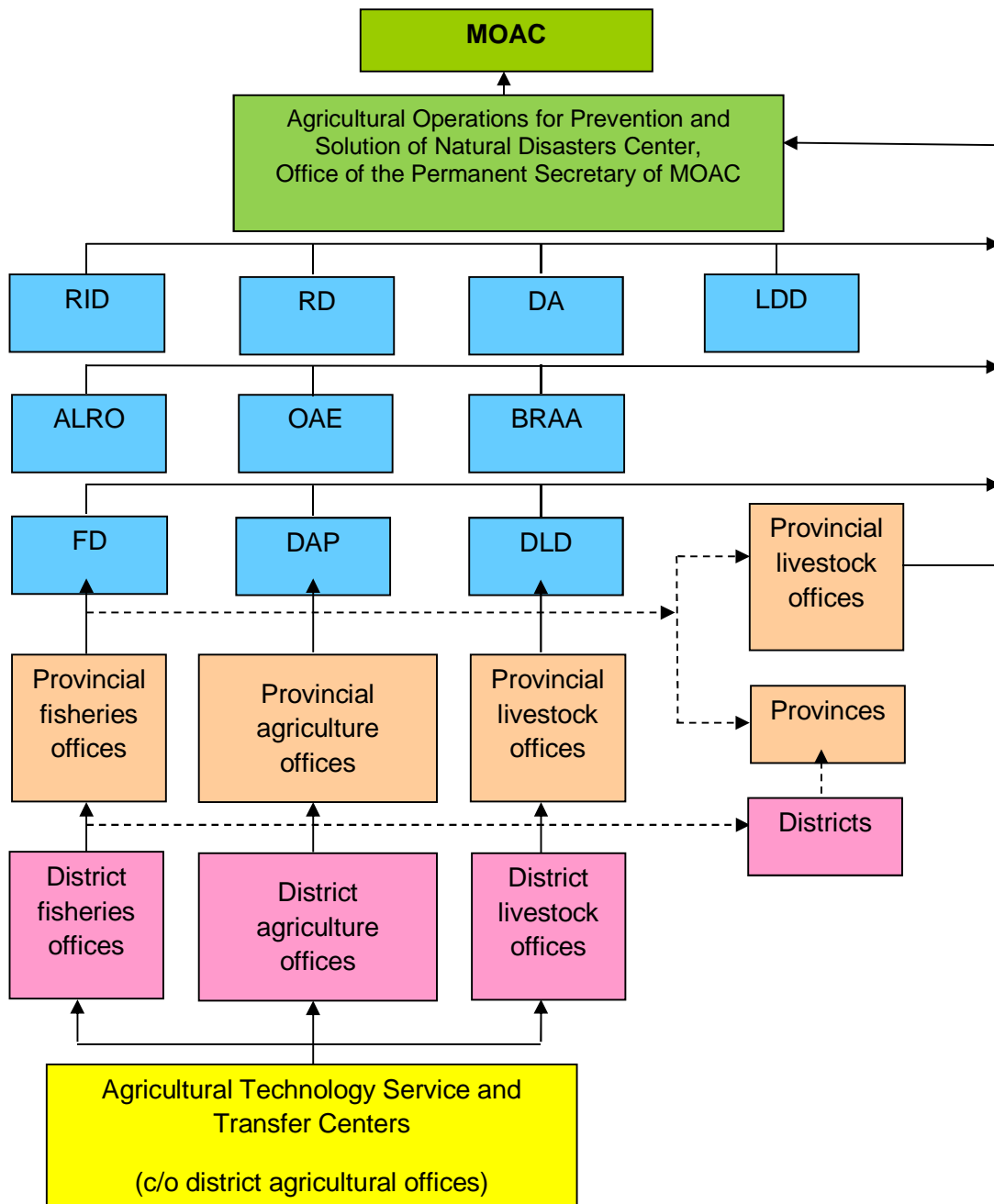
3. Management

Agricultural Operation Center for Prevention and Solution of Natural Disasters is to be established with the details as follows.

The center is an agency of the Office of the MOAC Permanent Secretary under supervision of the Natural Disaster Prevention and Solution Committee. It is a ministerial agency responsible for central administration to help victims in agricultural sector, whose farmlands are damaged by disaster. The directing subcommittee is appointed to supervise the management and performances of the Agricultural Operations for Prevention and Solution of Natural Disasters Center, including the monitoring, analysis and estimation of

agricultural situations, impacts and damages, and the victims' requests for help. Supervision, monitoring, expedition of performances run by agencies relating to natural disaster prevention and solution shall be periodically reported to the center and forward to the committee.

The organization chart of MOAC for monitoring and reporting on natural disaster is designed as the following.



Phase 2---During the disaster

1. Monitoring

The Agricultural Operation Center for Prevention and Solution of Natural Disasters is to monitor the disaster situation and compile the damage information provided by provincial agriculture and cooperatives offices and various Departments under MOAC and those derived from various sources regarding natural disasters in agricultural sector.

2. Damage survey and assessment

2.1 Agricultural technology service and transfer sub-district center or the assignee reports its district agriculture office the primary natural disaster against plants, fisheries and livestock pursuant to the specified form (Form DVA 1) once the disaster incurs.

2.2 The district agriculture office then immediately (or within 24 hours) forwards such report to its provincial agriculture office and the relevant district chief officer in order to prepare primary aids.

2.3 The provincial agriculture office coordinates with the provincial fisheries office and the provincial livestock office in order to estimate the damages pursuant to Form DVA 1 and forward it to the Department of Agricultural Extension at tel. 0 2940 7026 and CC to provincial fisheries office, provincial livestock office, regional agricultural promotion and development office, and provincial agriculture and cooperatives office.

3. Primary aids

3.1 The Royal Irrigation Department to carry on the following activities:

(1) Adjustment of water management plan and water consumption shifts to reduce impacts due to flood and drought.

(2) Supply of machineries, tools, water pumps, water trucks and water pushing machines to the disaster areas.

(3) Upgrading the efficiency of irrigation structures by heightening their ridges and strengthening the flood prevention systems, shutting or opening waterways to drain more flood water, repairing the worn out irrigation structures for temporary use, and constructing some weirs to block the intrusion of seawater into agricultural areas.

3.2 The Bureau of Royal Rainmaking and Agricultural Aviation to operate its rainmaking according to its schedules, the changes of situations and farmers' requirements.

3.3 The regional land development offices/land development stations to follow up the situations in their areas of responsibility from analytical data of the specified areas of disaster risk, and monitor such situations so as to publicize the farmers.

The provincial livestock offices to follow up the situations and weather forecasts of the Department of Meteorology, and coordinate with concerning agencies such as the Department of disaster Prevention and Mitigation and the Royal Irrigation Department.

Phase 3 After the disaster

When the situation resumes its normal condition, the mitigation shall be divided into two portions: financial aid and career/area rehabilitation aid.

1. Financial aid for mitigation

The criteria and procedures pursuant to the Ministry of Finance regulations B.E. 2546 on official emergency advance payment for disaster victims and its second amendment in 2006, and the Minor Criteria and Practices on Aids to Disaster Victims of Agricultural Sector in Case of Emergency B.E. 2549, proclaimed 20 November 2006, shall be implemented. This excludes the aids in case of epizooty by which the Epizooty Act B.E. 2499 (second amendment in 1999). The aids for fishing boats shall be implemented pursuant to the Fisheries Department regulations B.E. 2541 on subsidy for aquatic life farmers or fishermen who face with natural disasters.

1.1 Official advance payment

Responsible officers shall complete their performances within three months as from the last day of disaster.

District management The district chief officer is authorized to approve the payment of advance money up to the amount his governor assigns.

Provincial management The governor is authorized to approve the payment of advance money up to THB 50 million per disaster.

Ministerial management The permanent secretary is authorized to approve the payment of advance money up to THB 50 million per disaster.

If the local administration organization already gave aids to disaster victims according to official criteria the agency of the Ministry of Agriculture and Cooperatives may not pay the advance money in addition, unless such received aids do not exceed the rate of subsidy specified. However, the addition subsidy shall cover only the missing portion of the rate and be given as soon as possible. All given subsidies shall be recorded in the minutes of meeting of the district/provincial aids committee for approval of payments.

STEPS AND TIME FRAME IN SUBSIDY PAYMENT FOR MITIGATION

Step	Procedures	Duration
Request for payment of official advance money 1. <u>Damage survey</u>	1. It is the duty of a disaster victim in agricultural sector to confirm his/her request for subsidy in person and set his/her hand as evidence on the application form (Form AG01) at the sub-district service place specified by the province. 2. It is the duty of a village headman/sub-district headman/mayor in the locality to consider the exact damage of the applicant and certify his/her application form. 3. It is the duty of the assigned officer of a district agriculture office and those who specialize in livestock and fisheries to inspect whether the applicant is a agriculturist registered to any responsible agency and his application complies with the aid criteria designated by such agency, and calculate the amount of aid then set his/her name on the application form if everything is corresponding to the official regulations. 4. It is the duty of the district agriculture office to computerize the data filled in Form AG01 and evaluate the data of all victims in a village that request for subsidy in Form AG02, then certify the form and post it and its copies at the relevant office of district administration organization and district/village headman offices for at least three days. If any comment, inspection of correctness of the whole in Form AG01 shall be redone.	Performances pursuant to clauses 1 to 4 shall be completed within 30 days as from the last day of disaster.
2. Proposal to the District Aids to Disaster Victims Committee for perusal	It is the duty of the district agriculture office to evaluate the aids for each village based on Form AG02, the application form for sub-district allocation of budget, and the summary application form for district allocation of budget, and propose them to the District Aids to Disaster Victims Committee for approval. Officers responsible for fisheries and livestock shall attend the committee meeting to clarify their opinions.	This shall be completed within 40 days as from the last day of disaster.
3. Proposal to the Provincial Aids	The provincial agriculture office, the provincial fisheries office and the provincial livestock office jointly prepare the application	This shall be completed within

to Disaster Victims Committee for perusal	form for budget allocation (Form AG03) and submit it to the provincial Aids to Disaster Victims Committee for approval and forward to the governor for approval of the official advance payment under his authority.	10 days as from the day the district committee passed its perusal.
Step	Procedures	Duration
4 Province submits the proposal to the Department	In case the advance money approved under the governor's authority is not enough the province shall compile the documents and the details of advance money requirement submit to the MOAC Permanent Secretary for further approval.	This shall be completed within 10 days as from the day the provincial committee passed its perusal.
5 Department submits the proposal to the ministry	Inspection of documents and details of the request for advance money shall be under the authority of the MOAC Permanent Secretary.	This shall be completed within 10 days as from the day the province declared.
6 The Permanent Secretary approves the advance payment	The MOAC Bureau of Planning and Special Projects checks the documents and the details of request for advance payment whether it is under the authority of the Permanent Secretary.	This shall be completed within 10 days as from the day the department declared.

2. Rehabilitation of agricultural areas

If any relevant agency under the MOAC sees that the infrastructure for agricultural produces and public utilities should be developed in order to help the farmers it shall find out the facts and provide the district/provincial aids committee the report for approval and carry on the request for spending the official advance money or the central budget pursuant to the following criteria:

2.1 In care of the Land Development Department

The Land Development Department shall specify the criteria, principles and steps for helping the victims in case of landslide by surveying and assessing the agricultural areas destroyed by the disaster and planning to rehabilitate agricultural areas of landslide or overlaid by soil deposits/debris/sludge:

- **Landslide in agricultural areas**

Construct the soil and water conservation system in the landslide area to prevent the future disaster in order that the areas can be reused.

- **Agricultural areas overlaid by soil deposits, debris and mud**

Paddy fields. Level the areas by removing the soil deposits, debris and sludge out of the cultivation plot, reform the low-land paddy field, and improve its productivity with effective microorganisms (EM) or manure.

Farmland. Level the areas by removing the soil deposits, debris and sludge out of the cultivation plot, improve its productivity with effective microorganisms (EM) or manure.

Orchards. Level the areas by removing the soil deposits, debris and sludge out of the cultivation plot, dredge the furrows and improve its productivity with effective microorganisms (EM) or manure.

2.2 In care of the Royal Irrigation Department

The RID shall:

- Urge surveying the affected or damaged areas in its irrigation areas to find out the outlines of aids.
- Urge surveying the damage of irrigation structures and irrigation systems in order to repair them as soon as possible.
- Publicize the farmers to be aware of water condition in order that they will cultivate appropriately to the irrigated water.

In case the official advance money provided by the province is not enough or it cannot be approved the province shall inform the relevant agencies to ask for spending their normal budget. If the normal budget of an agency is not enough or no more, it shall request for spending the central budget through the approval of the MOAC.

Part II----Laws and Regulations

Criteria and minor practices on aids to disaster victims of agricultural sector in case of emergency in 2006 are explained as in the followings. This is the criteria proclaimed by the then Permanent Secretary of MOAC on 20th of November 2006 and being effective at present and the full text shall be referred herein for ready information. In this concern, it is noted that the proclamation by the then Director General of DDPM, Ministry of Interior is closely related with the practicing of MOAC criteria and the DDPM proclamation document is to be attached next to the full text of the MOAC criteria.

Criteria and Minor Practices on Aids to Disaster Victims of Agricultural Sector in Case of Emergency B.E. 2549

Whereas it deserves to improve the criteria and the minor practices on aids to disaster victims in case of emergency, and by virtue of Clause 8 of the criteria and the minor practices on aids to disaster victims in case of emergency B.E. 2546 which was designated by the Ministry of Finance pursuant to Clause 27 of the Ministry of Finance Regulations on Official Advance Money for Aids to Disaster Victims in Case of Emergency B.E. 2546, the Ministry of Agriculture and Cooperatives therefore revises the criteria and the minor practices on aids to disaster victims of agricultural sector in case of emergency as follows:

1. These criteria shall be called “the Criteria and the Minor Practices on Aids to Disaster Victims of Agricultural sector in Case of Emergency B.E. 2549.”

2. These criteria shall be effective as of the 1 August 2006.

3. The MOAC proclamation on the Criteria and the Minor Practices on Aids to Disaster Victims pursuant to the Criteria and Procedures for aids in plants, fisheries, livestock and other kinds of agriculture which was proclaimed on 30 August 2004 shall be cancelled.

All designated criteria, regulations, orders and any proclamation that are contradictory to these criteria it shall be deemed that these criteria govern.

4. The scope of official advance payment shall be of the aids to disaster victims in case of emergency pursuant to the meanings of the Ministry of Finance Regulations on Aids to Disaster Victims of Agricultural sector in Case of Emergency.

5. Payment of official advance money for aids to disaster victims in case of emergency shall comply with the following criteria, procedures, conditions and aid rates:

5.1 Vegetation

5.1.1 Aids in terms of production factor

The aids in terms of production factor shall be done through procurement of production factor pursuant to the rates specified in the aid criteria in respect of the moderate price list and the rates of agricultural production factor according to the Department of Agricultural Extension Proclamation by approval

of the MOAC Permanent Secretary, and it shall be deemed that the approved proclamation is part of these criteria accordingly.

5.1.2 Aids in terms of subsidy

The aids in terms of subsidy shall be based on the following aid rates:

- (1) For completely damaged plants
 1. Paddy fields: THB 414/rai
 2. Farm plants: THB 579/rai
 3. Garden plants and others: THB 786/rai
- (2) For growing plants that are affected by the disaster and they can be recovered to their normal conditions:
 1. Paddy fields: THB 142/rai
 2. Farm plants: THB 161/rai
 3. Garden plants and others: THB 161/rai
- (3) In case the production factors and the produces to be relocated due to the imminent disaster the subsidy shall be 50% of the relocation cost actually paid.
- (4) In case of plant epidemics the subsidy for procurement of chemicals/organic matters, as well as equipment and materials for prevention of dissemination and killing all kinds of pest, at market prices at that time, provided that the supplies shall be corresponding to technical principles.

5.2 Fisheries

Aids to aquatic life farmers troubled by the disaster shall be done in terms of production factor supplies or subsidy with respect to the following criteria and minor procedures:

5.2.1 The disaster victims must be the farmers in any branch of fisheries.

5.2.2 The aids shall be in terms of production factor supply or subsidy at the following aid rates:

- (1) All kinds of fish in earth ponds and paddy fields (only the cultivation areas): THB 3,406/rai (not exceeding 5 rai for each victim);
- (2) Shrimps, crabs and shellfish: THB 9,098/rai (not exceeding 5 rai for each victim);
- (3) Aquatic life cultured in floating cages or concrete ponds, such as fancy fish, frogs, soft-shelled turtles: THB 257/m² (not exceeding 80 m² for each victim);

If the calculated aid rate of any farmer is less than THB 257, he will have the right to receive full subsidy of THB 257.

5.3 Livestock

5.3.1 Aids in case of damaged pastures

(1) The public damaged pastures that require rehabilitation shall be supplied with fodder seeds appropriate to the condition of such area depending on the size of damaged area. The fodder seeds to be supplied shall not exceed 2 kg/rai and/or not exceeding 250 kg/rai for breeder shoots/sticks.

(2) The private-owned pasture that are damaged or need to be rehabilitated shall be supplied with fodder seeds (not exceeding 2 kg/rai) appropriate to the condition of such area depending on the size of damaged area not exceeding 20 rai, and/or not exceeding 250 kg/rai for breeder shoots/sticks.

(3) The price of fodder seeds for aids pursuant to Clauses (1) and (2) shall not exceed THB 110/kg and the breeder shoots/sticks THB 2.50/kg.

5.3.2 Aids in case of death or loss of domesticated animal's life

5.3.2.1 Aid criteria

- (1) Cows/bulls. The aid depends on the number of death or loss of cows/bulls but not exceeding two/victim.
- (2) Water buffaloes. The aid depends on the number of death or loss of buffaloes but not exceeding two/victim.
- (3) Hogs. The aid depends on the number of death or loss of hogs but not exceeding ten/victim plus their food not more than 10 kg each.
- (4) Goats. The aid depends on the number of death or loss of goats but not exceeding ten/victim.

- (5) Sheep. The aid depends on the number of death or loss of sheep but not exceeding ten/victim.
- (6) Ducks. The aid depends on the number of death or loss of ducks but not exceeding 1,000/victim plus their food not more than 0.5 kg each.
- (7) Chickens. The aid depends on types chickens lost or died:
 - Native or native half-caste chickens: not exceeding 300 plus their food not more 0.5 kg each.
 - Egg-breed and meat-breed chickens: not exceeding 1,000 plus their food not more 0.5 kg each.
- (8) Geese. The aid depends on the number of death or loss of geese but not exceeding 300/victim plus their food not more than 0.5 kg each.
- (9) Partridges. The aid depends on the number of death or loss of partridges but not exceeding 1,000/victim plus their food not more than 0.5 kg each.

5.3.2.2 Prices of animal breeds, their foods and types of aids

(1) Prices of animal aids and their types

Animal breed	Max. aid rate (THB)	Type of animal
<u>Cows/bulls</u> - Younger than 6 months of age - 6 to 12 months of age - 1 to 2 years of age - Older than 2 years of age	3,600 7,800 10,500 15,800	- Native or native half-caste breed - Male or female - Age (pursuant to actual damage but not more than 4 years of age) - Mature and good-health breeders - Foot and mouth disease, swelling throat disease vaccinated for 15 to 120 days before delivery. - Free from brucellosis with health certificate issued by veterinarian - Harnessed with rope
<u>Water buffaloes</u> - Younger than 6 months of age - 6 to 12 months of age - 1 to 2 years of age - Older than 2 years of age	3,600 7,800 10,500 15,800	- Native or native half-caste breed - Male or female - Age (pursuant to actual damage but not more than 4 years of age) - Mature and good-health breeders - Foot and mouth disease, swelling throat disease vaccinated for 15 to 120 days before delivery. - Free from brucellosis with health certificate issued by veterinarian Harnessed with rope
Hogs	1,200	- Genuine or half-caste breed - Male or female - 30-45 days of age - Body weight more than 10 kg - Good health - Properly vaccinated at ages
Goats	1,400	- Genuine or half-caste breed - Male or female - 6 to 12 months of age - Body weight more than 10 kg

		- Good health - Properly vaccinated at ages
Sheep	1,400	- Genuine or half-caste breed - Male or female - 6 to 12 months of age - Body weight is more than 10 kg - Good health - Properly vaccinated at ages
Native or half-caste chickens	22.50	- Male or female - Two weeks of age or more - Properly vaccinated at ages
Chickens	15.00	Egg-breed chickens - Female - One to seven days of age - Properly vaccinated at ages Meat-breed chickens - Male or female - One to seven days of age - Properly vaccinated at ages
Ducks	15.00	Foreign breed meat ducks - Male or female - One to seven days of age - Properly vaccinated at ages Egg-breed ducks - Female - One to seven days of age - Properly vaccinated at ages
Geese	50.00	- Native or native half-caste breed - Male or female - One to seven days of age - Properly vaccinated at ages
Partridges	12.00	- Native or native half-caste breed - Female - One months of age or more - Properly vaccinated at ages

(2) Prices of all kinds of animals' instant foods of appropriate quality matching with their types and ages are based on the market prices. In case of subsidy, the price is THB 10/kg.

5.3.3 No charter of private trucks/vessels to transport animals or animals' foods purchased/procured from private suppliers to the victims. Delivery to destination shall be specified as a condition in the sales contract.

5.3.4 Livestock pricing shall include the transportation cost to destinations of the victims.

5.4 Other fields of agriculture

5.4.1 Dredging for opening the waterways.

Wage rates in construction of dikes or expenses in purchasing materials to construct embankments for protection of agricultural areas by the Royal Irrigation Department shall be as follows:

(1) The expenses for dredging and opening of waterways, wages for construction of dikes and embankments, or the expenses for construction of irrigation structures to prevent flood water spread into agricultural areas and public domains:

- The calculation is based on the quantity of work multiplied by the rate of work specified by the Bureau of the Budget or the rate specified by the provincial commerce office.

(2) Expenses for the repair of irrigation structures and irrigation systems (for drainage only) in order that they can be used in case of emergency.

- The calculation is based on the quantity of work multiplied by the rate of work specified by the Bureau of the Budget or the rate specified by the provincial commerce office.

(3) The expenses of fuel and lubrication or power supply for running official water pumps by local administration organizations and those of additional private water pumps (in case of official water pumps are not enough) shall be based on necessity and economy, especially the self-help contribution of local people.

- A 12-in-pipe 'Naga' truck (mobile unit for irrigating paddy field): ten liters/hour of fuel and one liter/day of lubrication.

- A 12-in-pipe water pump: nine liters/hour of fuel and one liter/day of lubrication.

- A 10-in-pipe water pump: seven liters/hour of fuel and half a liter/day of lubrication.

- A 8-in-pipe water pump: six liters/hour of fuel and half a liter/day of lubrication.

- A 6-in-pipe water pump: four liters/hour of fuel and half a liter/day of lubrication.

5.4.2 Expense for contracting machineries or expense for using official machineries

(1) In agricultural areas overlaid by debris came along with flood and relevant official agency cannot access to them. The subsidy of THB 7,000/rai for each area not exceeding 5 rai will provided in order to remove such debris out of such areas and cultivation of short-life plants can be done.

(2) Expense for land leveling and ridge making in order to mitigate the victims and they will be able to cultivate their plants. The market price for this job is not more than THB 500.

(3) The unit cost of using official machineries under the Ministry of Agriculture and Cooperatives to improve asphaltic-concrete-paved roads, dredge waterways, land leveling and remove debris from flooded areas shall be of the moderate prices approved by the Bureau of the Budget mutatis mutandis.

6. All aids in terms of production factors or subsidies under these criteria shall be at authorized persons' judgments aiming at the necessity and conditions of event.

Proclaimed this 20th day of November 2006.

(Signed)

Mr. Banpote Hongthong
MOAC Permanent Secretary

Thai - English translation

Official Thai
emblem

DEPARTMENT OF DISASTER PREVENTION AND MITIGATION PROCLAMATION
Criteria, Procedures and Conditions in Announcement of Emergency Disaster
and Designation of Small-Scale Emergency Disaster

By virtue of Clauses 16 and 18 of the Ministry of Finance Regulation on Official Advance Money for Aids to Emergency Disaster Victims B.E. 2546, the Department of Disaster Prevention and Mitigation, by approval of the Ministry of Finance, therefore designates the criteria, procedures and conditions in announcement of types of small-scale emergency disasters:

Clause 1 Once the disaster incurs in Bangkok or other provinces and it is an emergency case the Director-General of the Department of Disaster Prevention and Mitigation or relevant governors, as the case may be, shall announce such disaster the emergency disaster in order that the relevant government agencies can help the disaster victims. Announcement of emergency disaster shall contain the following items:

- (1) Type of disaster;
- (2) Area of disaster;
- (3) Date of incurrence; and
- (4) Duration of aids to disaster victims, not exceeding three months as from the date of incurrence.

In case the disaster keeps going on, mention in the announcement that “the emergency disaster has not ceased.” And when such disaster ends, announce the end date of such disaster.

Clause 2 In case it is impossible to help the victims within due time specified in Clause 1, it is the judgment of the Director-General of the Department of Disaster Prevention and Mitigation to consider the extension of time for aids, depending on the necessity and appropriateness in solving such at-hand problems.

Clause 3 Once the following emergency disasters incur the relevant government agencies shall immediately provide aids to the victims, and the Director-General of the Department of Disaster Prevention and Mitigation or the governors, as the case may be, shall quickly announce such disaster the emergency disaster, within seven days as from the first day of aids given to the victims.

(1) Small-scale emergency disaster. It is the disaster that causes damage to residences not more than 20 or the number of victims not more than 50 families, or not exceeding 200 persons, or the total damaged agricultural area is not more than 1,000 rai.

(2) Emergency and at-hand disaster. It is the disaster that abruptly incurs and the aids shall be given to victims urgently.

Proclaimed this 26th day of April 2005.

(Signed)

Mr. Sunthorn Rewlueang
Director-General
Department of Disaster Prevention and Mitigation

Part III---Supporting data in agricultural damage assessment

The important parts of supporting data for considering damage by natural disasters are as follows.

SUPPORTING DATA FOR CONSIDERING DAMAGE

Plants

Rice

1. Impacts by disaster

Flood in paddy fields

There are two kinds of rice breeds that can grow well in inundated areas:

(1) Deep-water rice seedling. It is the seedling that can grow well although the water level is 50 to 100 cm deep e.g., Gor Khor 19, Hantra 60, and Prachinburi 2;

(2) High-water rice seedling. It is the seedling that can grow well although water level is 100 cm deep or deeper e.g., Prai Ngarm Prachinburi, Leb Mue Nang 111, and Pin Kaeo 56.

Effect due to inundation

Paddy field inundation causes damage to rice plants because of the inundating water level, type of inundating water and duration of inundation. These aspects affect the growth of rice plants:

Item	Water level	Type of water	Duration of inundation	Effect to rice plants
1	Part of rice plant emerges from water surface more than 30 cm	Clear/turbid water	For a certain time	Rice plants can normally grow
2	Part of rice plant emerges from water surface less than 30 cm	Turbid and still water affect rice plants more seriously	No longer than 2 to 3 weeks	Rice plant start ceasing their growth
3	All parts of rice plants submerge	do	3 to 5 days	Rice plants become yellowish after being inundated for three days. If the inundation declines, they can survive by adding some urea fertilizer into the water
4	All parts of rice plants submerge	do	More than 5 days	Rice plants start dying

Advice in rehabilitation of paddy fields after flood

It's better to cultivate light-sensitive paddy breeds because the yearly crop has already passed and management of plantation shall be done well in past-inundated areas:

(1) Areas under long inundation and all paddies die

- If the paddies in the fields before inundation were at harvesting stage and all produces were damaged, just plough up and over by fermenting rice straws at least seven days in advance.
- If the paddies in the fields before inundation were at early stage of growth, just do the fermenting plough or harrow the decayed rice straws.

Good management means the preparation of non-light-sensitive paddy breeds, light preparation and soil preparation by harrow the left over vegetables and paddy stubbles, and sowing new crop, getting rid of weeds, adding chemical fertilizer when the paddies are one month of age, adding chemical fertilizer again when they have young ears.

(2) Areas where paddies in the fields still survive

Rehabilitate the paddy fields by observing the aspects of paddies three days after the flood passed and do the following steps:

- If the rice plants in the fields are greener after the flood passed for three days, so no need to add fertilizer, and just prevent pest diseases. The rice plants only have some excessive leaves.
- If the rice plants show some yellow leaves, just extirpate only the yellow ones to prevent pest diseases.

Perennial fruit producing plants

In case of flood and inundation

Inundating water in orchards causes abnormal symptoms to perennial fruit producing plant to death. Plants inundated for a long time will have the following symptoms:

- 1) Yellow leaves;
- 2) Fall of leaves, flowers and fruits;
- 3) Openings are found on barks to internal and external exchange gases at their trunks;
- 4) Stomata are closed in order to reduce transpiration and prevent wilt of leaves. This is because their roots lack oxygen for respiration due to the water seeps into air voids in the soil. The roots therefore cannot do their functions. If inundation lasts for a long time the fruit producing plants will be shabby and finally die.

Criteria for damage assessment

Case	Inundation duration	Type of damage	
1. Flood	Durable to flood water	More than 30 days	Tree top and leaves are underwater
		Not exceeding 30 days	Tree top and leaves are above water level
		Not exceeding 15 days	Flooded up to tree bole only
	Non-durable to flood water	More than 15 days	Tree top and leaves are underwater
		Not exceeding 15 days	Tree top and leaves are above water level
		Not exceeding 5 days	Flooded up to tree bole only
2. Drought	Durable to aridity	More than 60 days	Continuous lack of water; leaves and tree top are wilting
		Not exceeding 60 days	Lack of water; 50% of leaves and tree top are wilting
		Not exceeding 45 days	Lack of water; leaves and tree top start wilting
	Non-durable to	More than 30 days	Lack of water; leaves and tree top are wilting
			Lack of water; 50% of leaves and tree top are wilting
			Lack of water; 50% of leaves and tree top are wilting

aridity	Not exceeding 30 days	Lack of water; leaves and tree top start wilting
	Not exceeding 10 days	
3. Plant diseases and pests	71% or more	Trunk and leaves are destroyed
	26 to 75%	do
	Not exceeding 25%	do
4. Landslide	More than 10 days	Fall of the tree and roots expose to the air
	5 to 10 days	Trunk tilts 45°
	Not exceeding 5 days	Leaves and top are torn; some branches are broken

Remark: In case of damage due to pest diseases the damage shall be reported in percentage of attack, based on the comparison of one rai equivalent to 100%.

Advice in taking care of fruit trees during frequent rains and after inundation

Inundation may incur in orchards during frequent rains and cease their growth. Fertility in trunk declines and affects its blossom in next season. If the orchards are inundated, just do the following steps:

First week after inundation

1. Urge heightening the ridges around the orchard if it is located in low land and pump inundated water out of the area to its normal level.

2. When the water is declining and the top soil exposes, urgently dig furrows to drain water from the soil in order to help respiration of the trees. At this stage the soil condition in general are still half dry or wet. Strictly, do not step on the orchard soil because the soil around the roots is still saturated with water, otherwise the roots which are weak for the time being will be more affected and it might die. Leave it like that for a few days until the top soil is dry.

3. At this stage, if the aeration into soil is feasible, just quickly do it. It will help the trees recover sooner and quicker drain absorbed water from soil particles. Anyway, this is not so practical.

4. In case the orchard locates in low land where ridge heightening is impossible and the inundation has to be left until it declines naturally and it will kill the trees. A way to rescue them is the air compressor in order to increase dissolved oxygen in the water, or use the aerator in order to circulate the water or increase the oxygen into the water for temporary usage of root system until the inundation fades away.

Second week after inundation

5. When the top soil is dry enough for stepping on, remove the debris and cut the branches near to the bole, especially the lower ones where stains of flood water or muddy water exist because such stains plug the tree's respiration pores, causing abnormal transpiration and photosynthesis through leaves. Another way, this is an opening to let the light conveniently illuminate to the top soil around the bole and dry it faster.

6. When the inundation declines, do not urge putting fertilizer through soil because almost of its root systems were damaged. To build a new root system needs quite a long time and it is not instant. So it's better to fertilize through leaves at the following proportions:

- About 20 g of fertilizer with NPK proportion of 1.2:1.5:1, for examples, 15:10:10 or 25:20:20, or nearest formula,;
- 20 g of nutrients, such as Magnesium, zinc and other supplementary nutrients;
- 200 g of granulated sugar;
- 45 g of fungi killing substance; and
- Mix in solution with 20 liters of water.

Spray the solution onto the leaves twice or three times (each time for three days). If the tree starts budding and growing, it means that the root system can work normally. The blossoms and fruits at its early should be eliminated as soon as possible in order to keep the mother tree stronger.

7. If the mud or sludge accumulated in the orchard, just dredge to its former top soil level and dispose it from the bush areas. For better ventilation by means of traditional mechanical tools (hoe, shovel, spade etc.)

but not with heavy equipment such as tractor because it will disturb the root system of the already weak tree and increase injury to it.

8. Some sickly fruit producing trees such as tangerine and durian, if its branch or trunk is torn or wounded just get rid of it and smear with fungi killing solution to immediately prevent root decay disease and bole decay disease.

9. If the trunk tilts due to flow of flood water, just reinstate it with rope or wire by fastening with firm stakes and cut its branches off about one-third in order to let it recover sooner.

10. Spraying pesticide and fertilizer solutions through leaves should be done with low concentration because the tree is under recuperation.

11. It's better to do the sampling of soil for analysis of the changes in nutrients and pH, and then fertilize it according to the analysis result.

12. Add useful microorganisms to the orchard soil with biotic fertilizer, compost or manure in parallel with chemical fertilizer.

Farm plants

Most farm plants are not water-loving plants, usually cultivated in high land with minor annual precipitation. The most arid-durable plants are sugar canes and cassavas.

Case	Damage duration	Type of damage
Flood		
Durable to flood water	More than 20 days	Tree top and leaves are underwater
	Not exceeding 20 days	Tree top and leaves are above water level
Non-durable to flood water	Not exceeding 10 days	Flooded up to tree bole only
	More than 5 days	Tree top and leaves are underwater
	Not exceeding 5 days	Flooded up to tree bole only
	More than 20 days	Tree top and leaves are underwater
Drought	More than 60 days	Continuous lack of water; leaves and tree top are wilting
	Not exceeding 60 days	Lack of water; 50% of leaves and tree top are wilting
	Not exceeding 10 days	Lack of water; leaves and tree top start wilting
Plant diseases and pests	51% or more	Trunk and leaves are destroyed
	26 to 50%	do
	Not exceeding 25%	do
Landslide	100%	Soil and mud/sludge overlaid

Remark: In case of damage due to pest diseases the damage shall be reported in percentage of attack, based on the comparison of one rai equivalent to 100%.

Vegetables, flowerers and ornamental plants

Case	Damage duration	Type of damage
Flood		
Durable to flood water	More than 30 days	Tree top and leaves are underwater
	Not exceeding 5 days	Flooded up to tree bole only
Non-durable to flood water	More than 5 days	Tree top and leaves are underwater
	2 days	Flooded up to tree bole only

Drought	More than 30 days	Continual lack of water; leaves and tree top are wilting
	Not exceeding 15 days	Lack of water; 50% of leaves and tree top are wilting
	Not exceeding 10 days	Lack of water; leaves and tree top start wilting
Plant diseases and pests	25% or more	Trunk and leaves are destroyed
	6 to 25%	do
	5%	do
Landslide	100%	Soil and mud/sludge overlaid

Remark: In case of damage due to pest diseases the damage shall be reported in percentage of attack, based on the comparison of one rai equivalent to 100%.

Livestock

Aids are considered only in case of loss, damage and death with certification of the district/provincial Aids committees.

1. Damage of fodder grass plot

1.1 Grass cultivation with seeds

- Ruzi grass (*Brachiaria ruziziensis*). It is a sort of grass lifelong for years and can be cultivated in low fertile soil, grows well in high land. Its soil can well drain water and rather durable to aridity and cattle's stepping on but not durable to flood or inundation.
- Purple guinea grass (*Panicum maximum* cv. TD 58). It is a sort of grass lifelong for years growing in shrubs with large soft plentiful leaves. It can grow in shadowy condition, suitable with water accessible areas but not durable to flood or inundation.

1.2 Grasses using breed sticks in cultivation

- Napier Grass (*Pennisetum purpureum*). It is a sort of grass lifelong for years, 3-4 m high. All breeds grow well in high fertile soil, suitable with water accessible areas but not durable to flood or inundation.
- Pangola grass (*Digitaria decumbens*). It is a sort of grass lifelong for years. Their small trunks are half-vertical and half-climbing, and hairless. Their leaves are tapering and long, soft and plentiful. It's good for making hay. It is relatively durable to flood and inundation.

Effects to grasses during inundation

Inundation in grass plot cause directly damage to the grass, depending on the inundating water level and the duration of inundation, as well as its growth.

Type of grass	Inundation duration	Effect
Ruzi	Not exceeding 2-3 days	If the inundation declines on the fourth day it can survive. Longer than this it will die.
Purple guinea	do	If the inundation declines on the third day it can survive but doesn't grow well. Longer than this it will die.
Napier	do	If the inundation declines on the third day it can survive. Longer than this it will die.
Pangola	Not exceeding 3-4 days	If the inundation declines on the fourth day it can survive, but no cutting it otherwise it will die.

2. In case of loss or death of farm animals due to disaster

2.1 Loss or death due to flood, drought, lightning, landslide. Aids are designated for farm animal owners who are disaster victims: cows/bulls, water buffaloes, hogs, goats, sheep, native or hybrid chickens, egg producing/meat chickens, ducks, geese, and partridges pursuant to the criteria, procedures and minor practices regarding aids to agricultural victims in emergency case B.E. 2549;

2.2 Aids in case of epizooties shall comply with the Epizooty Act B.E. 2499 and its amendment B.E. 2542, or the aids pursuant to the Cabinet's resolution on types of farm animals deserve for aids under the Ministry of Agriculture and Cooperatives Proclamation on criteria and minor practices regarding aids to agricultural victims in emergency case B.E. 2549;

By the way, in case of death of farm animals their carcasses shall be kept for a certain time to confirm their death. In case of loss without any proof of carcass counting, the evidence shall be certified by local leaders, such as village headman, district headman, district administration authority, or with the grievance declaration sheet certified by a police station.

Fisheries

Aids will be provided in case of loss and death of aquatic life only. The evidence of damage shall be certified by a district/provincial aid committee.

Summary of the Pilot Project at Each Model Area

Sector	Model Area		Project Code
	Program	Phitsanulok Province	
Community-based Disaster Risk Management Against Big Flood (CDRM)	Evacuation/ Rescue Coordination Center and Equipment (EVC) Youth Activities to Transfer Knowledge and Lessons Learned (YALL)	T.Chum Saeng Songkram (CSS), A.Bang Rakam	CSS-CDRM-EVC-1
		(1) Improvement of Communication System	
	Preparation of Flood Hazard Map (HZDMP)	(1) Synthesize of culture and knowledge on flood	CSS-CDRM-YALL-1
		(1) Preparation of Flood Hazard Map	CSS-WRM-HZDMP-1
		(1) Participatory Flood Monitoring	CSS-WRM-PFIM-1
Community Water Resources Management (WRM)	Community Water Resource Management Plan (CWRMP)	(1) Review of Government Intervention	CSS-WRM-CWRMP-1
		(1) Promotion of Sufficiency Agriculture	CSS-AGRI-CRDV-1
	Crop Diversification and Food Security (CRDV)	(1) Fish Survey	CSS-iGEN-FISH-1
		(1) Fish Processing	CSS-iGEN-IGLR-1
		T. Nakorn Pa Mak (NPM), A. BangkraThum	
Flood Damage Reduction in Agriculture and Livestock Sector (AGRI)	Preparation of Flood Hazard Map (HZDMP)	(1) Preparation of Flood Hazard Map	NPM-WRM-HZDMP-1
		(1) Participatory Flood Monitoring	NPM-WRM-PFIM-1
	Water Management Facilities/ Equipments Improvements (WMFE)	(1) Repairing small gate	NPM-WRM-WMFE-1
		(1) Trials on rice transplanting methods	NPM-AGRI-PADDY-1
		(1) Community Seed bank	NPM-AGRI-SEED-1
Flood Damage Reduction in Agriculture and Livestock Sector (AGRI)	Good Paddy Seed Production/ Seed Bank (SEED)	(1) Safe vegetable promotion	NPM-AGRI-CRDV-1
		(2) Green Market to promote safe food promotion	NPM-AGRI-MKT-1
	Crop Diversification and Food Security (CRDV)	(1) Fish Survey	NPM-iGEN-FISH-1
		(1) Fish Processing	NPM-iGEN-IGLR-1
Income Generation Activities towards Recovery of Rural Livelihood (iGEN)	Preparation of Flood Hazard Map (HZDMP)	(1) Preparation of Flood Hazard Map	NPM-WRM-HZDMP-1
		(1) Participatory Flood Monitoring	NPM-WRM-PFIM-1
	Water Management Facilities/ Equipments Improvements (WMFE)	(1) Repairing small gate	NPM-WRM-WMFE-1
		(1) Trials on rice transplanting methods	NPM-AGRI-PADDY-1
		(1) Community Seed bank	NPM-AGRI-SEED-1
Income Generation Activities towards Recovery of Rural Livelihood (iGEN)	Good Paddy Seed Production/ Seed Bank (SEED)	(1) Safe vegetable promotion	NPM-AGRI-CRDV-1
		(2) Green Market to promote safe food promotion	NPM-AGRI-MKT-1
	Crop Diversification and Food Security (CRDV)	(1) Fish Survey	NPM-iGEN-FISH-1
		(1) Fish Processing	NPM-iGEN-IGLR-1

Sector	Model Area		Chainat Province (CN)	
	Program		T.Wang Man (WM), A.Wat Sing	Project Code
Community Water Resources Management (WRM)	Community Water Resource Management Plan (CWRMP)		(1) Community Water Resources Management Plan Inter Tambon	WM-WRM-CWRMP-1
Flood Damage Reduction in Agriculture and Livestock Sector (AGRI)	Water Management Facilities/ Equipments Improvement		(1) Improvement of Dike along Irrigation Canal	WM-WRM-WMFE-1
	Crop Diversification and Food Security (CRDV)		(2) Promotion of Sufficiency Economy	WM-AGRI-CRDV-1
	Small-scale Livestock and Pasture Development (LVS)		(1) Feed Production and Storage (2) Training for Livestock Production (3) Installation of Bio-gas Facility (4) Silage storage at sub-center under DLD	WM-AGRI-LVS-1WM-AGRI-LVS-2 WM-AGRI-LVS-3 WM-AGRI-LVS-4
Networking, Supporting and Institution for Community Strengthening (NET)	Networking with Neighboring TAOs (NET)		(1) Inter Tambon Network for Flood Management	WM-NET-NET-1
			T.Khao Kaeo, A.Sapphaya	
Community-based Disaster Risk Management Against Big Flood (CDRM)	Drinking Water Supply during Flood Period (DWS)		(1) Drinking Water Supply System at School	KK-CDRM-DWS-1
Community Water Resources Management (WRM)	Preparation of Flood Hazard Map (HZDMP)		(1) Preparation of Flood Hazard Map	KK-WRM-HZDMP-1
Flood Damage Reduction in Agriculture and Livestock Sector (AGRI)	Participatory Flood Monitoring/ Information Management (PFIM)		(1) Participatory Flood Monitoring	KK-WRM-PFIM-1
	Paddy Cultivation Activities for Flood Adaptation(PADDY)		(1) Trials on rice transplanting methods (2) Reduction of Production Cost (3) Training for Parachuting	KK-AGRI-PADDY-1 KK-AGRI-PADDY-2 KK-AGRI-PADDY-3
	Good Paddy Seed Production/ Seed Bank (SEED)		(1) Community Seed bank	KK-AGRI-SEED-1
	Crop Diversification and Food Security (CRDV)		(1) Aquaponics	KK-AGRI-CRDV-1
Income Generation Activities towards Recovery of Rural Livelihood (IGEN)	Study on Fish Variety and Value in Flood Prone Area (FISH)		(1) Fish Survey	KK-IGEN-FISH-1
	Income Generation utilizing Local Resources (IGLR)		(1) Activation of Women Group through Utensil Making	KK-IGEN-IGLR-1
Networking, Supporting and Institution for Community Strengthening (NET)	Land Parcel GIS Database of Land Use and Ownership (LPGIS)		(1) Establishment of Land Parcel GIS Database	KK-NET-LPGIS-1

Sector	Model Area		Project Code Number	
	Program	T.Gop Chao (GC), A.Bang Ban		
Community-based Disaster Risk Management Against Big Flood (CDRM)	Community Flood Disaster Management Plan (CDRMP)	(1) Community-based Disaster Risk management	GC-CDRM-CDRMP-1	
		Drinking Water Supply during Flood Period (DWS)	GC-CDRM-DWS-1	
		Evacuation/ Rescue Center and Equipment (EVC)	GC-CDRM-EVC-1	
	Community Water Resources Management (WRM)	Preparation of Flood Hazard Map (HZDM)	(1) Preparation of Flood Hazard Map	GC-WRM-HZDMP-1
		Participatory Flood Monitoring/ Information Management (PFIM)	(1) Participatory Flood Monitoring	GC-WRM-PFIM-1
		Paddy Cultivation Activities for Flood Adaptation(PADDY)	(1) Trials on rice transplanting methods	GC-AGRI-PADDY-1
			(2) Reduction of Production Cost	GC-AGRI-PADDY-2
	Flood Damage Reduction in Agriculture and Livestock Sector (AGRI)	Good Paddy Seed Production/ Seed Bank (SEED)	(1) Community Seed bank	KK-AGRI-SEED-1
		Crop Diversification and Food Security (CRDV)	(1) Safe Vegetable Promotion	GC-AGRI-CRDV-1
			(2) Floating vegetable Cultivation	GC-AGRI-CRDV-2
Income Generation Activities towards Recovery of Rural Livelihood (IGEN)	Study on Fish Variety and Value in Flood Prone Area (FISH)	(1) Fish Survey	GC-IEN-FISH-1	
	Income Generation utilizing Local Resources (IGLR)	(1) Improvement of Fish and shrimp Processing	(3) GC-IGEN-IGLR-1	
		(2) Application of processed water hyacinth	(4) GC-IGEN-IGLR-2	
			T.Sihanat (SHN), A.Lat Bua Luan	Project Code
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
	Good Paddy Seed Production/ Seed Bank (SEED)	(2) Production and sale of qualified paddy seed	SHN-AGRI-PADDY-1	
		Crop Diversification and Food Security (CRDV)	(1) Introduction of Bio-control, Bio-fertilizer	SHN-AGRI-CRDV-1
	(2) Establishment of Learning Center		SHN-AGRI-CRDV-2	
	Logistics and Market for Agro-produce (MKT)	Small-scale Livestock and Pasture Development (LVS)	(3) Rehabilitation of products collection points	SHN-AGRI-MKT-1
			(1) Feed Production and Storage	SHN-AGRI-LVS-1
			(2) Training for Livestock Production	SHN-AGRI-LVS-2
			(3) Installation of a Bio-gas facility	SHN-AGRI-LVS-3
Networking with Neighboring TAOs (NET)	Networking among Tambons along Praya Banlue Canal	(4) Goat Raising	SHN-AGRI-LVS-4	
		(1) Networking among Tambons along Praya Banlue Canal	SHN-ORG-NET-1	

Sector	Model Area	Pathumthani Province (PT)	
		Program	Project Code
Community-based Disaster Risk Management Against Big Flood (CDRM)	Community Flood Disaster Management Plan (CDRMP)	T.Klong Ha, A.Klong Luang (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
Income Generation Activities towards Recovery of Rural Livelihood (iGEN)	Logistics and Market for Agro-produce (MKT)	(1) Green Market to promote safe food promotion	KH-AGRI-MKT-1
	Income Diversification by Agro-processing (AGPR)	(1) Recovery and Improvement of Agro-Processing	KH-iGEN-AGPR-1

Sector	Model Area	Nakhon Pathom Province (NT)	
		Program	Project Code
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

Sector	Model Area	Others	
		Program	Project Code
Flood Damage Reduction in Agriculture and Livestock Sector (AGRI)	Research on Bamboo Utilization in Flood Countermeasure (BMB)	(1) Bamboo Variety survey (2) Utilization of Bamboo and Processing (3) Bamboo Charcoal, Wood Vinegar, Bamboo powder for Agriculture Use	OTHER-AGRI-BMB-1 OTHER-AGRI-BMB-2 OTHER-AGRI-BMB-3

Appendix D-18

Report on Final Workshop on Project for Flood Countermeasures for Thailand Agricultural Sector

<Date> 24 & 25 April, 2013 (check-in 23th April afternoon for overnight stay)

<Venue> Golden Jubilee Agricultural Museum

<Objectives>

- To exchange experience and lessons learned of pilot projects among model areas
- To reflect those lessons and opinion from participants into technical papers and guidelines

<Program>

23	Ap	Afternoon	Check-in for Participants from Phitsanulok and Chainat
r.			
24	Ap	09:00-09:30	Registration
r.			
		09:30-09:40	Opening Remarks by Dr. Jirawan Yamprayoo, Inspector- General, Ministry of Agriculture and Cooperative
		09:40-09:50	Opening Address by Mr. Tomoyuki Kawabata, Senior Representative, JICA Thailand Office
		09:50-10:00	Project Brief and Objective of the Workshop by Mr. Tetsuro Oda, Co-Team Leader (Component 3), JICA Project Team
		10:00-10:30	Picture Presentation of Project Implementation Process by Mr. Nakorn Najaron, JICA Project Team
			Handing Over Ceremony and Group Photo, JICA Thailand Office
		10:30-11:00	Coffee Break
		11:00-12:00	Exhibition of Pilot Activities by Tambon and Research Institutes (at Building 2)
		12:00-13:00	Lunch
		13:00-16:30	Presentation and Discussion
		13:00-13:30	1. Continuity and Extension of Model Activities by Provincial Task Forces (by Ayuthaya PACO, Chainat PACO, Phitsanulok PACO and Pathumthani PACO)
		13:30-13:55	2. Private- Government –Academic-Cooperation for Orchid Sub-sector Flood Recovery, by Dr. Setapong Lelawatana, Director of Vegetable, Flower, Ornamental Plant and Herbal Plant Production Promotion Division, DOAE, Dr. Supatida Abdullagasim, Lecturer, Department of Horticulture, Faculty of Agriculture, Kampaengsaen Campus of Kasetsart University, Ms. Siamgjeaw Piriyaprim, Soil Organic matter Expert, LDD, and Ms. Montikaen Sangobjit, Researcher of Soil Microbiology Res

13:55-14:00 earch Group, Agricultural Production Science research and Development Office, DOA
Coffee Break

14:15-15:45 3. Disaster Risk Management (CBDRMP by Mr. Takehiro Iwaki, JICA Team/ Flood Hazard Map by Dr. Barames Vardhanabhuti, Kasetsart Univ.)

15:45-16:30 4. Water Management and Monkey Cheek Development by Mr. Fusataka Arakawa and Mr. Nakorn Najaron, JICA Team

16:30-16:45 Close Day 1st and Announcement

09:00-12:30 Presentation and Discussion

25
Apr.

09:00-09:10 Summary of Discussion on Day1st by Mr. Nakorn Najaron

09:10-09:20 5. Introduction of Project Framework on Agriculture and Livestock Sector, by Mr. Hideaki Hiruta, JICA Team

09:20-10:05 6. Comparison of Three Method of Paddy Planting Methods, by Ms. Narisara Jamroonwong, Director, Chainat Rice Research Center

10:05-10:35 7. Safe Vegetable Growing and Green Market for Quick Recovery , by Mr. Pongsawat Tanticharoenkit, JICA Team

10:35-10:50 Coffee Break

10:50-11:20 8. Feed Production and Storage, Flood Countermeasure for Livestock, by Assc. Prof. Wichai Suphalucksawa, KMITL, and Mr. Densak Kaew sri, JICA Team

11:20-11:50 9. Income Generation Activities, Fish Capturing and Processing, by Mr. Keisuke Shimizu, JICA Team

11:50-12:10 10. Land Use Database for Faster and Accurate Compensation Payment, by Ms. Jatuporn Nontasiri, Statistician Professional, OAE

12:10-12:30 Wrap-up of the Discussion for Reflection to Guideline, Mr. Tetsuro Oda

12:30-13:00 Closing Remarks by Ms. Narisara Jamroonwong, Director, Chainat Rice Research Center

13:00-14:00 Lunch and Departure

(14:00-16:00) Workshop on Finalize Tambon Disaster Resilient Plan for 3 Tambons (T. Gop Chao, T. Shinhanat, and T. khlong Ha)

<Participants>: Total 253

1. MOAC, JCC members and Departments at Central: 34 (DLD, RID, OAE,ALRO,DOF, RD, DOA, DOAE, LDD, DDPM, CDD)
2. JICA Thailand Office, JICA Expert, other JICA project and Donors: 10
3. Provincial Task Force from Phitsanulik, Chainat, Ayutthaya, Pathumthani, Nakhon Pathom: 49
4. Model Tambon: 111

(CSS 14, NPM 16, WM 18, KK 12, GC 12, SHN15, KH 18, Orchid farm
6)

5. Academics: 12

(KU, KMITL, KKU, NU, Mae Jo, HAI)

6. Media: 4

7. Staff: 33

(JICA Project Team, Assistant, NGO)

Minute of Final Workshop
The Project for Flood Countermeasures for Thailand Agricultural
Sector
At Royal Jubilee Agricultural Museum on April 24-25, 2013

Attendant

All attendants are 253 persons comprised of representatives from JICA Thailand Office, Provincial Task Force Committees, Representatives from Central Government Agencies under MOAC, Pilot Tambon Participants both TAO Staff and pilot farmers, Concerned Working Team and JICA Study Team.

The Lesson Learned Workshop had been held on Wednesday 24 April 2013 9:00 till closed on Thursday 25 April 2013 12:30.

Opening Remark by Dr.Jirawan Yamprayoon MOAC Inspector General

Project Brief and Objective of the Workshop by Mr. Tetsuro Oda and Mr.Nakorn Nacharoon

as attached document no.1

Picture Presentation of Project Implementation Process by Mr.Nakorn Nacharoon

Handing Over Ceremony and Group Photo

Summary of Presentation and Discussion

1. **Continuity and Extension by Model TAO and Provincial Task Forces**

Ayutthaya

Mr. Apichart Sukhita, Chief of Ayutthaya Agricultural and Cooperative Office summarized

The Ayutthaya Provincial budget concerned with JICA Pilot Project as follows,

- For Annual Provincial Budget year 2013, the following activities will be carried out, Safe Farm Product Sources Development, Public Relation and approval for Farm Product and Safe Food Production sources, the Safe Food Campaign at Robi

nson Ayutthaya on May 31 – June2, 2013. Farmer groups from Tambon Singhanat and Kob Chao will be target group to express their farm products in order to find new market channel to serve their non-toxic vegetable and others in the future. Network Strengthening Pilot Project at Tambon Phraya Bunlue is expected to be able to assist the Singhanat Farm Products Center selling to outside market. Community enterprise also will be established and enhanced.

- On May 26, 2013 Training at Tambon Ban Pan, Amphoe Sena where is the paddy planting pilot area for flood polder area of Bang Ban Irrigation Project for flood farm area life-adaptation will be held. Many kinds of special farming to cope with flood period will be stimulated such as planting on floating banana stem. Farmers in JICA study area will be invited to learn.
- 2 farmers in JICA Project area who had been chosen to be wise farmer namely Mr.Wichian Chotecharoempong from Tambon Singhanat, Amphoe Lat Bualuang and Mr.Bunjat Ramphuengjit from Tambon Kob Chao, Amphoe Bang Ban will be continuously supported.
- The Provincial Development Budget on Year 2014 about 52.8 million baht will be emphasized on Halal Food Complete Production Integrated Development Project over Ayutthaya area main responsible by Provincial Community Development. Main activities will be comprised of fishery, poultry, paddy, goat, freshwater shrimp raising, Halal food processing, packaging and quality improvement training and so on. Kob Chao and Singhanat Pilot Tambon also will be the target for this work.
- Disaster Prevention and Mitigation training activities for 2 pilots Tambon will be practiced with community participation by the requested normal budget.
- Task Force meeting will still follow up and promote the existing works in the next few years through provincial budget and some special committee might be set for some potential activities if necessary.

Chainat

Miss.Dusadee Rangsipalawasawat, Chainat Agriculture and Cooperative Office Chief summarized Chainat Provincial Plan related to JICA Pilot Project as follows,

- Tambon Khao Kaew will mainly be supported for best practice farm activities in the future.

- Tambon Wang Man will be concentrated on Inter basin water resources management through Provincial budget. However the new committee shall be set properly to suit with this long term working plan on recently on stream participatory activity. In addition, Biogas will be extended more in the nearby area learning from the pilot project in Wang Man.

Pathum Thani

Mr.Siravit Sukto Policy and Plan Analysis Expert, representative from Pathumthani Agricultural and Cooperative Office explained about JICA Pilot Project as follows,

- The most effective JICA work in Pathum Thani is Drinking Water Purifying System managed by the community
- The other is safe vegetable promotion which now can distribute the farm products to outside market and this JICA work can be disseminated to other potential area.
- For year 2014, the project for Safe food promotion has been proposed for 25 Million Baht so as to carry the following activities, safe food consumer group establishment to support the safe vegetable product from organic farming groups, raw safe farm products distributed channel to food shop promotion, Toxic farm products convincing for consumer enhancement. The green market festival also will be held at Future park Rangsit. The other provincial budget are related to farm business management and grouping for marketing. The rice berry production extension also will be promoted for farmer group.

Phitsanulok

Mr.Krit Kumklong representative from Phitsanulok Agricultural and Cooperative Office explained the JICA works as follows.

- In Tambon Chumsaeng Songkram were comprised of 3 main activities namely Walkie-Talkie network for flood and disaster monitoring, Self-adjustment learning on Disaster Period and Fishery Survey in order to add value and generate more income on fish processing products.
- 5 main activities were done in Tambon Nakhon Pa Mak namely Gate Reparation, Organic Vegetable Promotion, Rice Experimentation, Fishery survey for income generation and 3D model for Water Resources Management. However for Dredging of

the existing water resources, the overall systematic water resources management shall be study in order to avoid any flood impact to some area in the future.

2. Private-Government-Academic-Cooperation for Flood Recovery

Presented by Dr. Setthapong Lekhawattana as attached document no. 2

- The pilot farmer, Mr.Phuttipong Chongkittiphan showed his opinion on orchid experimental planting that he would like to thank you for the collaboration from the working team and appreciated this test. Because Por.Dor. and Microriza can be used with orchid for lower investment cost and non-toxic agent.
- Dr. Setthapong answer the question on Private-Government-Academic-Cooperation for Flood Recovery that This is the first time to work with JICA then different working concept and procedures of each agencies shall be altered to suit with and conform to the project objectives. For the follow up and continuity of the pilot test, the budget from the government through The National Orchid Committee which comprised of many government and private agencies will be taken into utilization for holistic and integrated development in the future in order to reach the export target as 10,000 million bath on Year 2016.
- Additional Research on Bamboo for flood recovery was presented by Dr.Sarawut Khaokaew from Kasetsart University. The bamboo processed productions can be used as activated charcoal, wood vinegar and animal feed.

3. Disaster Risk Management (CBDRMP/ Flood Hazard Map)

Presented by Mr.Takehiro Iwaki & Miss.Bupphachart Pongrangsarn / Dr.Barames Wattanabhuti from KU. Engineering Faculty as attached document no.3

- The question for discussion was CBRRMP preparation shall be improved for better process or not and the evacuation plan can be prepared only by the community or not. some Tambons representatives replied as the followings
- Tambon Khao Kaew representative said that this plan is direct useful for the community and proposed to produce web site that combine river basin water data cover upstream, middle stream and downstream. The influence stream on community flood shall be taken into consideration for data linkage in order to warn the community in advance.

- Tambon Chumsaeng Songkram representative said that community had never studied this evacuation plan before so the plan is very useful for all dwellers.
- Tambon Singhanat representative said that Singhanat is the last area to be flooded so the evacuation plan is very useful for them to make early preparation.
- Tambon Khlong Ha representative said that this activity can make them learnt how to prepare the hand drawing evacuation map through participatory process. Hence the inhabitants who know deeply about their area condition can self-rely on their selves when the flood comes and they will know how and where to mitigate to the evacuation site comparing with last big flood, the inhabitants did not know how to do during flood period and was not informed for evacuation plan by the government. Therefore they are appreciated this JICA supported activities that enhance them to be able to rely on their self and can make their own evacuation map and planning for the future flood. The easy handmade evacuation map had been prepared by dwellers in each village for their village maps and then combined together as Tambon Evacuation Map finally. All participatory process had been performed by the inhabitants with understanding so they can make and update it in the future by themselves.
- Tambon Khao Kaew representative said that now the JICA provided computer for water level data collection is still in TAO Chief Room and might be not used for the project purpose.
- Tambon Kob Chao representative said that the JICA provided computer for water level data collection is still in TAO Chief Room and might be not used for the project purpose.

However the community can learn and understand how to prepare the evacuation map and know how to mitigate to the safety sites in their community area.

4. Water Management and Monkey Cheek Development

Presented by Mr.Fusataka Arakawa and Mr.Nakorn Nacharoon as attached document no.4

5. Introduction of Project Framework on Agriculture and Livestock Sector

Presented by Mr.Hideaki Hiruta and Mr.Nakorn Nacharoon as attached document no.5

6. Flood Countermeasures/ Adaptation in Paddy Cultivation

Presented by Dr.Narisara Chamroonwong, Director of Chainat Rice Research Center as attached document no.6

- Mr.Siravit Sukto questioned that rice yield from the experimented plots were varied might be come from different input of fertilizer and why the farming cost of parachuting method was higher than broadcasting planting
- Dr.Narisara answered that actually the filled fertilizer amount was followed the Rice Department recommendation and was not much different. The parachuting planting made higher cost because the way to practice this method in the experimental plot was unstable depending on the worker skill. Some area had to be replanted because less density of paddy in that field caused additional expenses.

7. Vegetable Growing for Quick Recovery and Community Market

Presented by Mr.Pongsawat Tanticharoenkit and 2 Head of Villages from Tambon Khlong Ha and Tambon Nakhon Pa Mak

- The farmer requested for organic animal feeding promotion by using organic vegetable to be animal feed.

8. Flood Countermeasure for Livestock

Presented by Mr.Densak Kaewsri and Deputy Professor Wichai Supphalak from KMITL Agricultural Technology Faculty as attached document no.8

- Miss.Somjai from RDI, KKU. recommenced that the flood evacuation center for livestock as well as animal feed shall be considered and prepared by taking community area to be consideration. Mr.Wichai answered that all the evacuation plan and sites for both animal and people was already set for the pilot Tambon so the feed storage house was built on the public high land as well as the evacuation routes were set. In addition after this project is ended, KMITL will still offer good coordination and technical assistance for any request from the pilot community in the future.

9. Income Generation Activities and Fish Capturing

Presented by Mr.Keisuke Shimizu & Miss Somjai Amornratchayavijarn as attached document no.9

- The opinion of the pilot Tambon representatives from Kob Chao, Nakhon Pamak and Chumsaeng Songkram was shown that this JICA Project give them the knowledge to

make income during flood period from food processing, food preservation including packaging and marketing. The community can obtain supplemental occupation and income for better quality of life.

- Central Community Development Representative said the presentation should not mention that some OTOP group requested for flood compensation money even they were not affected from flood and Miss Somjai replied that it was not OTOP group but it meant to the other newly established group which was only set to request for the flood compensation budget.

10. Land Use Database for Faster and Accurate Compensation Payment

Presented by Miss Chatuporn Nonthasiri Statistic Specialist from Office of Agricultural Economics as attached document no.10

- Office of Agricultural Economics representative informed that on May 1-31, 2013, the survey team will be performed their field works in all country. Hence the communities please give good cooperation and accurate information as much as possible for their own benefit on land use database in the future.

Wrap-up of the Discussion for Reflection of the Lessons and Opinions

by Mr.Tetsuro Oda and Mr.Densak Kaewsri as attached document no. 11

Closing Remarks by Dr.Narissara on behalf of MOAC