เงื่อนไขกำหนดการใช้สระน้ำประจำไร่นาของเกษตรกรในฤดูแล้ง: กรณีศึกษาบ้านหนองแซง อำเภอบ้านแฮด จังหวัดขอนแก่น

Determining Factors on the use of Farm Pond in Dry Season: A Case Study at Nong Saeng Village, Amphoe Ban Haet, Khon Kaen Province

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บทคัดย่อ

สระน้ำประจำไร่นาเป็นแหล่งน้ำผิวดินที่เกษตรกรนิยมพัฒนาขึ้นเพื่อช่วยเพิ่มประสิทธิภาพการผลิตในการทำนาที่อาศัยน้ำฝน ส่วนใหญ่พบว่าการการใช้ประโยชน์สระน้ำในฤดูแล้งยังมีจำกัด ด้วยเงื่อนไขทางกายภาพและ เศรษฐกิจสังคมครัวเรือนเกษตรกร การศึกษานี้เป็นการศึกษาต่อเนื่องเฉพาะพื้นที่ ด้วยวิธีการสัมภาษณ์เกษตรกรที่มีสระน้ำประจำไร่นาติดตามข้อมูลการใช้สระน้ำสระในฤดูแล้ง (เดือนพฤศจิกายน 2548 - เดือนเมษายน 2549) ในหมู่บ้านหนองแซง กิ่งอำเภอบ้านแฮด จังหวัดขอนแก่น การบันทึกการใช้น้ำ ในระดับครัวเรือนได้เลือกศึกษา ครัวเรือนเกษตรกรที่ทำนาและปลูกอ้อยมีสระน้ำประจำไร่นา จำนวน 7 ราย แต่มีจุดเน้นในการใช้สระน้ำในฤดูแล้งแตกต่างกันเช่น ปลูกผัก เลี้ยงโค ไม้ผล และ ผสมผสานหรือทำหลายอย่างพอๆกัน การศึกษา พบว่า ในปี 2548 ซึ่งเกิดฝนทิ้งช่วงปลายฤดู เกษตรกร 3 รายสูบน้ำช่วงปักดำ ที่เหลือสูบใส่นาช่วงปลายฤดู ช่วยให้เกษตรกรผลิตข้าวได้บ้าง ดังนั้นสระน้ำประจำไร่นาช่วยให้เกษตรกรปักดำได้เร็วขึ้น และมีน้ำเสริมไร่นาได้บางส่วนเมื่อฝนทิ้งช่วง สำหรับการใช้น้ำจากสระในฤดูแล้งหรือหลังจากเดือนพฤศจิกายน ถึงเมษายน พบว่าปริมาณน้ำในสระในเดือนพฤศจิกายน 2548 เหลือประมาณ ครึ่งสระ (500 - 2,000 ลบ.เมตร) แต่ปริมาณการใช้น้ำโดยเฉลี่ย ตลอดฤดูแล้งมีเพียง 79 ลบ.ม.ต่อครัวเรือน โดยครัวเรือนที่ทำเกษตรผสมผสานใช้น้ำมากที่สุดที่ 157 ลบ.ม. ขณะที่ครัวเรือนที่ใช้น้ำเลี้ยงโคอย่างเดียวใช้น้ำสระน้อยที่สุดปริมาณน้ำสระในเดือนเมษายน 2549โดยเฉลี่ยเหลือ ประมาณ 875 ลบ.ม. และมีสระ 4 สระใน 11 สระแห้งหมดในปลายฤดูแล้ง ทั้งนี้เป็นสระที่เกษตรกรสูบน้ำออกใส่นาช่วงปลายฤดู ปริมาณน้ำในสระที่เหลือน้อย-จึงเกิดจากการระเหยของน้ำ มากกว่าการใช้ประโยชน์ รายได้จากกิจกรรมในฤดูแล้งที่เกิดจาการขายผักประมาณ 2,500-18,000 บาทต่อครัวเรือน ขณะที่เกษตรกรที่ทำเกษตรผสมผสานสามารถทำรายได้ ถึง 6,000 และ 28,000 บาท ส่วนครัวเรือนที่เลี้ยงโคและได้ขายในปีที่ศึกษามีรายได้ถึง 35,000 บาท ทั้งนี้พบว่าเงื่อนไขในการใช้น้ำในฤดูแล้งที่สำคัญคือการเก็บน้ำไว้สำหรับสัตว์เลี้ยง แต่หากแรงงานหลักของครัวเรือนเป็นแรงงานสตรี จะพบการปลูกผัก ไม้ผลเช่นน้อยหน่าและมะม่วง ร่วมด้วย เป็นการผลิตในระดับครัวเรือน ที่เหมาะกับปริมาณน้ำและแรงงานครัวเรือน ผลผลิตเพียงพอกับการบริโภคในครัวเรือน และเหลือขายในตลาดท้องถิ่น แม้ปริมาณรายได้จะไม่มาก แต่ก็เป็นรายได้ที่เกิดขึ้นเกือบทุกวัน ช่วยลดภาระค่าใช้จ่ายประจำวันของครัวเรือนได้ดี เหมาะสำหรับเกษตรกรที่ต้องการปฏิบัติตามหลัก เศรษฐกิจพอเพียง

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คำสำคัญ : เกษตรผสมผสาน บทบาทหญิงชาย เศรษฐกิจพอเพียง สระน้ำประจำไร่นา

Keywords : Farm pond, gender and sufficient economy, integrated farm

1. Introduction and purpose

Northeast Thailand is known to have erratic rainfall and low water retention soil. Lack of water at time of need becomes a major constraint for farmers to stabilize crop production for food or for income. In this region, medium to large-scale irrigation provide supplement water for only 10 % of agricultural areas Undulating terrain and insufficient rain during dry period of November-April prevent major irrigation construction (NESDB, 1983) Private farm pond is one solution to this problem. Farm pond is used to harvest rainfall and runoff water and store it for subsequent use. Over the past 10 years, the Thai government has invested vastly on farm pond development, it is now accepted that farm pond help support rice production In dry year, some farmers may pump pond water to save rice. As a result, farmers may not have enough pond water for dry season activities but he rice is saved (Prapertchob, et. al. 2004) As a result, observers have pointed out on the efficient use of farm ponds has only reach subsistence level (Ando,.et. al, 2003). Therefore, farmers' decisions to manage farm pond is not only related to biophysical factor but also socio-economic conditions of farmers. Under what conditions farmers want to pump pond water to save rice or to maintain certain amount of water for dry season activities has a become research question. This report presents the results of the study on farmers' decision making on the use of farm pond and the results of dry season activities using farm pond in village Nong Saeng during the year 2004-2005.

2. Research methods

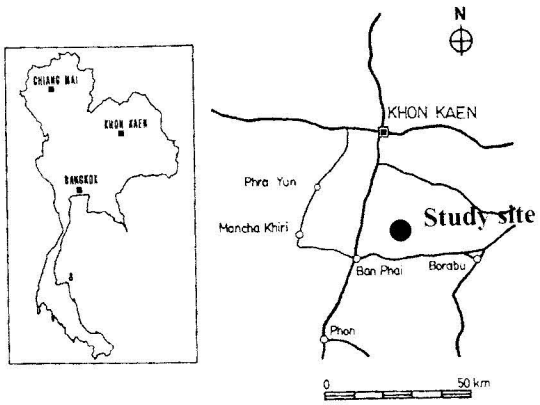
In the past, most farm ponds were small and located in lowland to supplement rainfall in wet season for rice cultivation and tapping natural fish. Today, private farm pond are larger in size and widely located even in the upland areas due to availability of modern technology for construction. In some case, location of farm ponds were determined by supporting agency, for example farm pond provided by the Land Reform Office have to be located on the reform areas that are mostly upland fields.. Scientists has shown that farm pond regardless of location if there are enough catchment areas more than 5 times of the size of pond there should be enough rain water flow into the pond of at least one meter depth. (Suzuki K, 2005) At Nong Saeng village, farmers still keep tradition farming activities such as rice, upland field crops and livestock. Availability of farm pond enables farmers to grow more vegetable crops and fruit along pond embankment or nearby areas. Scientists have shown that vegetable do not require much water and it is possible to develop water saving technology in crop production (ODA, 2005). This indicates that it is possible for farmers to expand vegetable production or produce the crops year round. With these crops in their plans, farmers often expressed their concerns on availability of pond water especially in dry season. This raises questions of what determine dry season activities, water supply or social factors. And, what are constraints for farmers to do dry season vegetable production in Nong Saeng? How

much cash income of dry season cropping can a family earned from vegetable and fruit? This study aims to provide these answers based on farmers' existing practices.

2. Materials and methods

2.1 Study site

Village Nong Saeng is about 35 km south of Khon Kane (Fig.1.) is mostly undulating terrain and sandy soil. There are 221 farm households or 1,000 population and agricultural land is about 1000 ha (Suphanchaimat, 2005). The annual rainfall is about 1000 mm. Farmers cultivate rice in lowland and sugarcane and cassava in the upland. Average land holding is 40 rai mostly under land reform scheme. Private on farm pond has been widely adopted since 1994. However, they have problem of seepage and high evaporation of 5 to 7 mm/day (Hamada et. al., 2006).



2.2 Study methods

To investigate these problems, several methods of study have been undertaken namely farmer interviews, field visits and daily records of cooperative farmers in dry season. Researchers conduct group meeting with farmers who have farm ponds in order to collect general information on determining factors on farm pond utilization. There were 7 farmers who agreed to keep farm records regarding farm pond utilization during the period of Nov 2005-April 2006. There were 2 farmers with different orientations; vegetable farms (V1, V2), mixed farming (M1,M2), livestock (L1, L2) and fruit farmers (F1).

3. Results and discussion

In the past, most farm ponds were small and located in lowland to supplement rainfall in wet season for rice cultivation and tapping natural fish. Today, private farm pond is larger in size and widely located even in the upland areas. As shown in Table 1, an interview of 30 farms in the studied village indicated that they had at least had 1 farm pond which mostly (over 60%) located on upper paddy or upland. When ask about problems of access to water to fill up the pond, farmers pointed out that farm ponds on lowland and upper paddy were usually filled up with water at the end of rainy season or in November. This observation are confirmed by physical scientists who pointed out that farm pond with catchments areas more than 5 times the size of pond should obtain at least 1 meter dept of water (Suzuki, 2005). Moreover, significant runoff water for sandy soil condition like in Nong Saeng village can be found after soil is saturated with water around August (Hamada, 2006) These two findings help support farmers confident on the availability of pond water around end of rainy season.

Table 1 Land holding and farm pond location by top sequence

	No. of plots	Area (Rai)	No. of farm plot with at least 1 pond	Proportion of pond by toposequence (%)
Lowland	14	15.87	10	27.80
Upper				
paddy	39	17.62	20	55.50
upland	21	15.23	6	16.70
Total	74	16.60	36	100.00

All respondents planted rice on average 10 rai and could obtain high yield at 370 kg per rai using family labor of 2.7 persons per household. Main purpose of rice production was to keep for home consumption. To avoid production risk over 80% planted rice by direct seeded method in combination with transplanting. Sell of rice was done when rice production was assured. Almost all households raised cattle on average 5.6 heads per household.

More than half of the respondents (58%) indicated their purpose of digging more ponds to supplement water for rice. However, only 16% pumped pond water to support rice in 2005 crop year. About 50% intended to store water for animal in dry season and the rest want to use in mixed farming (Table 2).

Table 2 Farm pond utilization in 2005 crop year

Farm pond utilization	No. farm	%
Mostly pump to support rice	5	16.67
Pump to support rice with other activities	10	33.33
Mainly save for cattle and some dry season crops	15	50.00
Total	30	100

Average household income in 2005 was about 149,025 of which 46% was obtained from sugar cane and cassava, 20% foam selling cattle, 15% from on-farm wage earning, 10% from remittances and only 4% from selling rice and 6% from selling vegetable and some fruits. The last item was mainly linked to availability of pond water in the areas. This amount of income covered family expense in the same year of 123,424 baht per family. Main item of expense was children education (39%) and pay back debt of 37%, the rest was for family consumption.

From farmers' interview, it shows that although Nong Saeng farmers practice rice based

farming systems with sugar cane as the main cash crop, they have different orientations to use farm pond such as livestock, fruit, vegetable and mixed farming These farmers should use the available water in accordance with their interests. Therefore, researchers monitored farmers with different orientations on pond water used especially on method of acquisition, amount of water for different purposes and amount of cash earned from dry season activities. Information was gathered during the period of October 2005-April 2006.

3.1 Socio-economic conditions of selected farm households

All studied farmers are family farms with average land holding of 46 rai and 1-3 labor. One vegetable oriented farm (V1) holds the least land area of 10 rai and main operator is female farmer. All farms planted rice in the year 2005 at about 32% of the total land areas mainly for home consumption. Small land holders (V1 and F1) planted only glutinous rice. Only 2 farmers (V1 and M1) transplanted rice in combination with direct seeded method and both pumped water to nurseries or during transplanted period. Other five farms used direct seeded method and 3 farmers had to pump water to rice field at the end season in November due to early rainfall termination. One livestock farm (L2) that pumped water to save rice ended up the smallest amount of water left in her farm pond and finally the pond dried up end of January (Table 3)

Table 3 Rice production of selected farmers

Farm type	Name	Total land holding (Rai)	Rice planted area in 2005 (rai)	Glu.rice production (kg)	Non-glu. Rice production (kg)	Pump water to rice fields (Y=Yes)		
						during nursery	during transplant	at the end season
V1	Samon	10	5	1,140	0	Y	-	-
V2	Boonlerd	36	10	1,200	1,080	-	-	Y
M1	Buarat	58.5	30	5,160	5,190	Y	Y	-
M2	Somjit	51	26	900	3,810	-	-	-
L1	Poonsuk	33	13	660	2,400	-	-	Y
L2	Kambaow	60	30	1,800	1,200	-	-	Y
F1	Boonsri	30	4	900	0	-	-	-

Almost all farms did not sell rice except one farmer sold non-glutinous rice. For those who could sell some vegetable and fruit could earned cash income ranging from 4% to over 20% of annual cash earnings .in 2005 (Table 4 & 5) On the other hand, one livestock farmer did plant tiny plot of vegetable but kept for home consumption or gave away.

All farmers raised cattle but only two farmers kept 1-2 buffaloes. Two farmers sold cattle

during the studied period. According to farmers, pond water facilitates cattle raring to greater extent. Previously, farmers had to walk the cattle across fields to fetch water from the village brook but now they have access of water for the animal on farm. Pond water also enables farmers to grow forage crop. It is important to note that cattle are often let free to walk into farm pond for drinking while buffaloes have to be given water away from pond to avoid pond water contamination.

Table 4 Farming activities of selected farmers

Farm type	Rice planted area in 2005 (rai)	Sugar harvested areas in 2005 (rai)	Livestock in 2005		Vegetable plots (sq. meter)	Fruit (rai)
			Normal Beef cattle	Fattening		
V1	5	6	3	0	16	0.25
V2	10	26	6	0	8	10
M1	30	33	5	0	224	4
M2	26	17	12	0	300	0.25
L1	13	0	9	2	0	0
L2	30	6	10	2	40	0.25
F1	4	4	6*	0	210	0

3.2 Farm pond utilization in dry season 2005

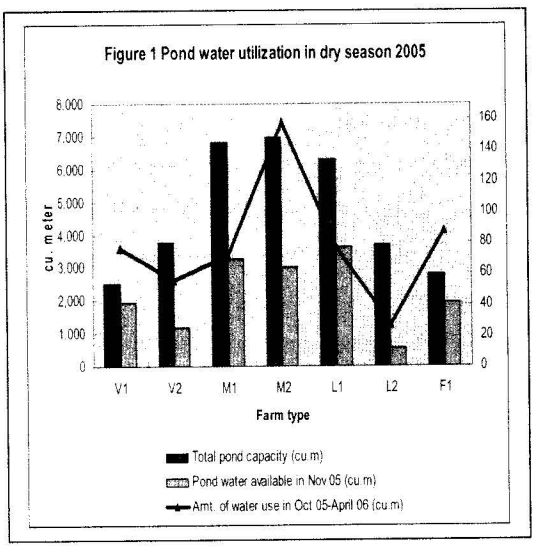
Farm ponds of 7 farmers were measured end of October 2005 and end of April 2006. At the beginning, three ponds had water volume more than 3,000 cu.meter or about half the capacity, the rest had less than 2,000 cu.m. The reported amount of pond water used for dry season activities was minimal, ranging from 27-158 cu.meter. On average, farmers used 48 cu. meter or about 3% of water available. . At the end of dry season (April 2006), average pond water left was 934 cu. meter and out of 12 ponds, 4 ponds totally dried up. The low balance water amount should caused by evaporation or leakage. The highest amount of water used (over 100 cu. meter) reported by one mixed farm (M2) she planted 400 sq. meter of vegetable spent most of her time at the field and could earn the highest income from vegetable and fruit production (22 % of total income) as shown in Table 5. For livestock oriented farms, they planted vegetable and fruit but did not sell. One farm earned 35,000 baht from selling one cattle and that the only source of his cash income that could obtain from having pond. Another livestock farm raised cattle but did not sell in the animal in the studied year.

Table 5 Annual farm income earned in 2005

Farm type	Income from rice	Income from sugar cane	Income from cassava	Income from cattle	Vegetable & fruit	Chicken &duck	Total	Proportion of vegetable and fruit income to total
V1	0	48,183	0	0	10,188	0	58,371	17%
V2	0	53,984	0	0	2,485	0	56,469	4%
M1	21,800	120,000	13,800	8,500	5,670	570	170,340	4%
M2	0	98,459	0	0	26,947	1,498	126,904	22%
L1	0	0	0	35,000	0	0	35,000	0%
L2	0	50,000	0	0	0	0	50,000	0%
F1	0	14,000	0	0	4,345	0	18,345	24%

Frequent pumping found in the cases of vegetable and mixed farming households (V1, M1 and M2). Farmers who concentrated on fruit farming choose to produce early maturity mango. He pumped pond water in December and January in order to apply chemical to the trees. However, he could earn only 4,345 baht from mango production which was much lower than normal year due to dry weather. Due to high cost of chemical input and declining mango yield he decided to replace part of the old mango trees to sweet corn in order to obtain more frequent cash income and require low input but will use more water.

One vegetable farmer (V2) had reduced his production this year due to his busy workload as the village representative to local government office. Therefore, most of his pond water was used for animal drinking. The other vegetable farmer is female operator; she planned cycles of vegetable crops such as tomato, green onion, chili, local parsley, yard long beans and sweet corn. Her crops could be harvested every months starting from October until February. Most of her products were sold locally. So far, local market can absorb all of her products. According to her, vegetable growing season should end around March when the weather gets too hot. On average, she could obtain about 1,000 baht cash income from vegetable every month in dry season.



The highest vegetable income of 4,541 baht was reported in November. Although vegetable crop provides small amount of cash as compared to sugar cane but the female farmer was satisfactory that she could earn frequent cash income for family daily expenses.

The amount of cash earning had been greater of the case of mixed farming. Combination of vegetable, fruit and poultry were reported. Main products of vegetable are tomato chili and banana while custard apple is the main product for fruit and native chicken is the main product for poultry. On average, farmer earned about 2,300 baht per month ranging from the lowest 464 in October and the highest of 5,048 in January.

Farmers indicated constraints for extensive vegetable were hot weather during March until April. They used to grow vegetable using only family labor thus limited scale of vegetable production despite sufficient water. Existing level of vegetable production can be absorbed by local market. However, if scale of production is to expand, farmers have to rely on middlemen and hire labor.

In case of fruit production, farmers prefer custard apple. Farmers indicated that they could adopt tree pruning with additional water from the pond. They pruned the trees around December-January and apply fertilizer and water after pruning. They observed the tree that had been pruned have bigger leaves than un-pruned trees. Higher quality fruit is obtained. Besides, custard apple requires much less labor for weeding, fertilizer and harvesting. This practice enable integrated farm of M2 to obtain significant income from fruit production. It is important to note that she could obtain high income because she sold her product directly to consumers in town by herself.

Table 6 Farm pond utilization in dry season 2005

Farm type	Full-time labor		Total land holding	No. of studied pond	Total pond capacity	Pond water available in Nov 05	Amt. of water used in Oct 05-April 2006	Amt. of water in March 2006	Possible loss of pond water in dry season	No. of dried pond in May2006
	M	F	(Rai)		(cu.m)	(cu.m)	(cu.m)	cu.m)		
V1	1	1	10	1	2,520	1,932	75.99	1,092	764.01	0
V2	1	1	36	2	1,880	1,169	55.56	293	820.44	0
M1	2	1	58.5	3	2,274	3,272	71.97	1,567	1,633.03	1
M2	1	2	51	1	6,955	3,016	157.77	1089	1,769.13	0
L1	1	0	33	1	6,288	3,633	76.73	1,747	1,808.98	1
L2	1	2	60	1	3,696	554	26.81	0	527.19	1
F1	1	0	30	2	2,784	1,932	87.48	336	1,508.52	1
Average			39.7		3,771	2,215	78.90	875	1,262	

4. Conclusion

Existing farm ponds enable farmers to stabilize part of their rice production. Despite low rainfall in 2005 and early termination of rain around end of October, on average water was available about 60% of pond capacity. Water utilization in dry season of farms with different orientation namely, livestock, vegetable, fruit and integrated farms, did not use much of the existing pond water (27-158 cu.meter). High loss of pond water was due to evaporation or seepage. On average, evaporation was about 7 mm per day. Vegetable production was produced at family scale provides minimal cash income but more frequent which is suitable for female farmers. Income from fruit and livestock are substantial and dependent on pond water. Extensive vegetable growing will require hiring additional labor and the use of labor saving device.

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