Evaluation Report
on

The Establishment of Community-Based Irrigation Management and Its Effects to Users in Krapeu Troam, Oudong District, Kampong Speu Province Cambodia

Chan Danith
Planning, M & E Adviser
Partnership for Local Governance
UNDP-UNOPS

Cambodia
February 2004

Table of Contents

Acknowledgement

The author would like to express considerable appreciation to evaluation team, Mr Sim Bun Thoeun Vice chief of Provincial Department of Commerce; Mr. You Chantha-Vice Chief of Extension Unit, Provincial Department of Agriculture, Forestry and Fisheries; Mrs. Kao Sakorn-staff of Provincial Department of Women and Veteran Affairs; Mr. Koy Sonin- Vice Chief of Provincial Department of Environment ; Mr. Bin Samban staff of Provincial Department of Land Title, Urbanization, and Construction; Mrs. Long Bun Nareth Technical Support Unit/Seila; Mr. Choeug Choeun-Staff of Contract Administration Unit/ Seila for their hard works during data collection at the field. Without much efforts, the data will never wholly completed for producing this report.

Thanks are forwarded to Mr. Nop Prin-Vice chief of Clean Water and Sanitation Office and Mr. Hy Rithy-Vice Chief of PDWRM for their assistances including transport arrangement, project documents, and field facilitation. Also the author would like to express his heartfelt thanks to provincial and district staffs of PDWRM for their prior field arrangements and organizing village and commune meeting that allowing the team having opportunities to meet and discuss. One again, author thanks to commune councils of Prah Srae and Veal Pong and villagers for helping during field works.

Abbreviations and Acronyms

WUFC	Water Use Farmer Community
PDWRM	Provincial Department of Water Resource and Meteorology
MWRM	Ministry of Water Resource and Meteorology
Seila	Cambodian term referred to “Fundamental Stone”
PLG	Partnership for Local Governance
PDC	Provincial Department of Commerce
PDAFF	Provincial Department of Agriculture, Forestry and Fisheries
PDE	Provincial Department of Environment
PDLUC	Provincial Department of Land Title, Urbanization and Construction
TSS	Technical Support Staff (Seila Program)
CAU	Contract and Administration Unit (Seila Program)
N	Frequency

List of Table and Figure

1. Introduction

Cambodia is a country in Southeast Asia, Indochina sub-continent. The country enriches of water resource both fresh and marine. Mekong River connects to far China's Great Tibet Plateau and meets Tonle Sap Great Lake in the center of the country. Water system spreads differently and diversely through many streams along sides of the rivers and the Great Lake. Water flow fluctuation is based on capacity of the rains in the seasons, upstream velocity and weather; therefore, water allocations differ from time to time.

In Kampong Speu, Krapeu Troam dam system was repaired in 2003 and formed as Water Use Farmer Committee. The purposes of system are to promote living condition of farmers through doubling rice production per year[1] by increasing rice yield from 1.5 to 2.5 tones per hectare; and to supply drinking water for human and animals. The water system is able to irrigate wet rice cultivation in two communes.

The formation of community was done through various steps including surveying arable area, water system, electing committee; and developing community statutes. The statutes are followed a circular[2] 01 S.R. of the Royal Government of Cambodia dated on 11 January 1999 *on the Policy Implementation of Sustainability of Irrigation System* and Prakas[3] No 306 of the Ministry of Water Resource and Meteorology (MWRM) dated on 20 July 2002 on *an Official Use Documents to Establish and Develop Water Use Farmer Community*.

The water system has drawn farmer interests involvin in irrigation activities for rice production. However, it is still the onset of the project which has faced so many barriers for running the system. These include inadequate canals and sub-canals which are not able to fulfill the needs of farmers; inadequacy of water gates construction within the system leading constraints to regulate water flow in time. Moreover, the newly elected committee has limited capacity in management that would possibly face difficulties.

The paper evaluates the establishment patterns of community; then examines the effects of irrigation system to users before and after project; underlines level of commitment of water user based management; and finally seeks out problems encountered during implementation. This report provides basis facts of PDWRM in implementing community-based irrigation management project under Seila support. This report is part of field exercise of project evaluation for provincial line departments under Seila's Provincial Investment Fund, especially benefited to its M & E focal points.

2. Evolution of the Irrigation System

Krapeu Troam dam system is in Veal Pong commune, Oudong district, Kompong Speu province. It receives water from Krain Ponley stream. The dam system bordering Kampong Chhnang province in the north; the south bordering to Trach Tong commune & Vaing Chas commune in the eastern part, and Veal Pong commune to the west of Kampong Speu. The dam is about 55 kilometers southern of Kampong Speu provincial town. Total population benefits from the system is 5,818 equals to 1,655 households in 22 villages, with total irrigating rice land 584 ha. Reportedly both communes experienced in floods and draught for many years.

The dam system built in 1977 during Pol Pot regime. Water can supply in two districts, Samaki Meanchey of Kampong Chhnang province, and Oudong District of Kampong Speu.

[1] Program Objective of PDWRM 2003
[2] Ministry of Water Resource and Meteorology, 2000. Circular No. 01 on policy implementation of sustainability of irrigation system, funded by FAO, PRASAC, ADB, AFD, APS
[3] Ministry of Water Resource and Meteorology, 2000. Circular No. 01 on policy implementation of sustainability of irrigation system, funded by FAO, PRASAC, ADB, AFD, APS

In Oudong, the dam system is capable to irrigate into two communes, Veal Pong and Prash Srae with totally 712 ha of rice land. 571 ha of which are for rainy rice, and 150 ha are for dry rice.

During year 2000, Krapeu Troam suffered flood causing damage to some places such as the dam body, water gates and canals. The stream bank erosions increase sedimentation in the stream gradually.

In 2003, PDWRM in cooperation with local authorities conducted surveys for project rehabilitation including repairing 2,700 meters of two main canals and 12 sub canals, under food for work project sponsored by the Prime Minister. Subsequently, PDWRM under Seila's Program support was formed a community entitles Water Use Farmer Community by electing committee, sub groups and groups and, drafting statute. So far the statute is passed by local community. In the future once it will be passed by district governor, and will be signed by PDWR, then finally by the MWRM.

3. WUFC Committee Structure

Committee structure composes of 44 persons equals to 11 groups or 22 sub-groups. A sub-group is represented a village population voice consisted of 4 persons as subgroup committees; they are elected by people in a village. Similarly, a group committee comprises of 4 persons, elected from two subgroups. The committee members are elected by all group committee that consists of four persons: a committee chief, first deputy, second deputy, and a cashier. The Committee is responsible for overall management of WUFC.

Five phases in community establishment were recognized. The followings are adopted from Prakas of MWRM as criteria for comprehensive establishment of WUFC.

Phase 1. Conduct survey
Step 1. Correspondent with local authorities, socio-economic study and surveying irrigated land
Step 2. Opening public meeting
Phase 2. Elections
Step 3. Elected sub-group
Step 4. Elected group
Step 5. Elected WUFC
Phase 3. Statute development
Step 6. Statute drafting, and finalization
Phase 4. Capacity building
Step 7. Training to WUFC committee and users
Phase 5. Registrations and official recognition
Step 8. Registration of committee and community statute to MWRM for official recognition.

Box 1. Phase in WUFC Establishment

4. Study Areas and Research Framework

The study is covered to 2 communes of Krapeu Trom (Figure 1) comprises of 1,655 households in 22 villages that are under coverage of water supply. To select the study area, we used simple random sampling techniques to randomly select 12 of 22 villages as target areas. Similarly to select sampling size, we used simple random sampling technique to select 61 households from total population.

Primary data is collected by using standardized questionnaire survey through face-to-face interview in every village—farmers were met and started interview following questionnaire. Key informant interviews were done by meeting key persons in community such as commune councils, village chiefs, group and sub-group chiefs, and elders using semi-structure interview

following checklist. Similarly focus group discussions were done to get more in-dept information of community on irrigation management, farmer commitment, and problems faced during implementation. For secondary data, we collected project documents from PDWRM such as maps, demographic data, and references.

Collected primary data was analyzed by using analyzing techniques called SPSS and Excel. Frequency and percentage mainly used to present various variables on yield, water capacity and so on. T-test was used to compare two groups including rice yield change, and change in water deficit for rice before and after projects

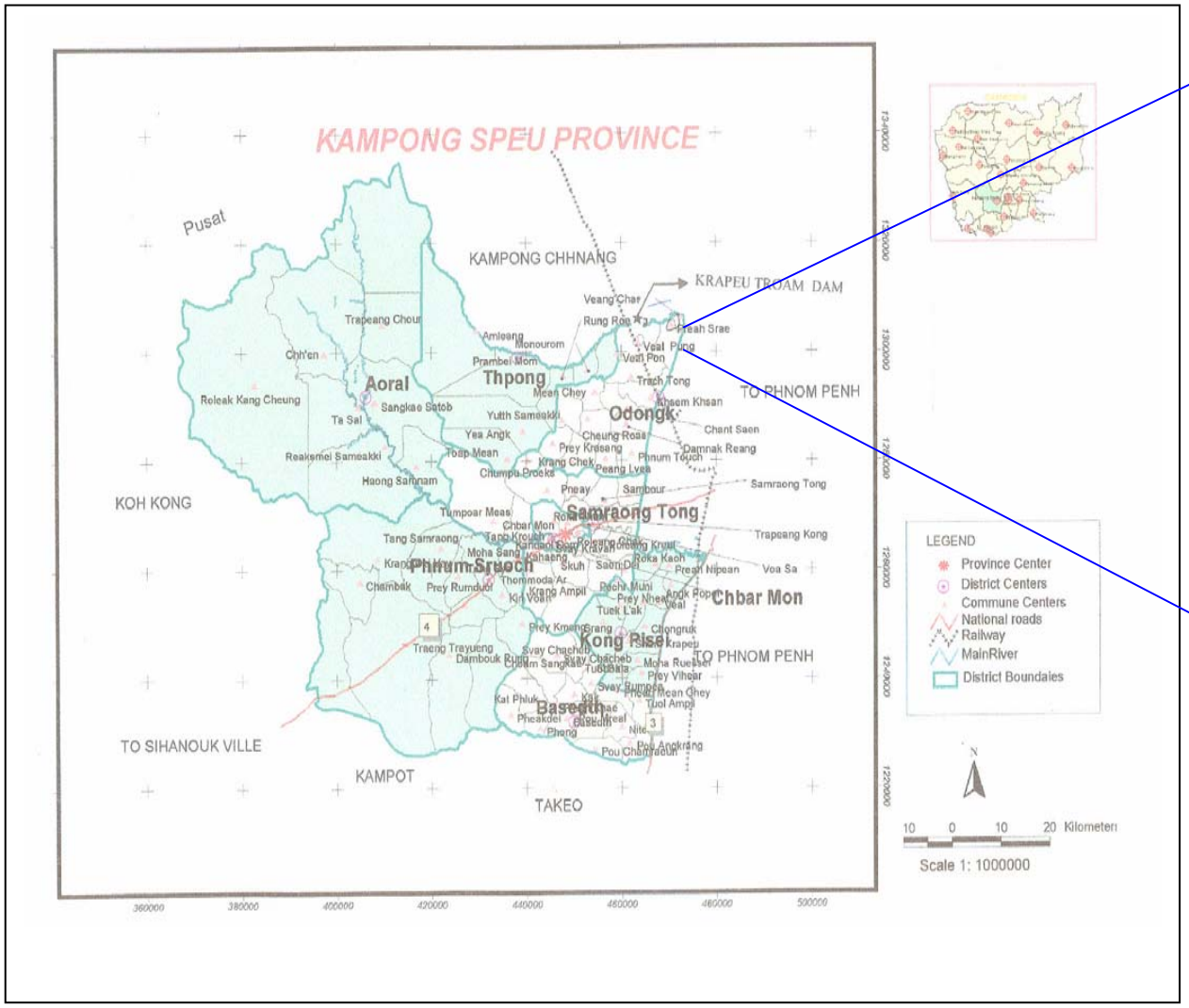
5. Evaluation Team, Trainings and Arrangements

The team, under supervision of PLG 's Planning, M & E Adviser, consists of 7 persons comes from seven Provincial Departments and Units of Executive Committee of Provincial Rural Development Committee of Kampong Speu Province. They are as following:

Mr Sim Bun Thoeun Vice chief of Provincial Department of Commerce; Mr. You Chantha-Vice Chief of Extension Unit, Provincial Department of Agriculture, Forestry and Fisheries; Mrs. Kao Sakorn-staff of Provincial Department of Women and Veteran Affairs; Mr. Koy Sonin- Vice Chief of Provincial Department of Environment ; Mr. Bin Samban Staff of Provincial Department of Land Title, Urbanization, and Construction; Mrs. Long Bun Nareth Technical Support Unit, Seila Program; Mr. Choeug Choeun-Staff in Contract Administration Unit, Seila Program

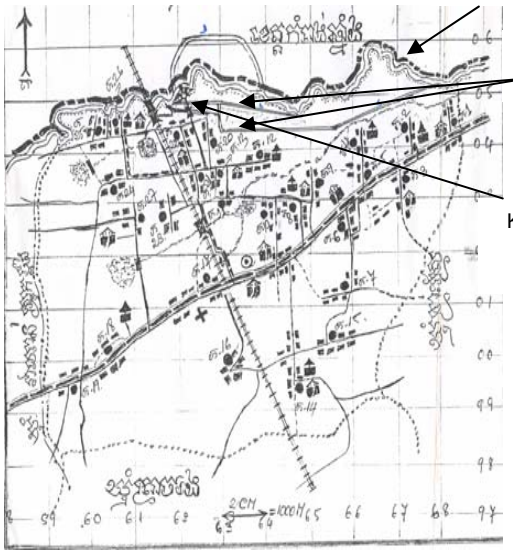
Before field survey, CAU/ExCom conducted a two-day-training course on data collection to team members focusing on various types of data collection tools and techniques for qualitative and quantitative research plus classroom exercises. Subsequently, the team met to develop evaluation objectives via coordination schema analysis. The questionnaire and checklist have been developed based on set objectives. Before conducting field survey, the team again was discussed the questionnaire and other field arrangement.

Figure 1.Map of the Study Area



Preah Srae Commune

Veal Pong Commune



Main Stream

Canals

Krapeu Troam Dam

6. Findings

6.1 Respondent Information and Physical Characteristics

From data collection, large number of respondents is in middle age and over. As showed in Figure 2, there is high percentage of age groups between 36-45 and 56-65 were interviewed. Few of whom are younger and older, are considered not to be well aware about water use community issues and have not had clear response to evaluation queries. Surveyors reported that they have opportunity to meet female in most households, however, most of them were shy or responded unclear answers. Number of female is less than the male that are in 67.2%.

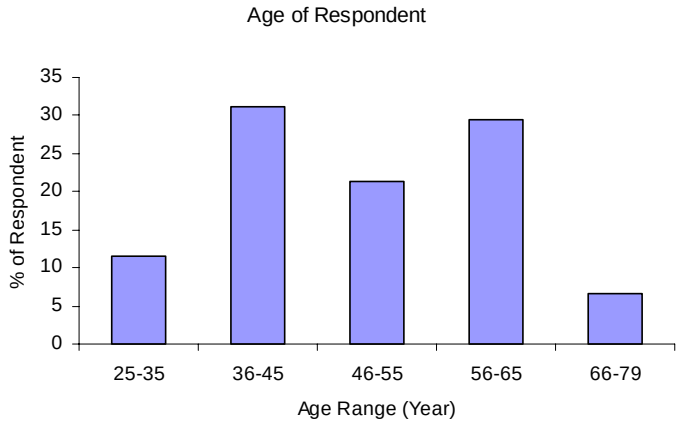


Figure 2. Age of Respondents

Land Holding and Irrigated Field Capacity

An average rice land size is 0.88 ha per household, the maximum is not more than 4 ha, and minimum is 0.05 ha. As shown in Figure 3, large number of farmers (47.5%) possess 0.05-0.5 ha, and 23% and 21.3% holding between 0.6-1 ha and 1.1-1.5 ha respectively. An increasing population and new residents are reasons of land size reduction. Similarly by looking at irrigating land holding, we found that 82 % of households has irrigated land from 0.05-0.5 ha from a total land they have while the percentage goes down to 16.4% at 0.6-1 ha and 0% at 2-4 ha rapidly. If comparing the size of rice land and irrigated land, it is realized that 82% of household have only 0.05-0.5 ha out of total land size holding. However, if comparing total population, there is 23% of them have 0.6-1 ha of land whereas 16.4% are in irrigation. So it means that irrigating land is less due to the fact that the farmers have limited access to irrigation as their rice fields are far from the canal systems.

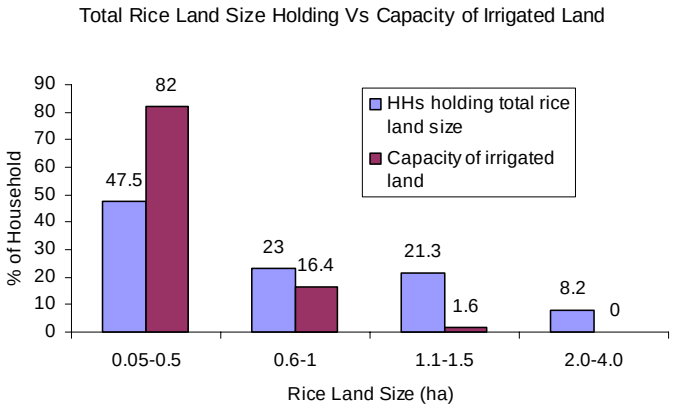


Figure 3. Land Size and Irrigation Capacity

The reasons of distance from rice field to water canal system and insufficient water system effects capacity of irrigation that lead to increase and decrease farmer opportunities to benefit from the system. Figure 4 below depicts that farmers whose rice field distance less than 50 or 1000 meters from the water canal system— stream, canal and sub-canal system, benefit from the project. However those whose rice field far beyond 500 or 1000 meters did not involve in the system as causing of absent water drainage or considering upper rice land, which could not receive drained water. In such geographical facts, some questions arose why all local farmers not involve in the project? Those above are the answers.

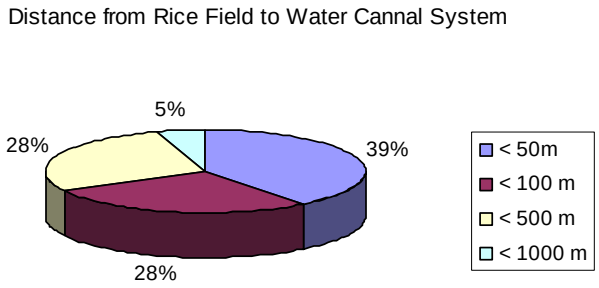


Figure 4. Distance of Rice Field

6.2 The Establishment of Water Use Farmer Community

Community Involvement Patterns

PDWRM staffs have been involved in different steps including surveying irrigation areas, socio economic, infrastructure facilities, rehabilitating possibilities and fund estimation.

Committee establishment is followed by guidelines set out by MWRM as mentioned in Box 1 above, to which is considered be completed sets of the process. If there is absent of any Step, it is meaningless or invalidity as it is not well matched to MWRM's Prakas or because relevant stakeholders are not benefited.

Examining perceptions of users on the reasons of community involvement, Table 1 reveals that 80.3% of them really need water supply for rice cultivation—they have depended on water for wet season rice for long time. Similarly, 4.9 % of them perceive that once involving community, there will be more conflicts as good coordination among committee members. Likewise 6.6% thought community will run well so they involve it.

Table 1. Reasons of Involvement in WUFC

	F	%
Need water supply	49	80.3
Easier in coordination	3	4.9
Well-managed community	4	6.6
Community will be supported by government	5	8.2
Total	61	100

Community development needs to mobilize people participation in all respects. On the other hand encourages equal participation between male and female in gender term. When decision is made only by male-headed family solely there will be unfair in social atmospheres. Thus female in another side would be promoted. In figure 6, the study found that large proportion (79%) of local farmers is male who has strong voice in decision among family members in community development if compare to female (16%). This shows the lack of women participation in decision

process. In fact there is no barrier between male and female, but usually female have depended on male in most living and social aspects.

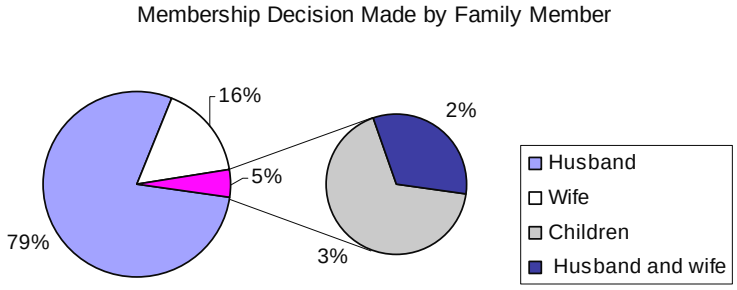


Figure 6. Gender Decision in Membership Involvement

The decision patterns should be crafted by local users so that they are legitimacy to use the system more proudly and happily rather than ones pressurize or force them. In figure 7 widespread of answers (92%) argue the decision to be community involvement by own interest not by externality threats—viewed to be right way when seeing real benefit from irrigation system. However, about 5% of total answers seemed to be under pressure by local authorities. In such matter, during meeting with key informants, found that local communities were not apparently shown of being threads but gather and convince them to be in members as quicker as possible due time constraints for PDWRM meeting.

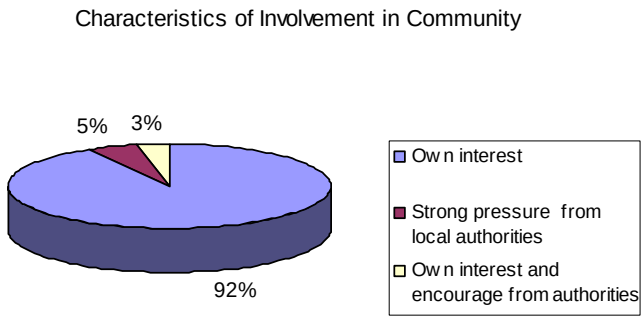


Figure 7. Characteristics of Membership Involvement

Satisfaction of Election Results, and Committee Members

Committee members have to be good knowledge of management, coordination skills and trustworthily. Most community development experiences especially in common pool institutions have suggested that in sustainable management of common resource need to have leaders who being respectful, and reliable; and the selection process need to be involved by all users. In our case, all local users (100%) satisfied the composition of committee and their personality characteristics. Likewise, all election processes have been confirmed that large responds at 96.7% fall to be free and fair due to more involvement from stakeholders and good consultation process as seen in Table 2. Therefore community members have demonstrated their satisfactions to the whole election results as presented in Table 3.

Table2.Satisfaction Level of Committee

	F	**%**
Free and fair	59	96.7
Somewhat free and fair	2	3.3
Total	61	100

Table 3.Satisfaction Level of Election Results

	F	***%***
Strongly satisfied	17	27.9
Satisfied	44	72.1
Total	61	100

At the present, community has neither income to pay for overall operational costs of the system, nor allowance for committee while fee raising has not been yet in place. As soon as a community statute will be officially approved by MWR, it will be then in use. By that time water fee collection will be done accordingly. Realistically, incentive is most important for ones to provide services for everyone in community that is considered to be long term sustaining of a project lifetime. With such fact, while testing committee feeling on their satisfactions, majority of responds made by villagers tend to be strong satisfied and satisfied level at 32.8 and 67.2 % respectively as seen in Table 4. Meanwhile, when interview with committee on such matter, they have intentions to help community in management such as water system repairing; village led meeting and so forth. The workload currently is not hard as the system is not well functioning. In the future they hope that once the statutes are in use then they get service allowance or incentive.

Table 4. Satisfaction Level of Elected Committee in Election

	F	***%***
Strongly satisfied	20	32.8
Satisfied	41	67.2
Total	61	100

6.3 Effects of Community Management

Change in Water Supply

Krapeu Trom irrigation system has long-standing profile since decades, the water use capacity and irrigation infrastructure status have been changed over time depending on natural water discharge, types of irrigation devices and man interactions. Chou Doeun, 74, in Pour Kaung village said "The stream depth used to be 3-5 meters during 1960's but now eroded sediments increase so the stream becomes shallow in some places and even has the tree grown". Since 1996, though a main water gate was repaired, water capacity has not stronger like year 1977, and could not be able to divide more efficiently to down stream's rice fields. This because of inadequate water gates in downstream and canals to retard water speed. However, villagers claimed that water capacity and flow is better than 3 to 5 years back.

As shown in Figure 5, if comparing between before and after projects, water deficit for wet rice cultivation after project is less and the number of deficit day declines comparing before project.Meanwhile a statistical test by using Paired Sample t-test is shown: *t value=7.719; df=60; Sig. (two-tailed) =0.00 at 95 % level of confident*. This shows that there is statistical different of the duration of water supply deficit of the two situation before and after project. In another words, water deficit has decreased over time.

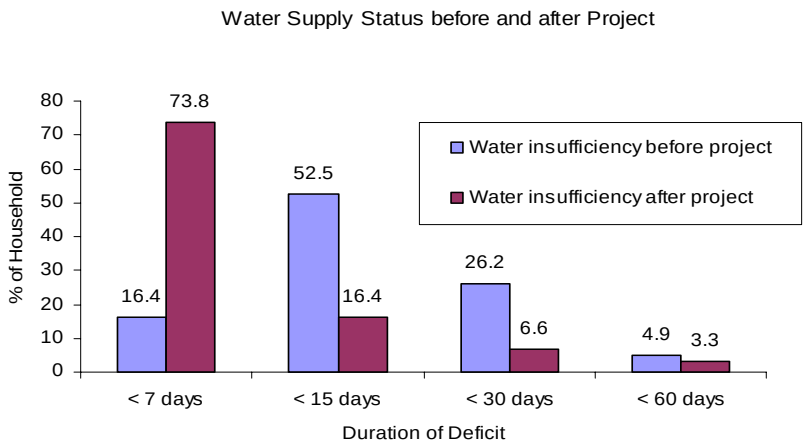


Figure 5. Water Deficit Comparison

Krapeu Trom community is newly established, the rehabilitation of the system are not much progressed largely. As reported from PWRM staffs, under financial support from Seila, PWRM has not in the position to rehabilitate water system to fulfill local requirements due to shortfall of budget, time and available resource. As mentioned earlier, since formation of committee, PDWRM had repaired few water sub canals. The prime minister provides concrete canal, pumping machine. Comparably, water systems are better than last few years though inadequate water gates within the system.

Change of Rice Yield

Rice yield change either increasing or decreasing does not effect water supply solely in agriculture production. Several factors effected to the change. The explaining below do not full arguments of rice yield change to some extent but it needs to be interpreted by using Factor Analysis[4]. However, our interpretation is based on real responses of local farmers through indigenous knowledge and rice growth condition of the examined years. Maximum rice yield of local farmers in year 2003 is higher (5,550kg) than in 2002 (3,900 kg). Look at the mean, the yield increases in 2003 as seen in Table 5. The data is regardless of whatever land size holding of farmers. By testing Paired Sample t-Test, indicates that*: t value=-2.315; df=60; Sig. (two-tailed) =0.024 at 95 % level of confident*, this means that there is statistical difference of rice yield. In short, rice yield has changed over the year.

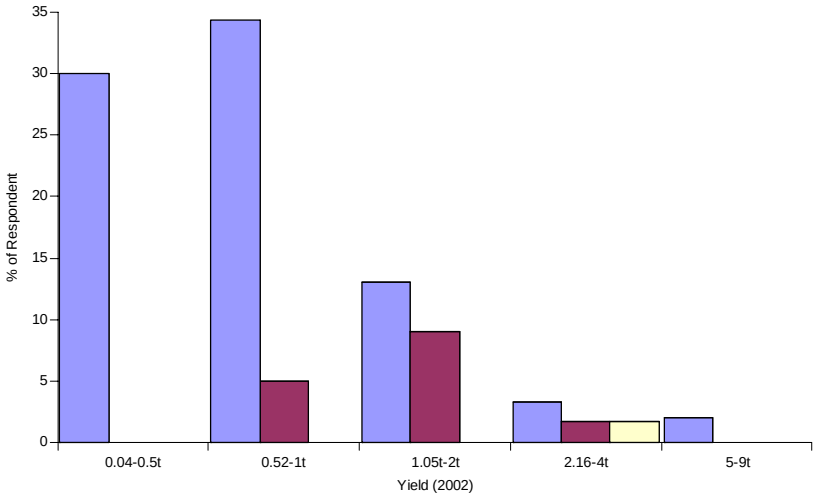
Table 5. Rice Yield Comparison

	Rice yield 2002 (kg)	Rice yield 2003 (kg)
Mean	916.30	1023.43
Minimum	40	40
Maximum	3900	5550

By detailing yield and land size of the year information, for year 2002 (before project) in Figure 8, large percentage of farmers— 30% and 34.4% yielded 0.04-0.5t and 0.52-1t respectively at the same land size 0.04-0.5 ha. However in Figure 9, in year 2003 (after project) the percentage of farmers who yielded between 0.04-0.5t and 0.52-1t decreases but it is 32.8% with higher yield

[4] Statistical tool to analyze factor parameters for change of variables .

(1.05-2t) than in year 2002 where the figure falls in 13% of farmers at the same land size (0.05-0.5ha)



	0.04-0.5t	0.52-1t	1.05t-2t	2.16-4t	5-9t
0.05-0.5 ha	30	34.4	13	3.3	2
0.6-1 ha		5	9	1.7	
1.1-1.5ha				1.7	

Figure 8. Rice Land Size and Yield 2002

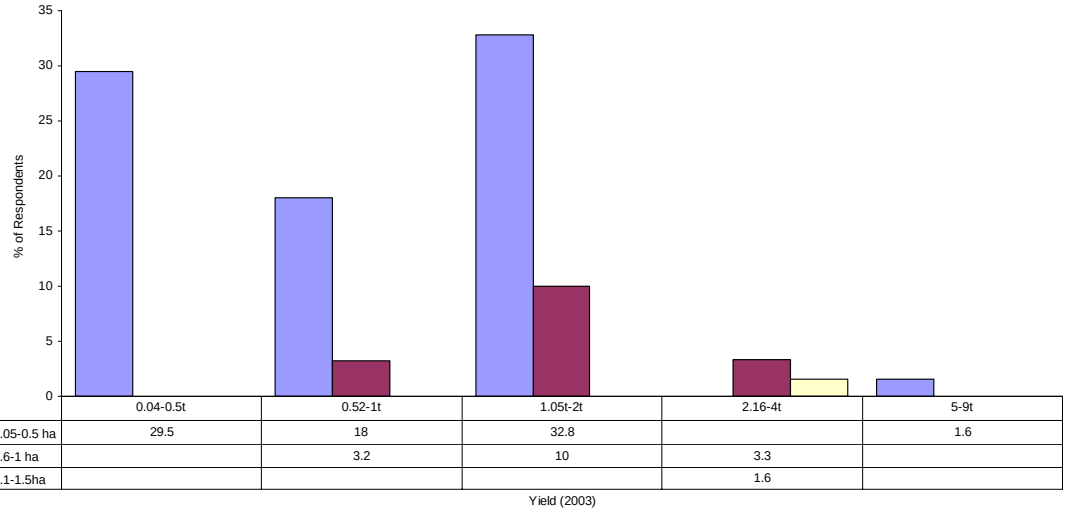


Figure 9. Rice Land Size and Yield 2003

The yield change as mentioned above does not in the reason of water supply only. This would be of many factors that far beyond the scope of this study. So Justification is made here only depends on farmer perceptions. About 70 % of respondents argued that change of their rice yield is due to sufficient of water supply according to data collection; however, a few of whom recognized that might be of good care of pest control and fertilization.

After 1979, an increasing water use for irrigation has been major problems among villages around the system. Villages where were in upper parts of the stream always had access to collect water for their rice field by closing stretches of water gates in some places that inducing irritation of water flow and quantity to lower villages. Such matters created disagreement among them severely. Without coordination among villages and villages, upper villages usually closed water gates preventing water went down whenever they need while lower villages suffered by draught. On the other hand, the down stream villages however, whenever they need water there were only thing that they had to blame to the upper ones otherwise strong conflict occurred.

After establishing WUFC, the statutes and water committee were developed. So villages under the system have had good coordination on water allocation accordingly. As shown in 1 above villagers claim that the reasons of their involvement in community are not only they need water but also they feel community have good coordination of water allocation. Such matter proves that the conflicts of water use have been settled down over time.

6.4 Commitments of Users in Community Development

As described earlier, WUFC has just established in 2003 by Provincial Department of Water Resource and Meteorology. Community has elected committee to overall manage the system including water fee raising, repairing, monitoring and so forth. Until now community has finalized the draft of the statutes and trained committee on basic community development and benefit of water community. However, local farmers have not been paid water fee to community yet as waiting for official recognition from higher level.

Despite above fact, from data collection, it found that all villagers have commitments (63.9%) to help in repair in case of any damages. Notwithstanding, 36% of respondents claimed that even thought they rarely visited the canal, they committed to help community as seen in Table 6. They have argued that community does not have repair cost of water system including canal breaking and engines thus they would happy to pay either by cash or labor. However, once the statute will be in effect, the cost will be secured by community fund package, then operation cost will be allocated.

Table 6. Commitment in Water System Repair Involvement

Type of Commitment	*F*	*%*
Strong commitment	39	63.9
Committed though less time for daily checking	22	36.1
Total	61	100

In any circumstance, farmers need to pay for water fee they will obligate to the cost follows to agreed regulations. A farmer in a surveyed village said “the more benefits they get from canal for irrigation, the payments will not be the problem”. Farmers recognized the outcomes from irrigation, so they have strong willing to pay water fee yet it is for their benefits. Whatever of agreed price, water use can be secured rainy rice cultivation during the year. According to the study as indicates in Table 7, about 23 percent of farmers is in strongly committed level and over 75 percent is in committed level to the payment.

Table 7. Willingness of Water Fee Payment

Level of Commitment	*F*	*%*
Strongly committed	14	23
Committed	46	75.4
Somewhat committed	1	1.6
Total	61	100

7. Emerging Issues and Prospects for Irrigation Development

Local farmers in Krapeu Troam community used to use water from the main stream for rice as they did in the past. Water gates, canals constructions and rehabilitations have not been completely constructed from time to time because of financial insecure. Sedimentation increases to some parts of the stream leads to reduce water capacity and changing water flow patterns in down stream villages. Reduction of water quantity over the years and insufficient water retardation devices within the system causes inequality of water distribution among users especially downstream residents. There are needs of continuation of improving irrigation infrastructure system in provision of digging and repairing new and old canals and constructing water gates.

In addition, community is newly established, so capacity of committee members have not been equipped very well in particular to community development, technical knowledge and management issues. PDWRM in cooperation with funding institutions should continue supports in terms of community based organization and basic management knowledge.

In line with off-rice seasons, potentially farmers can grow some vegetable species and root crops in their rice field for income generation opportunities. This would be great if PDWM would incorporate such activities with irrigation management. Advantages are, farmers would benefit rice and vegetable, at the same time community can raise more income as community funds.

8. Conclusions

The study found that the establishment of WUFC has proceeded very well through given stages guidelines made by MWRM. Local users feel very strong enthusiasm and satisfied themselves such as decision atmosphere, election process, and show confident in the future of irrigation management. Further, the study outlined the yield of rice after project increase since water allocation is better than before project. In addition, users have strongly committed to pay water fee and willing to involve in repairing of canal damages and community management.

Evaluation team found some potential community development activities through vegetable growing during off-rice seasons and other community development activities. Therefore, they would able to generate household incomes in the future. Further, villagers call on relevant institutions especially NGOs to help in them in continuing their supports.

Annex: Photo Documents

Evaluation Team Conducted Random Sampling for Household Survey

Group Orientation with Commune Councils

Key Informant Interview

Water Users Group Discussion

Women Focused Group Discussion

Questionnaire Survey with Local User

Main Canal for Rice Crop Irrigation
(Dry Season Picture)

Irrigated Rice Field

Heavy Water Pump Engine for Irrigating

Water Divides (Canal) from a Main Stream