Community Participation Level Model for Community forest Management in Klongtagrao Watershed Area, Chachoengsao Province

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ABSTRACT

　　　　Influence of deterministic factors education on the community participation level for community forest management in Klongtagrao watershed, Thatakieb district, Chachoengsao province was studied in five villages of which community forests were as follows: Nhongkhayang, Romphothong, Thammaratnai, Kao-krating and Khao-klouymai village. Eighteen factors expected to have influence on the community participation level were determined. It was divided into each community mean, including 225 sampling families including with measurement tri-dimensions of the participation as follows: quantitative, qualitative and transferring dimension by assessment the level of the participation from three resources, namely outsider experts, the leader's community working management for community forests and deep interview together with observation of the researcher then they were averaged and studied the correlation. It was found that there were nine factors relating to the level of participation. That was the amount of data information about community conservation received, understanding towards data, interest towards data, the ability communication inside the community, the potential of formal leaders, the potential of informal leaders, the potential of all leaders in the community, conservative way of life, and trendy of conservation. The proper equation was chosen by stepwise analysis with alpha in/out 0.1. It was found the suitable equation for predicting the level of participation was Community participatory level (CPL) = -58.91 + 1.46 leader potential R^2(adj) 0.79, Quantitative CPL = -53.00 + 1.92 leader potential; R^2(adj) 0.89, Qualitative CPL = -57.35 + 2.00 leader potential; R^2(adj) 0.80, and Transferring CPL = -54.6 + 1.75 formal leader potential; R^2(adj) 0.80

Keywords: Community participation level, Community forest, Klongtagrao watershed

INTRODUCTION

　　　　Resource management towards community based was not a new topic but in the past it wasn't interested owing to law frame, improperly connected regulation. It made a state section didn't make decision on community based that was the cause non-stop argument until the period of Thai constitution since 1997. Thai society was aware of community resource more, at the mean time decentralization to rural areas was an urgently factor made the state have to change power, and some rules about resource management to rural organization more step by step.

The factor study influenced towards community participation for natural resource conservation in Thailand was widely studied but there wasn't confirmed the deterministic influence level toward the effect of the participation. So it was not clear to proper any methods for development towards the level of conservation community concretely. This research was emphasized 1) to determine the level of correlation between deterministic factors of the community and the level of community participation towards conservation community forest resource and 2) to determine the proper equation for predicting the level of community participation in order to develop some methods for promotion the level of community participation for conservation community forest resources in the future. From 13 sampling researches, they were found 18 factors affected towards participation. There were four manifest deterministic factors of the participation level namely attitude in important of resources, received the information of management, benefit of resources management and age, fourteen ambiguous factors including sex, Income, school period, occupation, social status, natural resources richness, forest cover, convinced by other person, way of life, settlement period, participation trend, members of conservation groups, relation to conservation officers and race. The detail were shown in Table 1.

MATERIALS AND METHODS

Data Collection

Study area description

Khlongtagrao watershed is located in Thatakiab district, Chachoengsao province. The watershed area is about 371.27 km² or 232,043.75 rai, and having dendritic shape, main channel length about 31.87 km, covered 12 villages in Thatakiab district. Khlongtagrao channel flows from southeastern highland to north plain land at the outlet (Si-yad reservoir).

The location can be found at;
Geographic coordinate; UTM 47P
X-coordinate 777874.5 - 808565.6
Y-coordinate 1458283.5 - 1485910.7

Most of areas having moderate slope and with the average slope of 8%. Most of land use patterns were forest and agricultural area (farm crop, paddy field, para rubber). Klongtakrao watershed area could be divided into 9 landuse types; namely dry evergreen forest 50.00 %, agricultural areas 42.57%, mixed deciduous forest 4.22% water body 1.33%, secondary forest 0.66%, community forest 0.66%, eucalyptus plantation 0.29%, community area 0.24% and teak plantation 0.03 respectively. Landuse map were shown in Figure 1.

The study area is rural area close to Khao Ang Rue Nai Wildlife Sanctuary. Almost all of the villagers residing in this area had worked in forest concession area and moved out from wildlife sanctuary in 1990. Some villagers have a long conflict with the conservation officers, such as land conflict, hunting conflict or resources used conflict. The villagers thrust to their community leaders more than government officer to lead them.

Population Sampling

Klong Takrao watershed was compose of 12 villages, 2,348 families and 8,609 persons. Five villages were managed community forest activities namely: Nhongkhayang, Romphothong, Thammaratnai, Khao-klouymai and Kao-krating. These five areas were employed as the representatives for this study.

General population; population in Nhongkhayang, Romphothong, Thammaratnai, Khao-klouymai and Koa-krating village is 892 families as shown in table 2 (Community Development Department, 2003). To calculate the sample set, Khajornsilp (1996) suggested the percentage of cruise for the small population (less than 1,000 samples) should be 25%. The obtained calculated and adjusted sample size were shown in Table 2.

Table 1. Deterministic factor of community participation level in natural resources management as notified by various researches

Factor	Petplai (1998)	Hem thanon (2003)	Sirikhant anon (2002)	Daoweer akul (1996)	Thamma chart (1998)	Saisor (2003)	Tride chee (2003)	Kaow nont (2002)	Neam kong (2003)	Techar at (2003)	Sa-ard (2002)	Hom saen (2003)	Watcha raphog (2003)	Researches had influence factor (No.)
1. Sex	-	-	-	χ	√	-	√	√	-	-	-	-	-	3
2. Age	√	-	-	χ	√	-	√	-	-	-	-	-	-	3
3. Income	√	-	-	-	-	-	-	-	-	-	-	-	-	1
4. School period	√	-	-	-	χ	-	-	-	-	-	-	-	-	4
5. Forest cover	√	-	-	-	-	-	-	-	√	√	-	-	√	1
6. Natural resources richness	√	-	-	-	-	-	-	-	-	-	-	-	-	1
7. Attitude in important of Resources	-	√	√	-	√	-	-	√	-	-	-	-	-	4
8. Beneficially	-	√	√	-	-	√	√	-	-	√	-	-	-	5
9. Occupation	-	-	-	χ√	√	-	-	-	-	-	-	-	-	1
10. Social status	-	-	√	√	χ√	-	-	-	-	√	-	-	√	3
11. Information received	-	√	√	√	√	√	√	-	-	√	√	-	√	8
12. Convinced by other person	-	-	-	√	-	-	-	-	-	-	-	-	-	1
13. Way of live conservation	-	√	-	-	-	-	-	-	-	-	-	-	-	1
14. Settlement period	√	-	-	-	χ	-	-	-	-	-	-	-	-	1
15. Participation trend	-	√	-	-	-	-	-	-	-	-	-	-	-	1
16. Member of conservation group	-	-	-	-	-	-	√	-	-	-	-	√	-	2
17. Relationship to officers	-	-	-	-	-	-	-	-	-	-	√	-	-	1
18. Race	-	-	-	-	-	-	-	-	-	-	-	√	-	1

Remark: √ meaning: influence factor for community participation level
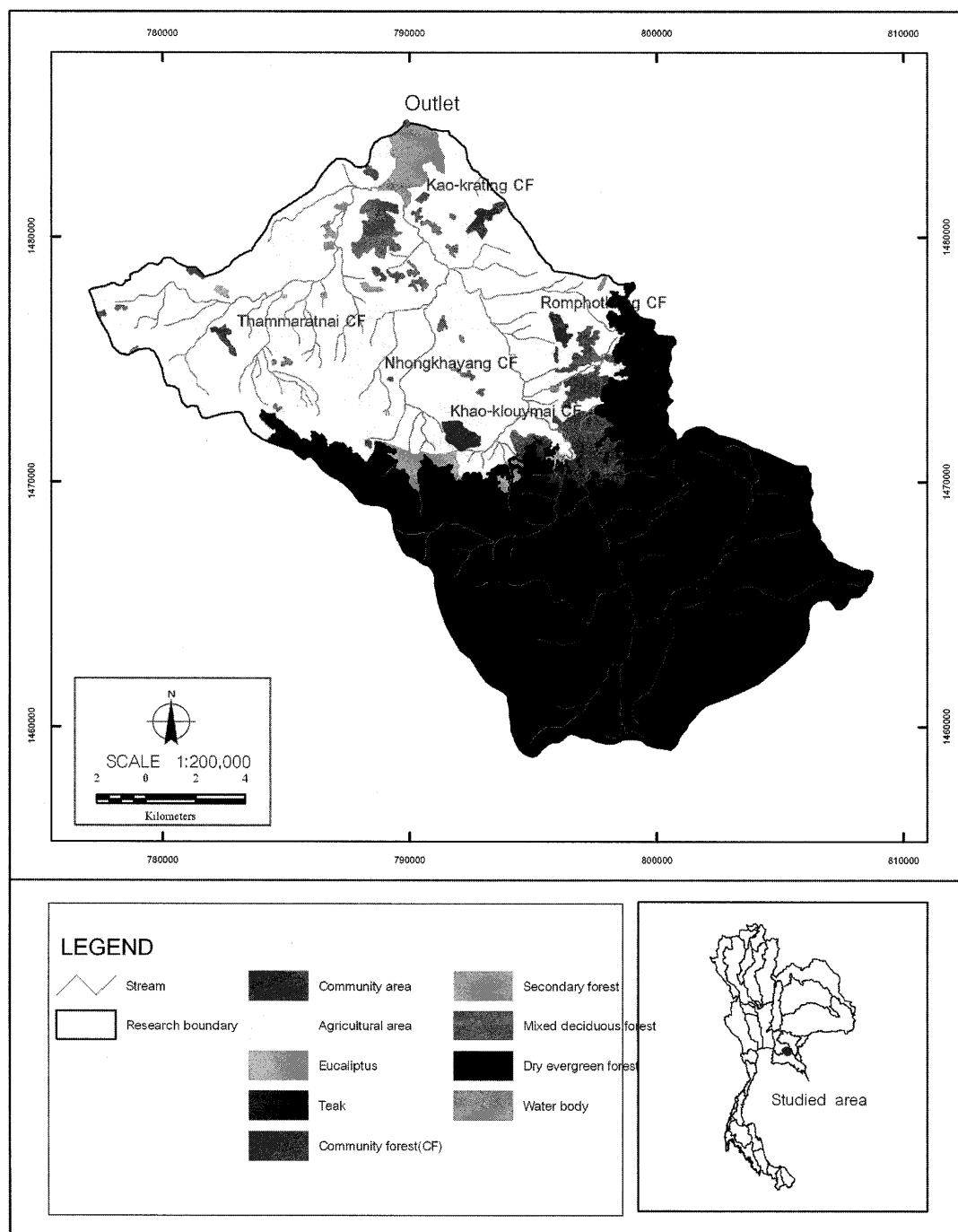χ meaning: non significant factor for community participation level

Figure 1. Land use map of Klongtakrao watershed area.

Factors Measurement

18 deterministic factors were employed for measuring the level of expected effects of the 225 respondents towards the level of community participation. The using data was collected by using questionnaires, and then analyzed the level of deterministic factors by community separately. The square of reliability (rtt2) of questionnaire is 0.80 (calculated by variances method, internal consistency) (Kijpreedaborisut, 1999).

Table 2. Distribution of Total, sample and adjusted sample household by village

Villages	household			Sample method
	Total	Sample	Sample (adj)	
General population				
1) Nhong Kha-yang	235	58.75	59	Simple randomized sampling
2) Thammaratnai	68	17.00	17	Simple randomized sampling
3) Rompho-thong	249	62.25	63	Simple randomized sampling
4) Koa Krating	150	37.50	38	Simple randomized sampling
5) Khao Klouymai	190	47.50	48	Simple randomized sampling
total	892	223.00	225	

Community leader; In-depth interview was conducted for at least 1 official leader and 2 unofficial leaders per village by purposive sampling.

Independent factors were employed for determining the level of community participation by 3 village's sophists (such as community leader) known about conservation activities in each village very well, including 3 outsider participation experts, and the researcher. The obtained information from such 3 resources were used for calculating the mean to the level of community participation dimension in term of quantity, quality and transfer. The square of reliability (rtt2) of assessment from is 0.93. (Calculated by variances method, internal consistency) (Kijpreedaborisut, 1999).

- Quantitative dimension is a countable participation factors such as the percent of the participated families, frequency of the participation, size/area of doing activity, and budget.

- Qualitative dimension is a quality of participation activities such as variation of the activities, willingness to participation, difficulty, results of the activities against the conservation, forms of the conservation with the state and push-forward groups.

- Transferring dimension mean ability of community to transfers or manifest participation to member and sustainable maintain it such as transferred ideas to the whole member of the community or to the young to practice, variation of participated groups, and ages.

Data Analysis

Deterministic factors of each community were taken and then computed the correlation between the level point of the community participation in the community forest conservation and the level of community participation as quantity, quality, and transfer. Regression analysis was used to examine the deterministic factors towards the level of participation and used stepwise analysis for determining the proper equation. Hence the community participation level in various dimensions could be predicted. The data were analyzed by using program Minitab 13.0: the Statistic computer program.

RESULTS AND DISCUSSION

Community participation levels (CPL)

Five sampled communities with communities forest activities which were employedfor the study, were Romphothong (Rpt), Khao-klouymai(Kkm), Nhongkhayang (Nky), Thammaratnai (Trn) and Kao-krating (Kkt) village. Each community having different in community participation levels from each others and differ between dimensions, Romphothong had the highest level in every dimensions and the second was Thammaratnai. The detail of CPL level was showed in Table 3.

Table 3. Quantitative, Qualitative Transferring and CPL community participation level (%)

Dimensions	Participation level (%)				
	Kkt	**Rpt**	**Kkm**	**Nky**	**Trn**
Quantitative dimension	28.5	69.6	51.9	23.8	65.5
Qualitative dimension	23.0	71.7	51.6	24.6	65.2
Transferring dimension	28.3	72.2	48.2	31.7	71.5
CPL (Quan × Qual × Trans)/10,000	1.94	37.29	14.83	1.95	32.15

Community deterministic factor level (CDF)

Community deterministic factor levels were various in each other village and vary among factors. Detail of CDF level were shown in Table 4.

Community participatory level equation

Equation representing the relationship between deterministic factors towards the community participation level was formulated by employing regression analysis. The obtained equations the having high R^2(adj) and significance with p-value lower than 0.05 were chosen.

1) Quantitative community participation level model in (Quantitative CPL)

The participation of the community towards natural resource conservation in quantitative dimension was presented in term of: percent of the participated families, frequency of the participation, size/area of doing activity and budget use which was differed from the factors of each community. It was indicated that factors influence on the level of the participation natural resource conservation for quantitative dimension specific community forests in the Klongtagrao watershed were all of the given deterministic factors, they were information understanding, information interested, formal leader potential, informal leader potential, and leader potential. Details were shown in Table 5.

2) Qualitative community participation level model in (Qualitative CPL)

The participation of the community towards natural resources conservation in qualitative dimension was variation of the activities, good participation, difficulty and case of activities, results of the activities against the conservation, forms of the conservation with the state and push-forward groups. The factors of each community were different from each others. There were 2 factors had influenced on natural resource conservation in quantitative dimension at Klong tagroa watershed namely formal leader potential and leader potential. Significance equations were shown in Table 6.

Table 4. Communities deterministic factor levels (CDF level)

Deterministic factors	Community				
	Kkt	Rpt	Kkm	Nky	Trn
1. Race	Thai	Thai	Thai	Thai	Thai
2. Religion	Buddh.	Buddh.	Buddh.	Buddh.	Buddh.
3. Main occupation	general employ	crops	Crops farmer general employ	general employ, crops farmer, field farmer	General employ, crops, seller
4. Community's aged (years)	28.31	20.84	23.36	20.69	24.60
5. Family was born in community (%)	7.7	8.7	12.5	3.4	0.0
6. Relation to community place (%)	95.9	95.8	97.5	94.5	93.1
7. Average family size (persons)	3.44	4.17	4.10	3.34	3.23
8. Male : Female 100 person	91.10	108.50	104.04	107.45	79.40
9. Average monthly income (bath)	6,682.1	10,091.2	6,489.6	10,203.4	7,650.0
10. Average monthly expense (bath)	4,956.4	7,970.6	5,532.6	8,515.3	6,766.7
11. A specific average family in debt (bath)	43,736.8	89,375.0	35,878.8	192,419.4	48,083.3
12. A specific average saving family (bath)	18,464.6	16,415.3	7,884.6	191,272.7	29,308.3
13. A good level relation between community and conservative officials	62.25	63.50	62.50	59.75	68.25
14. The amount of conservative data information transferred to family community (%)	59.50	70.00	66.75	41.00	82.50
15. Community can understand the theme of data information (%)	57.75	68.50	65.75	37.25	79.25
16. The level of interest towards community conservation (%)	60.25	73.25	65.75	47.25	79.25
17. The potential to communicate data information about community conservation thoroughly (%)	61.00	70.25	63.00	39.00	78.25
18. The level necessity of the community depended on the forests for consumption (%)	6.50	12.75	10.50	17.25	14.25
19. The level necessity of the community depended on the forests for use (%)	12.25	4.00	2.00	8.50	15.75
20. The level necessity of the community depended on some wood from the forests (%)	1.25	6.50	1.00	3.75	0.00
21. The level necessity of the community depended on wild animal's meat for consumption (%)	3.75	1.75	0.50	2.50	2.50
22. The level necessity or indirect needs towards the natural resource of the community forest (%)	36.50	41.25	56.20	24.50	39.25
24. The potential of formal leaders	52.17	65.75	61.08	46.42	74.42
• The ability / influence to motivate members in the community to participate conservative activities (%)	50.75	63.75	61.50	45.25	73.25
• Interest / enthusiasm towards conservation management activities (%)	53.75	66.00	62.50	47.00	75.75
• Knowledge, understanding towards conservation correctly (%)	52.00	67.50	59.25	47.00	74.25
25. The potential of informal leaders	42.92	57.58	45.75	28.08	49.75
• The ability / influence to motivate members in the community to participate conservative activities (%)	39.75	56.50	46.25	25.75	49.25
• Interest / enthusiasm towards conservation management activities (%)	43.50	58.75	46.75	28.75	51.75
• Knowledge, understanding towards conservation correctly (%)	45.50	57.50	44.25	29.75	48.25
26. Conservation trend of the members in the community depended on participation of the whole activities (%)	55.25	67.00	52.50	38.50	65.75
The level of relation between the community and forests (%)	57.75	63.75	74.50	47.50	73.25
27. The ability of adaptation to separate ways of life from the forests (%)	45.50	36.50	37.00	50.00	35.00
28. The level of devotion to reserve ways of life "Man and Forest" (%)	52.50	63.50	66.75	55.00	70.00
29. The points of feeling to the abundance of the natural resources in the community area (%)	67.64	69.13	74.50	63.58	64.66
30. Good opinion / attitude towards the conservation of the community forest resource (%)	73.95	76.11	77.71	75.25	79.39

Table 5. Equation of the deterministic factors which having influenced on the participation in quantitative dimension

Deterministic factors	equation	R^2	$R^2_{(adj)}$	F	p
Information understanding	Quan = -24.0 + 1.18 Inf_u	0.834	0.778	15.05	0.030
Information interested	Quan = -54.0 + 1.56 Inf_i	0.850	0.800	16.95	0.026
Formal leader potential	Quan = -58.1 + 1.77 Lead_for	0.869	0.825	19.82	0.021
Informal leader potential	Quan = -28.9 + 1.71 Lead_inf	0.788	0.718	11.17	0.044
Leader potential	Quan = -53.0 + 1.92 Lead_pot	0.916	0.889	32.89	0.011

The equation of the participation of the community in conservation community factors by stepwise analysis; Alpha-to-enter/remove = 0.10 as follow:
Quantitative CPL = -53.00 + 1.92 Leader potential; $R^2_{(adj)}$ 0.89

Table 6. Equation of the deterministic factors which having influenced on the participation in quantitative dimension

Deterministic factors	equation	R^2	$R^2_{(adj)}$	F	p
Formal leader potential	Qual = -63.6 + 1.85 Lead_for	0.817	0.756	13.37	0.035
Leader potential	Qual = -57.3 + 2.00 Lead_pot	0.847	0.796	16.62	0.027

Equation of the community participation in qualitative dimension towards natural resource conservation by stepwise analysis; alpha-to-enter/remove = 0.10 is
Qualitative CPL = -57.35 + 2.00 Leader potential; $R^2_{(adj)}$ 0.80

3) Transferring community participation level model in (Transferring CPL)

Community participation helped natural resource conservation in transferring dimension as follows: transferred ideas to the whole member of the community or to the young to practice, variation of participated groups, ages and factors of each community. It was found 3 factors had influenced in transferring dimension as follow; information interested, formal leader potential and leader potential. Significance equations were shown in Table 7.

Table 7. Equation of the deterministic factors which having influenced on the participation in transferring dimension

Deterministic factors	equation	R^2	$R^2_{(adj)}$	F	p
Information interested	Tran = -47.6 + 1.50 Inf_i	0.781	0.708	10.68	0.047
Formal leader potential	Tran = -54.6 + 1.75 Lead_For	0.848	0.798	16.76	0.026
Leader potential	Tran = -45.6 + 1.83 Lead_Pot	0.826	0.768	14.22	0.033

Equation of the community participation in transferring dimension towards natural resource conservation by stepwise analysis; alpha-to-enter/remove = 0.10 is
Transferring CPL = -54.60 + 1.75 Formal Leader potential; $R^2_{(adj)}$ 0.80

4) Community participation level model in (CPL)

Community participation helped natural resource conservation in the whole tri-dimensions including; quantitative, qualitative and transferring dimensions. The points of each one were calculated. It was found 3 important factors which having the influence namely information interested, formal leader potential and leader potential. Significance equations were shown in Table 8.

Table 8. Equation of the deterministic factors which having influenced on the participation in transferring dimension

Deterministic factors	equation	R^2	$R^2_{(adj)}$	F	p
Information interested	CPL = -54.9 + 1.18 Inf_i	0.775	0.700	10.35	0.049
Formal leader potential	CPL = -62.9 + 1.34 Lead_For	0.802	0.736	12.14	0.040
Leader potential	CPL = -58.9 + 1.46 Lead_Pot	0.844	0.792	16.21	0.028

Equation of the community participation towards natural resource conservation by stepwise analysis; alpha-to-enter/remove = 0.10 is

Community participatory level (CPL) = -58.91 + 1.46 Leader potential; $R^2_{(adj)}$ 0.79

CONCLUSION AND RECOMMENDATION

CONCLUSION

There were five deterministic factors had correlation with the community participation level. Five factors were in quantitative dimension. 2 and 3 ones were in qualitative and transferring dimensions respectively, and consider about CPL including 3 dimensions had 3 factors. It was found leader potential of the community had the highest significance level of the correlation in every dimension. Moreover, the understanding conserved data, interested in conserve information; formal leader potential and informal leader potential trend had varied correlation with the level of the participation in each dimension. The details were shown in Table 9.

In community forest's conservation, 'Leader potential' was significantly related to Community participation level for at least 0.80 in all dimensions. Therefore, 'Leader potential' was selected as 'the community deterministic factor' (CDF) in the equation for predicting CPL model. Using a variety of factors might slightly increase the correlation value, but diminish the degree of freedom. Equation of community participation level towards natural resources reservation in tri-dimensions as follows;

Quantitative CPL = -53.0 + 1.92 Leader potential; R^2(adj) 0.89

Qualitative CPL = -57.35 + 2.00 Leader potential; R^2(adj) 0.80

Transferring CPL = -54.6 + 1.75 Formal Leader potential; R^2(adj) 0.80

CPL = -58.91 + 1.46 Leader potential; R^2 (adj) 0.79

The reason leader potential factor of Klongtagrao extremely influenced the community participation level was 'rural community' characteristic. In addition, this area was located closely to a conservation zone which translated into few government's activities. Then, Local

Community's self reliability was high and the trust in their leader, which was considered to be a great social capital, became more necessary.

Table 9. Correlation between community's deterministic factors and community participatory levels

Community's deterministic factors	Correlation between CDF and CPL (R^2_{adj})			
	Quantity	Quality	Transferring	3 dimension
Understanding conserved data	0.78	-	-	-
Interested in conserve information	0.80	-	0.71	0.70
Formal leader potential	0.83	0.76	0.80	0.74
Informal leader potential	0.72	-	-	-
Leader potential	0.89	0.80	0.77	0.79

RECOMMENDATION

To increase the level of participation towards the community forest conservation at Klongtagrao, are as follows:

1) Developing both formal and informal leader potential in various forms eg, the ability to motivate the community to realize the importance of the community forests, having knowledge and understanding to reserve the forests. The most important factor is how to make the community leader become the lion's lead to manage the community forests properly and permanently.

2) Promoting to transfer interesting, simple conservation data throughout all the members of the community continuously.

3) Stimulating conservation trend continuously eg,
- Planting trees on important days
- Adapting to ritual ceremony
- Stimulating by other leaders of the communities
- Let outsiders studying and doing research.

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