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Role of Participatory Development Communication in Natural Resource Management: A Case in Ratchaburi Province, Thailand

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ABSTRACT

Using selected agricultural communities in Ratchaburi Province in Thailand, this study mainly investigates the relationship between participatory development communication (PDC), on one hand, and knowledge, attitude, and practice of community-based natural resource management (CBNRM), on the other. Toward achieving this goal, data were collected to: (1) identify the status of CBNRM in Krabyai sub-district, Ratchaburi province; (2) determine the PDC levels of the various stakeholders; and (3) find out the level of knowledge, attitude, and practice of CBNRM. The results of the statistical analysis and the conclusions drawn from a focus group discussion provide the basis for the steps recommended to enhance PDC as applied to CBNRM efforts in other municipalities in Thailand. The study follows a one-shot survey research design whereby primary information is elicited from 43 respondents consisting of 35 farmers and 8 government officers. Data are analyzed using descriptive statistics and Spearman's rank correlation coefficient analysis.

The findings highlight the need to improve and continuously find ways to properly involve and encourage participation from various stakeholders. In terms of PDC levels, data show that consultation is favored by most stakeholders. Most of the respondents have high knowledge of CBNRM. More than half of the respondents have a positive attitude toward CBNRM. As to the levels of practice of PDC in CBNRM, most stakeholders often participate in activities conducted on natural resource management. Most importantly, a significant relationship was found between the level of PDC and the knowledge, attitude and practice of stakeholders on CBNRM.

Keywords: participatory development communication; community-based natural resource management

JEL Classification: Q10, Q15

INTRODUCTION

Development communication plays a major role in information distribution in developing countries and other parts of the world. Communication does not only inform but also influences the behavior of the receiver of information. Effective development communication should motivate people to participate in planned activities.

Servaes (1999) wrote that communication and development begin with grass-roots communities and organizations, highlighting the participatory nature of both. Participatory approaches gained recognition in the 1980s and 1990s and have since evolved into a rich field standing in stark contrast to models and theories on communication of the first development decade (Huesca 2002). Ondrik (1999) and the Asian Development Bank (1996) defined participatory development as a process through which stakeholders can influence and share control over initiatives, decisions, and resources that affect them. Development communication adopted the same approach in program monitoring, evaluation, and implementation. Participatory development communication (PDC), a term coined by Bessette (2004), aims to facilitate dialogue and empowerment in community-based level interventions in Latin America, Africa, and Southeast Asia.

PDC means moving from a focus of informing and persuading people to that of changing their behaviors or attitudes and facilitating exchanges among different stakeholders to address a common problem. Bessette (2004) considers PDC as a powerful tool to facilitate the process of development, as it encourages communication participation with development initiatives through strategic utilization of various communication strategies.

PDC has been used in several development projects such as land and water conservation

(Bessette 2006) or NRM (NRM) (Gonsalves et al. 2005), and poverty alleviation.

Izac and Sanchez (2001) defined NRM as the sustainable use of resource base in agriculture to meet the production goals of farmers, as well as the goals of the rest of the community. Garcia (2001) noted that a major consideration in the sustainable management of natural resources is the strong emphasis on the socioeconomic aspect of agricultural productivity. The decision to use NRM processes is based on the involvement of multiple stakeholders. That is the reason why community-based NRM emphasizes participatory methods or decisions being made by the stakeholders themselves. This gives agriculture a fresh outlook toward sustainability.

According to Ashby (2003), participatory communication adds value to NRM by building on natural diversity because it is highly decentralized, adapted to location-specific conditions, and stakeholder-driven. The adaptive management of complex ecosystems needs to include the stakeholders in addressing environmental problems. Participatory approaches are especially needed in situations where there are disagreement and conflict over what constitutes appropriate management.

Thus, PDC in NRM is an essential component of participatory research. PDC suggests shifting away from informing stakeholders to improve their knowledge, attitude, and practice; instead, it brings together communication, research, and action into an integrated framework. It also involves researchers, extension workers, community members, and other stakeholders in the different phases of the development process.

Background of the Study

Community-based NRM (CBNRM) in Ratchaburi province, Thailand attempts to address the problems of poverty and natural resources degradation simultaneously even

though their solutions are often seen as being in direct conflict with one another. The programs described represent promising approaches to mitigating and preventing environmental damage. The local communities, on the other hand, also benefit from the sustainable use of natural resources. The objectives of CBNRM in Ratchaburi province are pursued through a collaborative process that includes representatives from the community, the municipal government, and non-governmental organizations (NGOs). The CBNRM approach has become a means for grassroots organizations and the government sector to motivate diverse stakeholders to become involved in NRM at both national and community levels. However, the debate continues over how to properly involve and encourage participation from various stakeholders and to increase the equity of access to natural resources among users.

One of the major challenges that Thailand faces today is the preservation of its natural resources. It is home to “diverse indigenous/tribal people of differing cultural beliefs and histories residing within its geographical borders” (Lasimbang and Luithui 2008). These people are dispersed in the country’s different regions, primarily in the rural agricultural areas. During Thailand’s 30-year “development epoch,” commercial agricultural development became the backbone of economic development (Buch-Hansen, Oken, and Prabudhanitisan 2006). This resulted in the mass production of natural resources-based products. Consequently, there was a high rate of natural resources depletion, in addition to the effects of climate change.

Of the several districts in Thailand, Ratchaburi province, an agricultural area, has exhibited increasing depletion of natural resources. The province’s land area of 519,646.2 hectares consists of 268,988 hectares of agricultural land, 184,210 hectares of forestlands, and 7,551 hectares of irrigated

area (Thailand Ministry of Natural Resources and Environment 2009). If not mitigated or controlled, the depletion of the natural resources could increase poverty incidence not only in the area but also in the entire country.

Ratchaburi province has been prone to severe natural disasters in the past few years such as drought, inundation, hurricane, and conflagration due to climate change. The Thai government has allocated an increasing budget for NRM in the area. In 2007, USD 529,028 was allotted mainly to address the effects of severe drought. The following year, USD 301,956 was earmarked for inundation, and in the next two years (2009–2010) the budget allocation was for drought. But a severe inundation in 2011 had the government providing USD 1,700,310 for the restoration and management of the area (Ratchaburi Department of Disaster Prevention and Mitigation 2011).

Increased budget allocation, however, cannot solve the crisis alone. The government needs an effective strategy in mitigating the problems. PDC in CBNRM is seen to help the government in formulating effective strategies to alleviate the effects caused by natural disasters and natural resources degradation in a community.

People’s participation is a prerequisite to CBNRM (Garcia 2001). The people are the stakeholders and decision-makers. The community and the local government should work together to determine ways to protect the degraded and sensitive ecosystem. NRM will require the participation of the local government units, NGOs, and other institutions. Participation serves as a stimulus in technology adoption and policy support implementation.

The Sustainable Development Foundation of Thailand (2003) has studied the issues and problems in NRM in Thailand. The results of their studies yielded the following conclusions:

1. There is fragmentation in the management of the government units, and a monopoly of

natural resources through centralized laws and policies. Giving the primary responsibility in NRM to one specific government department has created efficiency issues in governmental operations.

2. The concept of NRM is piecemeal rather than holistic. Natural resources are viewed as trade commodities and only serve as production inputs.
3. NRM principles remain fragmented and continue to emphasize the use of natural resources for economic development.
4. Different organic laws do not correspond with the Constitution and the actual circumstances on the ground due to a lack of participation from the people who are affected by such laws. Additionally, there is lack of transparency, resulting in an overlapping of interests and benefits.
5. The community's rights and people participation in NRM have not been recognized and accepted.

Statement of the Problem

Bessette (2006) explains that best practices in NRM development point to situations in which the stakeholders jointly identify development parameters and participate in the decision-making process. This process goes beyond community consultation and participation in activities identified by researchers. In best-case scenarios, the development process itself generates a situation of empowerment in which participants transform their view of reality and are able to take effective action.

PDC reinforces this process. It empowers local communities to discuss and address NRM practices and problems, and to engage other stakeholders in building an improved policy environment. Motivated by an interest in exploring how PDC influences the communities' NRM, the following objectives were drawn up:

1. Identify the status of CBNRM in Krabyai

sub-district, Ratchaburi province;

2. Determine the PDC levels for CBNRM by stakeholders within the agricultural communities in the Krabyai sub-district;
3. Find out the level of knowledge, attitude, and practice of CBNRM of the Community Development for Economic Sufficiency Project (CDESCP) of Kasetsart University, Kamphaeng Saen Campus;
4. Analyze the relationship between the stakeholders' PDC levels, and the level of knowledge, attitude, and practice of CBNRM; and
5. Recommend steps to enhance PDC as applied to CBNRM, based on the results of the study.

The results will be used to determine and improve communication practices related to stakeholders' participation for sustainable NRM within the agricultural community in Krabyai sub-district. These could also be used as reference for future studies concerning the application of PDC or its integration in sustainable NRM in an agricultural community. This study can also provide the information needed by policy-makers, researchers, agricultural extension workers, and community development workers to develop a functional framework of PDC. The results can also help the Thai government plan, develop and implement policies, strategies and systems that will enable agencies to work together with effectiveness and sustainability.

Participatory Development Communication

The meaning of participation has undergone changes through time. UNESCO (1986) explains that participation has two related components, namely: (1) "being involved in," which means passively undergoing a process, and (2) "taking part in" which may mean the active and positive sense of exercising a shared responsibility in carrying out a process.

According to Aycrigg (1998), there are four levels of participatory communication:

1. Information sharing - one-way communication wherein people are included by informing them about what is being done.
2. Consultation - one-way communication with strong emphasis on feedback. Stakeholders provide inputs, but do not have a significant say in the decision-making process.
3. Collaboration - two-way communication supporting open interaction in decision-making; input in decision-making is balanced.
4. Empowerment - two-way communication that ensures shared decision making; there is transfer of control over decisions and resources.

According to Coldevin (2003, p. 16 participatory communication under rural development is “a shift from the dominant paradigm of top-down to self-development wherein the villagers and urban poor are the priority audience, and self-reliance and building on local resources are emphasized.” Participation thus becomes the exchange of information from both parties—the people and the organization. In this process, the people at the grassroots identify the problems and the solutions and they are given an opportunity to participate in the decision-making.

In her development communication research, Cadiz (2006) uses participatory rural communication appraisal to undertake preliminary situational assessment in participatory communication programs for NRM. The appraisal is found to help change agents obtain the information needed in developing effective communication programs and materials and methods in NRM to ensure suitability for the stakeholders. It also allows better listening and understanding of the stakeholders, resulting in better project planning. It promotes the involvement of stakeholders in decision-making that impacts on

their livelihood, and in planning communication programs for new development efforts.

Participatory Development Communication in NRM

PDC (PDC) has been introduced by Bessette (2006) as an aid to NRM. He believed in its potential to influence communication practices at the community level—empowering local communities to discuss and address NRM and encouraging stakeholders to establish and improve environmental policies. Bessette further adds that PDC facilitates participation in a development initiative identified and selected by a community, with or without the external assistance of other stakeholders.

The term PDC has been used in the past by a number of scholars to stress the participatory approach of communication in contrast with the more traditional diffusion approach. It is also called participatory communication for development, participatory communication, or communication for social change. In the following paragraphs, we attempt to focus on how it is defined in this study.

Participatory communication in NRM is not just a set of techniques to make people change their knowledge, attitudes, and practices. Instead, as posited by Cadiz (1994), the people should voluntarily engage in activities as part of the process of gaining critical understanding of why they are doing so. If people understand why and voluntarily change their practices and activities, such changes are likely to be more long-lasting. In social change, people work together in agreement to make some changes happen at the community or societal level.

Garcia (2001) states that NRM research needs to be conducted in a multidisciplinary and interdisciplinary manner and should be participatory and community-based. To address the primary concerns of the local communities and to effectively manage the natural resource

base, community participation is a basic requirement since it is the entire community's responsibility to protect their natural resources.

Bessette (2006) states that for communication to effectively address challenges in NRM, it must ensure true appropriation and ownership by local communities. The ability to work with local communities in a participatory way, to support learning processes, to develop partnerships with other development stakeholders, and to affect the policy environment should be recognized as equally important as the knowledge needed to address technical issues in NRM. The extension workers, researchers, and community members involved in NRM initiatives should be adept in the use of communication in participatory research and development initiatives. This requires learning PDC values, local and modern knowledge in NRM, as well as communication skills.

Flor (2001) enumerates the following lessons drawn from participatory communication studies: (1) effective environmental communication is not merely instructive nor consultative, which means that participation goes beyond the consultative process; (2) it is not merely informative; it should go beyond the bottom-up approach. Information sharing should be both ways and not just linear, where stakeholders interact without hesitation in the process; (3) participation and collective action are internally driven and not strictly imposed; (4) it should make use of indigenous media; (5) communication should also be done at the interpersonal, community, and national levels; (6) participation takes time, and effective environmental communication proceeds at its own pace; and (7) it assumes a momentum of its own.

These findings emphasize that the approach to development communication research should not be linear. The increasing interconnectedness today assumes that communication is visible in

every aspect of people's daily lives. Participation is innate, but proper research participation is yet to be perfected. PDC is a way of enabling people to increase community involvement—to have a unified decision over something that is shared by the community. Thus, determining the levels of PDC is important when conducting participatory research to determine the gaps in knowledge, attitude, and practice.

THEORETICAL CONSTRUCTS

Participation in development and communication is often presented as a normative principal to aspire for (Rahnema 1995). Maximum participation carries an assumed status of maximum benefit. Development communication involves a planned change in knowledge, attitudes, and practices, which influence not just the individual but other components of a system as well.

Evidence shows that PDC is an important means whereby the quality, impact, and sustainability of development policies can be enhanced. PDC can also be viewed as an "end" in itself, to the extent that it can raise the awareness of stakeholders and strengthen their capacity to analyze and resolve their own problems. In particular, it can assist weak or vulnerable groups to share equitably in development benefits and empower them to better defend their interests and initiate self-help actions.

In the case of NRM, multiple stakeholders are involved in its administration and implementation. The model for this study assumes that the level of PDC is, in some manner, related to the level of knowledge, attitudes, and practices of the stakeholders concerning NRM.

As shown in the conceptual framework (Figure 1), the stakeholders' levels of PDC (i.e., information sharing, consultation,

collaboration, and empowerment), are assumed to affect the levels of knowledge, attitude, and practice of NRM.

CONCEPTUAL FRAMEWORK

Communication is a social process that goes beyond the use of media. It contributes to the sharing of knowledge and information and to achieving participation in development. Sustainable rural development requires qualified field agents, especially in agriculture, who can competently manage and carry out communication activities and services that facilitate the systematic participation of development stakeholders.

A communication strategy is an explicit overall design which identifies and describes all the essential elements and activities in a communication program. The first stage in preparing the design requires knowing the stakeholders' knowledge level, attitudes, and practices to identify the different components and approaches of the intervention.

In Figure 2, the study's conceptual model is outlined in its theoretical and empirical levels, both proceeding from the assumption that the levels of PDC are related to the stakeholder's knowledge, attitude, and practice. The study hypothesized that there was a significant relationship between stakeholder's knowledge level, attitudes, and practices in natural resources management and participatory development communication. In particular, (1) participatory development communication levels were directly correlated to knowledge level, attitudes and practices, meaning, that as participatory development communication level increases, knowledge level, attitudes, and practices among stakeholders also increased, and (2) participatory development communication levels were inversely correlated to knowledge level, attitudes, and practices,

thus, participatory development communication increased, knowledge level, attitudes, and practices decreased or vice versa.

Looking at the situation in Ratchaburi Province, the increasing budget on NRM can be lessened if there is proper communication between, and greater participation among stakeholders and the government. The results of this study will hopefully give the government a fresh approach toward NRM and improve stakeholders' knowledge, attitude, and practice of NRM.

RESEARCH HYPOTHESES

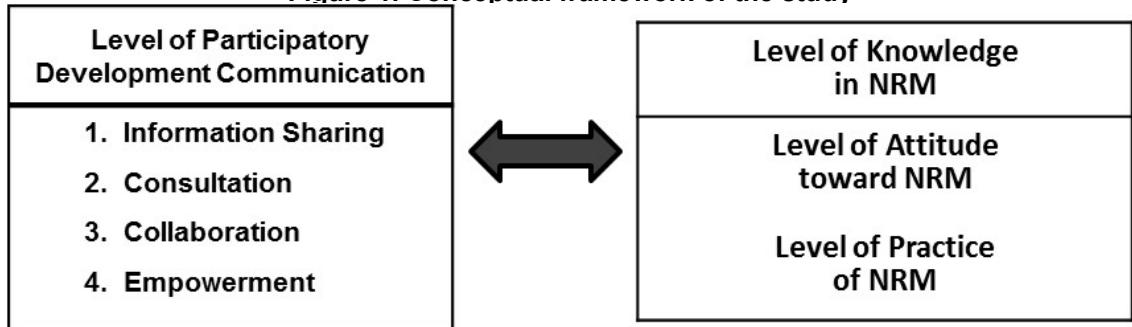
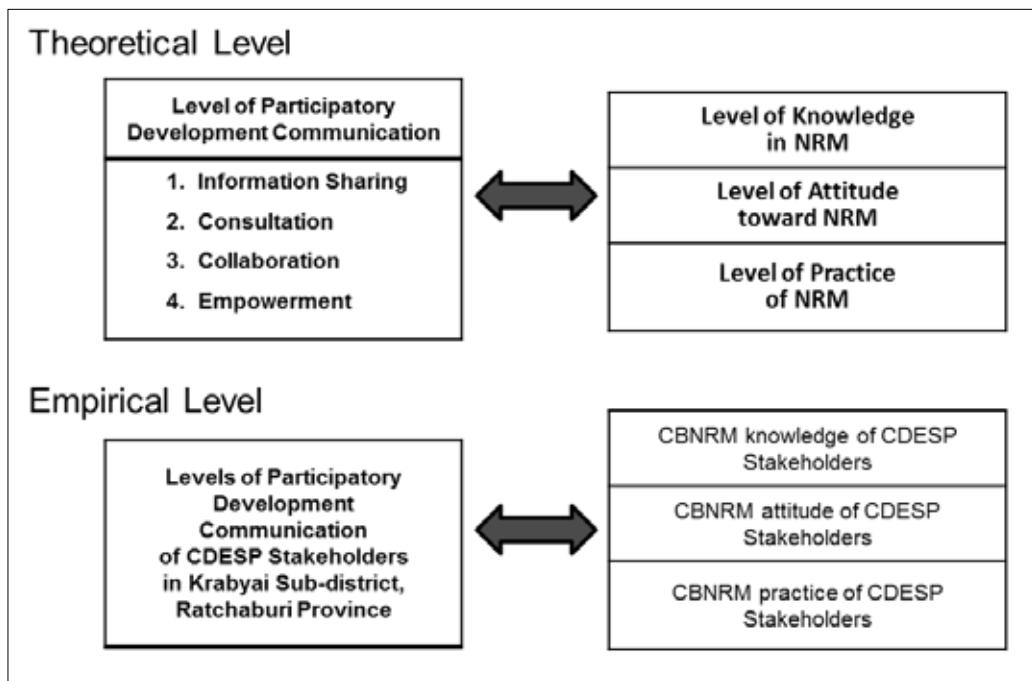
In the relationships of the variables outlined in the conceptual model, measures were used to identify the levels of PDC and levels of knowledge, attitude, and practice of NRM. The following null hypotheses were tested:

1. There is no relationship between stakeholders' level of PDC and their levels of knowledge of NRM in Krabyai Sub-district, Ratchaburi Province.
2. There is no relationship between stakeholders' level of PDC and their attitude toward NRM in Krabyai Sub-district, Ratchaburi Province.
3. There is no relationship between stakeholders' level of PDC and their practice of NRM in Krabyai Sub-district, Ratchaburi Province.

Operational Definition of Terms

Level of PDC refers to the process whereby communication variables are utilized by stakeholders working together to achieve common goals using participatory strategies. The various levels of PDC in this study, which were elicited through the story-telling approach, are:

1. Level 1: This assumes no participation among stakeholders. Their knowledge level

Figure 1. Conceptual framework of the study**Figure 2. The study's conceptual model**

on NRM was assessed by asking if they practiced PDC in NRM in Krabyai Sub-district.

2. Level 2: At this level, information-sharing is considered as a one-way communication—people are basically included by informing them about what is being done. The information shared may come from individuals or organizations. The following questions were asked of the stakeholders: What kinds of PDC in NRM were used in

Krabyai Sub-district, Ratchaburi Province? What communications were used in informing the stakeholders about NRM?

3. Level 3: At this level, consultation is primarily one-way communication with stronger emphasis on feedback. Stakeholders in this level provide inputs, but do not have a significant say in the decision-making process. They are allowed to seek advice and validate received information. The following questions were asked: In receiving

the message regarding NRM, did you have a feedback regarding those messages? Did you have other interactions with other stakeholders regarding decisions on NRM?

4. Level 4: At this level, collaboration, pertains to a joint intellectual effort toward achieving a common goal. In this study collaboration is defined as two-way communication supporting open interaction in decision-making—input in decision-making is balanced. Stakeholders were asked if they participated in the decision-making process in NRM.

5. Level 5: At this level, empowerment, concerns the transfer of control over decisions and resources. Basically, this level gives stakeholders the authority to decide among themselves. The question asked at this level was: Were the stakeholders in-charge of the decision-making process in NRM?

Knowledge, attitude, and practice (KAP) in this study is defined based on the KAP Model by Chaffee and Roser (1986).

Knowledge is a set of understandings, and cognitive awareness of “science.” It is also one’s capacity for imagining, and one’s way of perceiving. The degree of knowledge assessed by the survey helps to locate areas where information and education efforts remain to be exerted. Knowledge was measured using a 5-point Likert scale (5=very high, 4=high, 3=moderate, 2=low, 1=very low).

Attitude is a way of being, a position. It generally refers to the respondent’s feelings and perceptions regarding NRM. This is an intermediate variable between the situation and the response to the situation. It helps explain why a subject, given a choice of several responses to a stimulus, would choose one and not another. Attitudes are not as directly observable as are practices; thus it is a good idea to assess them. Attitude was also measured using a five-point

scale (5=very positive, 4=positive, 3=neutral, 2=negative, 1=very negative).

Practice is the observable action of an individual in response to a stimulus. This is something that deals with concrete acts. Practice was also measured using a five-point scale (5=always, 4=usually, 3=often, 2=sometimes, 1=never). The interview guide included questions on the stakeholder’s NRM activities in the community and the frequency of their activities.

METHODS

The study was conducted in Krabyai sub-district in Ratchaburi province which is located in western Thailand. This sub-district is one of the major agricultural areas in Thailand. Its major crops are corn (20%), vegetables (20%), and sugar cane (20%).

The study followed a one-shot survey research design. Complete enumeration was applied for the sampling of respondents. The 43 respondents came from two main groups: 35 farmer-participants from the Community Development for Economic Sufficiency Project (CDESP), which is based in Kasetsart University (Kamphaeng Saen campus); and eight government officers working on NRM in Ratchaburi Province.

A preliminary interview guide was pretested¹ among 10 respondents from the Kamphaeng Saen Sub-district in Nakhon Pathom Province. The results of the pre-tests were used in developing the final semi-structured interview guide used to elicit information from the 43 respondents. The guide contained questions to determine the respondents’ level of PDC, as well as their knowledge, attitudes, and practices of NRM in the Krabyai Sub-district.

A focus group discussion (FGD) was conducted to disseminate the results of the study and develop an action plan to improve

the management of the natural resources in the sub-district. The group was composed of two municipal officers, five extension workers, and six representatives from the respondents.

The data-gathering methods consisted of (1) a review of data and available information about the research site from secondary sources and personal inquiries; and (2) use of personal interview as the primary method of data collection. Consent of the respondents was sought prior to the interview.

RESULTS

Level of PDC in NRM

The five levels of PDC assessed in this study using the interview guide were: no participation, information sharing, consultation, collaboration, and empowerment. Table 1 shows the respondents' levels of PDC in NRM.

Results revealed that all respondents participated in activities related to CBNRM. It appears that the stakeholders, including government agencies working together in NRM, communicate within and among themselves.

In terms of information-sharing (Level 2), respondents often resorted to two-way

communication by means of meetings, face-to-face communication, and letters.

Most of the farmers (51.16%) and half of the government officers (50%) favored consultation (Level 3). They provided inputs or feedback, but did not have a significant say in the decision-making process. They sought advice, aired their concerns, and validated received information.

Collaboration (Level 4) registered the fewest practitioners at 6.98 percent (7 of 51), indicating a need to improve teamwork among the stakeholders. Moreover, it was observed that a top-down approach was used in NRM.

When the stakeholders were asked whether they were in-charge of the decision-making process, only the progressive farmers said that they were actively involved in the process.

As seen in Table 1, consultation (Level 3) is most often practiced by the stakeholders (60.48%). Far second are information sharing (Level 2) and empowerment (Level 5), both at 16.28 percent, followed by collaboration (Level 4) at 6.98 percent.

Apparently, though the farmers are participating in NRM, they do not know how to properly plan and make decisions. Hence, there is a need to strengthen the farmers' collaboration

Table 1. Stakeholders' level of PDC in NRM within the agricultural community in Krabyai Sub-district, Ratchaburi Province

Level of PDC in NRM	Farmers		Government Officers		Total	
	No.	(%)	No.	(%)	No.	(%)
Level 3: Consultation	22	51.16	4	9.30	26	60.46
Level 5: Empowerment	3	6.98	4	9.30	7	16.28
Level 2: Information sharing	7	16.28	-	-	7	16.28
Level 4: Collaboration	3	6.98	-	-	3	6.98
Grand Total	43	100.00				

1 The knowledge level interview guide showed a reliability value of 0.72 after applying the Spearman-Brown method for test reliability. Using the Coefficient Alpha's Cronbach reliability test, the attitude and practice interview guides yielded reliability values of 0.93 and 0.82, respectively.

and decision-making skills (capacity-building) and improve the relationship between the farmers and the government agencies. For instance, the government agencies can encourage farmers to attend meetings on planning and decision-making since the latter are more familiar with the conditions in their communities and their needs.

Knowledge in NRM

Over half of the respondents (53.49%) show high knowledge of NRM (Table 2). This is followed by those with very high (30.23%) and moderately high (16.28%) knowledge.

In general, more than 80 percent of the stakeholders display high to very high levels of knowledge on NRM. However, they still need training or other activities to enhance or reinforce this knowledge. To reiterate the recommendations put forth by Bessette (2006), they can use PDC as a tool for facilitating community participation and development, as well as sharing knowledge needed in such a process.

Attitude toward NRM

Attitude toward NRM was measured using 10 questions. Table 2 shows that most of the answers range from positive (60.47%) to very positive (39.53%).

To successfully manage natural resources, the communities should be involved when formulating rules governing the use, development, and protection of these resources because they are the ones sharing the resources and the ones affected by changes in the rules. The positive to very positive attitudinal responses strongly indicate the respondents' willingness to participate in CBNRM. If properly equipped and empowered, stakeholders will be able to freely share opinions and suggestions, cooperate, get involved in the decision-making process, and take charge of the communities'

NRM activities.

Most respondents put high importance on the following: sharing their opinions, suggestions, and information on NRM; cooperating to achieve the objectives of the organization; participating in different NRM activities to gain more knowledge and skills; taking charge of managing their communities' natural resources; and deciding on what is good for their communities.

Surprisingly, there were seven neutral answers with high percentages especially those on cooperation, participation in resource management activities, and decision-making. Perhaps these respondents (mainly farmers) felt little confidence in managing their communities' natural resources. These neutral responses may be traced to the fact that they had gotten used to government agencies giving them full support, but not the authority to decide for themselves.

All respondents, however, believed that managing their natural resources would improve their lives (positive [39.53%] to very positive [60.67%]).

Practice of NRM

The level of practice in NRM was determined through 10 questions.

Over four-fifths (83.71%) of the respondents said that they either often (46.51%) or usually (37.20%) engaged in CBNRM. Following them are those who always (13.95%) and sometimes (2.33%) engaged in CBNRM (Table 2).

Results show that the respondents 'often' participated in activities (46.51%) and in developing plans (48.83%) for NRM, had comments/recommendations for solving problems on NRM (39.53%), and collaborated with another community member to sustain NRM (30.23%).

Items garnering the most 'sometimes' reply included the following: participation in decision-making (55.81%), regular exchange

of information among community members (51.16%), consultation with other community members about problems on NRM (62.79%), and monitoring and evaluation of NRM activities in the community (67.44). Table 2 shows the importance respondents place in the exchange of opinions and information with other community members. But in actual practice, they did this only some of the time. Data about decision-making consistently show the reluctance of most of the respondents to engage in this activity.

Cooperating in activities conducted for NRM was the only item that received a high 'usually' rating (48.84%). In the results, cooperation to achieve organizational objectives garnered a high positive rating of 48.83 percent. The respondents seem to be a cooperative bunch, which augurs well for implementing projects to sustainably manage the communities' natural resources.

Attending to/taking care of natural resources in the community was also the lone entry that obtained a high 'always' rating (37.20%).

Relationship between PDC and Knowledge of, Attitude toward, and Practice of NRM

The relationships among the variables were analyzed using Spearman's rank correlation coefficient. The results are shown in Table 3.

Stakeholders' level of PDC was correlated with their knowledge of NRM ($r[41]=.9951$, $p<.05$). Thus, the first null hypothesis was rejected. In addition, stakeholders' level of PDC was also correlated with their attitude toward NRM ($r[41]=.9941$, $p<.05$). Thus, the second null hypothesis was rejected. Level of PDC and stakeholders' practice of NRM were also correlated ($r[41]=.9984$, $p<.05$); so the third null hypothesis was rejected.

The results confirmed the assumption in the model used for this study that all levels of PDC are related to or affect the knowledge, attitude and practice of stakeholders concerning NRM. This means that high levels of PDC correspond to high levels of knowledge, attitude, and practice of NRM. The results bolster Bessette's (2006) view that communication is effective in addressing the development challenges of NRM. As earlier mentioned, this requires a

Table 2. Stakeholders' level of knowledge in, attitude toward, and practice of NRM within the agricultural community in Krabyai Sub-district, Ratchaburi Province

	Farmers		Government Officers		Total	
	No.	(%)	No.	(%)	No.	(%)
Level of knowledge of stakeholders in NRM						
Level 4: High	22	51.16	1	2.33	23	53.49
Level 5: Very high	6	13.95	7	16.28	13	30.23
Level 3: Moderate	7	16.28	-	-	7	16.28
Grand Total	43	100.00				
Attitude toward NRM						
Level 4: Positive	25	58.14	1	2.33	26	60.47
Level 5: Very Positive	10	23.25	7	16.28	17	39.53
Grand Total	43	100.00				
Practice of NRM						
Level 3: Often	20	46.51	-	-	20	46.51
Level 4: Usually	11	25.58	5	11.63	16	37.21
Level 5: Always	3	6.97	3	6.97	6	13.95
Level 2: Sometimes	1	2.33	-	-	1	2.33
Grand Total	43	100.00				

Table 3. Summary table of relationships among the stakeholders' level of PDC and knowledge, attitude and practice in NRM using Spearman's rank correlation coefficient analysis

Hypothesis Variables Testing	Σd	Σd^2	df	Sig.
Level of Knowledge on CBNRM	43	65	2	0.9951*
Level of Attitude on CBNRM	50	78	2	0.9941*
Level of Practice on CBNRM	21	21	2	0.9984*

* Significant at .05 level

combination of PDC values, local and modern knowledge in NRM, and communication skills. It must also be mentioned that Cadiz (2006) cautioned against viewing participatory communication in NRM as merely a set of techniques that easily alters people's knowledge, attitudes, and practices. She further explained that there should be voluntary change in people's practices and activities because such changes are likely to be more long-lasting.

Focus Group Discussion

The researchers set up the focus group discussion (FGD) to share the results of the study and develop a plan to improve the use of PDC by two municipal committees. The group consisted of five extension workers and government officers concerned with NRM in the communities of Krabyai Sub-district and six representatives from the respondents.

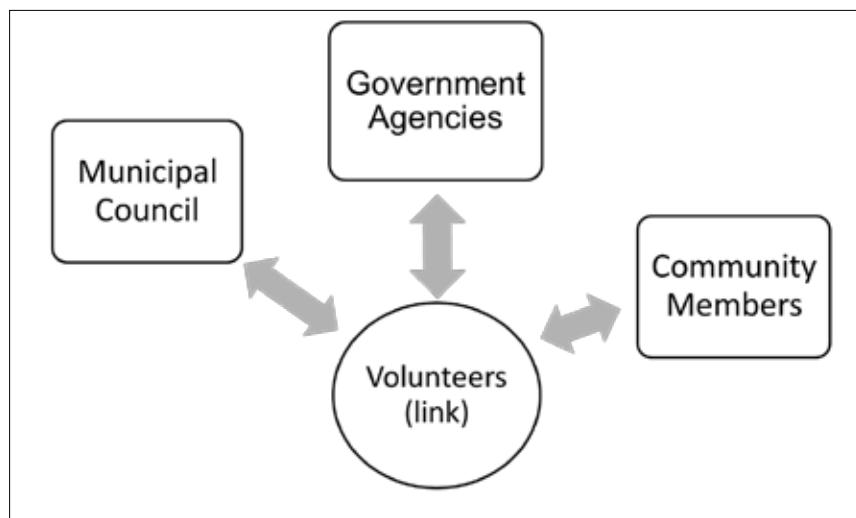
The results of the focus group discussions show that:

1. The identified area will be divided into three zones based on the geography of the community and the crops planted, which will be done to easily manage the zones.
2. The zones are planted to different crops, hence the need for integrated farming and NRM. A cultivation calendar was also developed during the discussion to determine and schedule the activities of the farmers involved.

3. Based on the problems on PDC met by the municipal council, government agencies, and community members, all the participants in the discussion approved the creation of stakeholder linkages. They perceived that the task of effectively promoting participation requires establishing linkage with a broad range of stakeholders since some may not have been part of an organization's traditional networks. In this respect, particular steps should be taken to expand and enhance relations with civil society organizations. The government agencies can also broaden their knowledge of, and relations with, relevant municipal and community members active on the ground.

In line with this, there are strong reasons for incorporating volunteers into NRM practice (Figure 3). First, it helps build organizational strength. That strength comes from a sense of ownership that volunteers gain when they become visible advocates for the association. Second, community members, as member volunteers, are more credible than paid government workers. The community members can discuss peer-to-peer, and they can promote the association because they believe in it. Third, using volunteers extends the resources of an association. Volunteers provide extra hands that enable an association to do tasks and activities that might not otherwise get done. Volunteers also provide valuable input to association leadership and staff.

Figure 3. Proposed approach for collaboration among stakeholders



There are five volunteers from the stakeholders in the communities. They are responsible for the: (1) baseline survey on natural resources and problems, (2) monitoring, (3) collection of data and reporting, (4) cooperation and collaboration, (5) informing and communicating with community members, and (6) meeting and planning.

The volunteers will also serve as links among the government agencies, municipal councils, and the community members. They can also conduct surveys which can add value when they are used to identify development problems or objectives, narrow the focus of the objectives of a policy, plan strategies for implementation, and monitor or evaluate participation. They can express their values in activities that are meaningful. The volunteers have authority to decide and act on NRM in the community.

4. The participants also agreed to make use of another channel with which to communicate with the community members other than personal communication (volunteers). They may publish a newsletter for public relations and information dissemination, hence providing additional knowledge to the

community and its members. The newsletter is excellent for in-depth presentation of issues and specific information. It also can be directed to community members. The design and development of the newsletter will be done in collaboration with media specialists from Kasetsart University, and the community leaders representing the public sector committee. To foster deeper community participation, there should be more projects for public relations in schools in Krabyai sub-district that will allow students to design and develop the newsletter. The members of municipal council will be responsible for public relation in their respective areas.

CONCLUSION AND RECOMMENDATIONS

The study confirmed that community-based natural resources management in the Krabyai Sub district, Ratchaburi Province attempts to address the problems of poverty and natural resources degradation simultaneously even if these solutions are seen as in direct conflict. Thus the objectives of NRM are

pursued through a collaborative process that involves representatives from the community, municipality and government agencies.

The results of this study show that the community should improve and continuously find ways to properly involve and encourage participation from various stakeholders.

The management of natural resources in Ratchaburi province may be characterized as a product of centralized laws and policies by government agencies. The authority to manage of natural resources is granted by government officers.

There is a relatively high correspondence between the conceptual framework adopted and the empirical findings of this study. The results of this study showed that the stakeholders' levels of PDC are directly correlated to their knowledge, attitude, and practice. The study confirmed that as PDC level increased, stakeholders' knowledge, attitude, and practice levels were also likely to increase.

The conceptual framework still stands, but based on the findings of the study, the emphasis must now be placed on collaboration and empowerment. These variables will help strengthen the stakeholders' capacity to carry out PDC in community-based NRM.

The following are recommended:

1. Since the level of PDC significantly contributes to the stakeholders' knowledge, attitude, and practice of CBNRM, there is an apparent need to set up activities on PDC in all involved agencies.
2. There should be more PDC activities in CBNRM, especially those that will increase the level of practice.
3. Government workers should be given more opportunity to apply PDC. Increasing the PDC level, as well as the level of knowledge, attitude, and practice of NRM will result in production effectiveness and promotion of proper management of natural resources.

4. The government should create communication policies anchored on PDC in NRM to lessen the financial cost of alleviating future environmental disasters.

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