

An Important Gap between the Awareness and Practices of Rural People in Sustainable Development: A Case Study of Minbu and Bogalay

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Abstract

Since the 1990s the word "sustainability" became popular in all academic disciplines. With the acceleration in usage of the word sustainability, the public awareness became popular. Many academic publications and government movements are related to public awareness. However, there are still a gap between awareness and actual practices of people. Due to this gap, although people are aware about some negative impacts of their action, they usually carry on conducting or hesitate to conduct something that has positive impact. This paper tried to find out the factors that make differences between awareness and practices from two different case studies (Minbu and Bogalay) by means of structured interviews and open talks to the villagers. The result of this study show that acquired information of the people changed into awareness with the combination of individual's knowledge level. Many acquired information do not actually reach into the level of awareness. In next stage, awareness has to pass through individual's situation (three filters: social, economic, and cultural filters) and environmental conditions (institutional and physical facilities/constraints). Due to different combination of above three individual internal factors and two external environmental factors gaps are occurred between awareness and practice of people in concern with sustainable development.

1. Introduction

Since 1990s the word "sustainability" became popular in all academic disciplines. With the acceleration in usage of the word sustainability, the public awareness became popular. Many academic publications and government movements are related to public awareness. However, there are still a gap between awareness and actual practices of people. Due to this gap, although people are aware about some negative impacts of their action, they usually carry on conducting or hesitate to conduct something that has positive impact. This gap should be related to both external environment and internal factors of individuals. By examining this gap it is possible to find out the way to attract more people to participate in the environmental conservation and sustainable development.

Before starting our study we propose a model of awareness and practice (Fig.1). In Random House Webster's Dictionary awareness is defined as "having knowledge" or "conscious". It is different from information that is just stated what is what. Practice means "the action or process of performing or doing something". We assume that people acquired information through various media or social contact with other people. In this information stage individual's knowledge is not much involved. Some people accept information as it is while other wiser people verified their receiving information with their existing knowledge. This verification and acceptance belonged to reasoning process. Then, received information becomes awareness with the combination of individual knowledge. Thus, awareness is more fixed and recorded than information in the mind of individual.

All people could attain this awareness level if they have information and certain knowledge. Then, some people tried to practice in accordance with what they are aware of and others not. Before practicing one's awareness some constraints must be pass through. These constraints could be divided into internal and external factors. Internal constraints include cultural, social and economic filters. External environment constrains include physical and institutional facilities.

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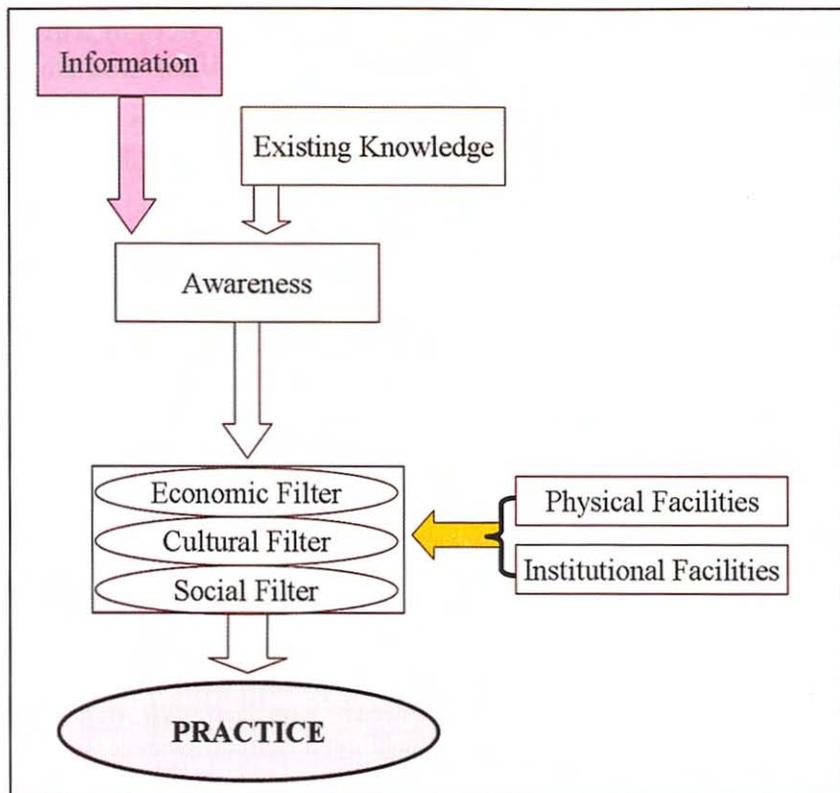


Figure 1 Conceptual framework of relationship between information and practice

2. Geographical Background of Study Areas

To test the above concept, two case studies were selected from Myanmar. The first case study area is located in Dry Zone Area of Myanmar. Greening projects are implemented in this area both with the internal and external aids. Major tasks of the project are replanting of forests and limitation of existing forests usage. On the other hand, the major causes of forest depletion are also considered. Increasing population is one of the major factors causing forest depletion in the area. With increasing population, usage of firewood increased in rural areas. To mitigate these problems, both government and NGOs tried to reduce firewood usage by means of alternative energy and by means of using energy saving stoves. The study area (Ywartharyar village) is located near the major fuel saving stove plant in Minbu Township (Fig. 2). The plant was established in 1999 and started production in 2000. Nearly all workers of this plant are commuting from the study area. Just after the start of production, fuel saving stoves was distributed to Ywartharyar Village with the help of authority concerns. In this study the actual usage of fuel saving stove was considered as practice to find out the constraints that caused gap between fuel saving stove users and traditional tri-brick stove users.

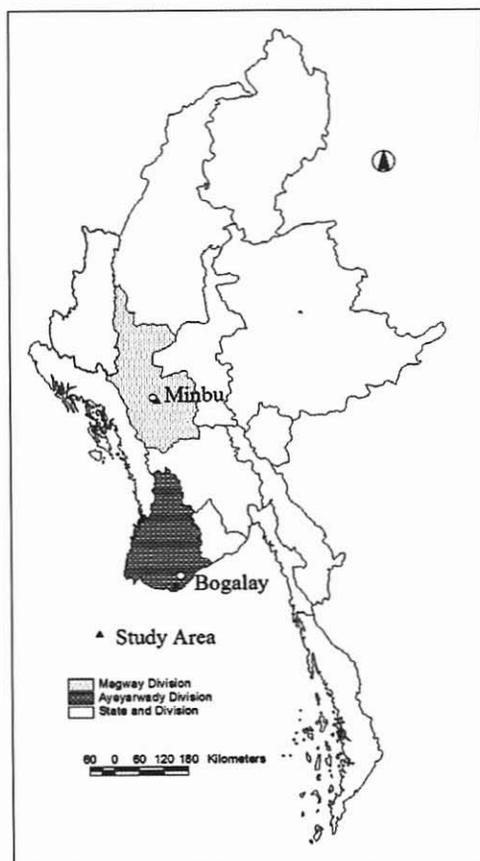


Figure 2 Location of study areas

Source: Department of Geography, Yangon University.

Second case study area is located in the area of reforestation in Bogalay Township (Fig. 2). Mangrove forests are depleted in Ayeyarwady Delta during the last three decades due to over exploitation for firewood and charcoal. In place of depleted forest encroachment of farmlands due to increasing population on limited resources was observed. With the farmland encroachment depleted mangrove forests were totally wiped out. Newly expanded farmlands could yield paddy for about 4 years above minimum level (about 35 baskets per acre). Then, it is faced with crop failure due to salt water extrusion from below. Since 1999, Forest Resources Environment Development and Conservation Association (FREDA), a non-government organization started reforestation project in cooperation with Forest Department. They give incentives and aids for the forest user group members (CF members) who established community forestry on their lands by growing mangrove forests. This program includes both knowledge sharing to people and organizing people to expand Community Forest (CF) area and its sustainability (FREDA, 2003). Success to the certain extent is seen. In this paper, CF member and non-CF members (especially villagers who own farmlands and not involved in CF project) were interviewed to find out the gap that make differences between awareness and practices.

3. Awareness and Different Stove Usage: A Case of Ywatharyar Village

Fuel saving stove plant was established by Myanmar Myay Ceramic Industry Co. Ltd. near Ywatharyar Village in 1999 and produces and distributes its products throughout the country (especially townships included in Dry Zone). The plant produces both charcoal stove and fuel saving stove (later it will be referred to as fuel saving stove). Charcoal stove is mainly distributed to urban areas while fuel saving stove is distributed to rural areas. Fuel saving stove has many advantages to traditional tri-brick stove. Before distribution of fuel saving stove their usage and cost and benefit were informed through authority concerns by means of information talks in 2001. Since the majority of workers come from Ywatharyar, nearly all villagers know about the advantages of fuel saving stove. Therefore, it could be generally assumed that nearly all households from Ywatharyar Village use this superior quality fuel saving stove at present.

Field survey (checked up to kitchen) results in January 2007, however, shows that only 40 % percent of the households were using fuel saving stove. About 42% of households used traditional tri-brick stove. Self-made stove (for fuel saving) and charcoal stove occupied 7% and 5% of households, respectively (Fig. 3 & Plate 1). Therefore, it is evident that although people were well informed about the advantages of fuel saving stove and they know about it, only some people were actually practicing it. Why does the rest of the villagers not use fuel saving stove? This is our main research question for this case study.

Based on the results of fuel saving stove usage, second field trip was prepared to find out the gap between awareness and practice by means of structured and open interviews conducted to some selected households. Of the total, 164 households (41.1%) are included in the second field observation (Table 1). However, for convenience sake only 73 tri-brick stove users and 70 fuel saving stove users were used in the analysis.

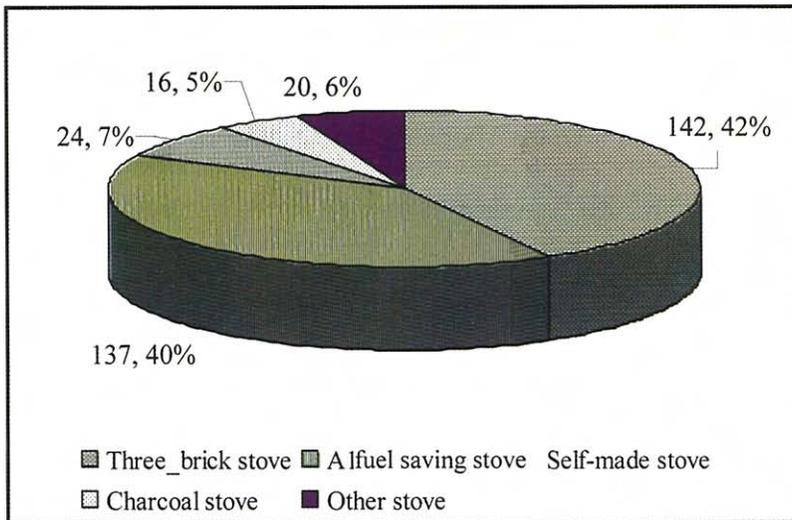


Figure 3 Different usage of stove in Ywatharyar Village, Minbu Township (n = 399)
 Source: Field observation, January, 2007.



A- Tri-brick stove B- Self-made stove
C- fuel saving stove D- Charcoal stove

Plate 1 Different type of stoves using in study area

Source: Photo taken by author in January 2006.

Table 1 Overall stove usage and sample size

	Tri_ brick stove	fuel saving stove	Self-made stove	Charcoal stove	Other stoves	Total
All household	142	137	24	16	20	339
Sample	73	70	2	7	12	164
Percentage	51.41	51.09	8.33	43.75	60.00	41.10

Source: Structured interviews conducted in January, and June 2007.

Interviewees were asked about the information of fuel saving stove that could be absorbed through public information (such as conference, education talks) and informal information (through social contacts) medias and correlate with other socio-economic, cultural, institutional and physical facility factors.

The questions related to individual’s acquired information are as follows:

- Q1. Could fuel saving stove save firewood more than tri-brick stove?
- Q2. Could fuel saving stove reduce cooking time?
- Q3. Does fuel saving stove easily ignite compared to tri-brick stove?
- Q4. Could fuel saving stove reduce the amount of smoke compared to tri-brick stove?
- Q5. Could fuel saving stove reduce frequency of fire out break?
- Q6. Could farm wastes be used in fuel saving stove?

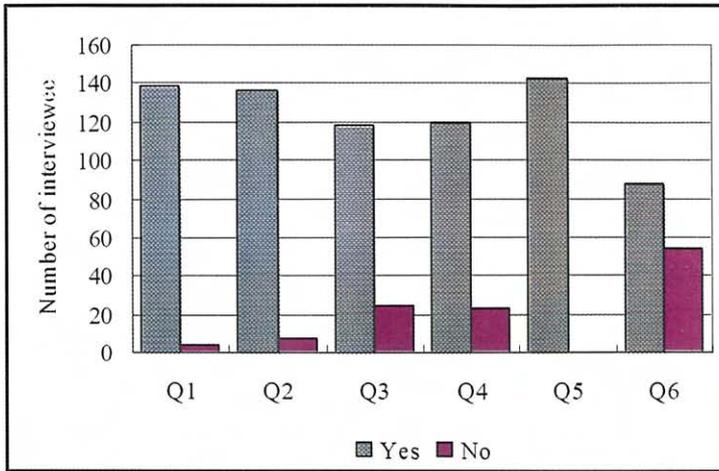


Figure 4 Different responses on information questions

Source: Structured interview, June, 2007. (n = 143)

Note: Please refer to text for Q1, Q2, etc.

Above information are easily absorbed by rural people and do not need to use their existing knowledge or do not need to think much. This information was given to the villagers by means of education talks or through pamphlets distributed to the villagers by the stove plant manager.

In the information questions, nearly all households know and agree on Q1, Q2 and Q5. However, in case of Q3 and Q4, some respondents answered that there was no difference in easiness of ignition or amount of smoke that come out during cooking from fuel saving stove and traditional tri-brick stove. In addition, some people did not think that farm wastes such as remains of pigeon peas and corns were usable as fuel in fuel saving stove (Fig. 4). Therefore, Q3, Q4, and Q6 were further analyzed to know the difference between fuel saving stove users and tri-brick users (Table 2). In case of Q3, fuel saving stove users agreed more with the point that “fuel saving stove is more easily ignited than traditional tri-brick stove”. In case of Q4 and Q6, higher percentage of fuel saving stove users accepted that “fuel saving stove could reduce smoke compared to tri-brick stove, and fuel saving could be used by farm waste”. *Therefore, it is evident that fuel saving stove users acquired more information than tri-brick users. Since they get more information, this information encouraged them to use fuel saving stove. In other case by using fuel saving stove they get more information about fuel saving stove.*

Table (2) Difference in acquired information between fuel saving stove and tri-brick stove users in Ywatharyar Village

	Q3			Q4			Q6		
	Yes	No	Total	Yes	No	Total	Yes	No	Total
Tri-brick user	56 (76.71)	17 (23.28)	73 (100)	57 (78.08)	16 (21.92)	73 (100)	43 (58.9)	30 (41.1)	73 (100)
Fuel saving stove user	62 (88.57)	8 (11.42)	70 (100)	63 (90.00)	7 (10.00)	70 (100)	45 (64.29)	25 (35.71)	70 (100)

Note: Within the parentheses are percentages.

Source: Structured interview, June, 2007. (n = 143)

Secondly, people were asked about the awareness of the consequences of different stove usage. These questions could be answered ‘Yes’ only if they combined the information with their individual knowledge. When the questions were asked the relationship or process of cause and effect involved in awareness was omitted. Then, the person who answered “Yes” was further asked with the successive question of “Why?” to verify their real awareness. If one could not give proper cause and effect relationship answer we counted as “No” even though a person answered awareness questions as “Yes”. The same procedure was applied to all awareness questions. Awareness questions are as follows:

- Q7. Have you ever thought that the use of fuel saving stove could reduce health hazards?
- Q8. Have you ever thought that the use of fuel saving stove could reduce forest depletions?
- Q9. Have you ever thought that the use of fuel saving stove could improve the climate of your village?

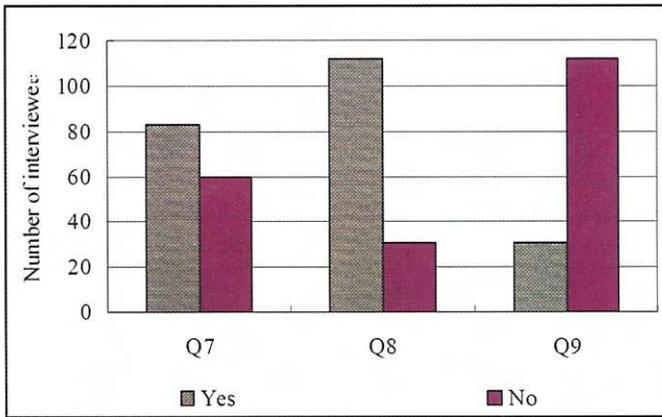


Figure 5 Different awareness level by different stove users in study area
 Source: Structured interview results (June, 2007).

Concerning Q8 people recognized fully that the use of fuel saving stove could reduce forest depletions because they are currently facing with scarcity of firewood and rising price of firewood due to forest depletion. Q7 and Q9 are directly related to their family’s socio-economic conditions. They, however, do not fully recognize these points. It reveals that although people received information, only part of it become awareness in combination with individual’s knowledge and direct experience they are facing. In case of Q9, the cause and effect relationship is that use of different stove could result in different forest depletion since fuel saving stove could reduce firewood requirement up to 40 percent. Presence of forests could balance the too extreme climatic conditions. Thus, forest depletion could subsequently generate climate change and have an affect on their village. Therefore, it is not only information but individual’s knowledge and power of rational thinking which is essential to become awareness. As a result, only some people actually used to think this point.

Then, it is worthy to analyze how different stove users respond to these questions (Table 4). In case of family’s health hazard (Q7), fuel saving stove users was more aware than tri-brick stove users. Only 49.31 percent of tri-brick stove users are aware of the health hazard generated by different stove type while 67.14 percent of fuel saving stove users recognized it. So the percentage of fuel saving users is higher in amount concerning health hazard awareness. In case of Q8, fuel saving stove users (88.57%) accepted the point of forest depletion will be

reduced by using these stoves. While only (68.49%) of the tri-brick stove users accepted this point. In addition, concerning with climate change fuel saving stove users was more aware of it than tri-brick stove users. More than 27 percent of fuel saving stove users recognized that climate change could occur by usage of different stove type, while only 13.7 percent of traditional tri-brick stove user is aware of it. *Therefore, it could be concluded that the awareness is also different between the different stove user groups and fuel saving stove user group are more aware about the environmental consequences of different stove usage than tri-brick stove user group.*

Table 4 Different answer to awareness question by different stove user group

	Q7			Q8			Q9		
	Yes	No	Total	Yes	No	Total	Yes	No	Total
Tri-brick user	36 (49.31)	37 (50.68)	73 (100)	50 (68.49)	23 (31.51)	73 (100)	10 (13.70)	63 (86.3)	73 (100)
Fuel saving stove user	47 (67.14)	23 (32.86)	70 (100)	62 (88.57)	8 (11.43)	70 (100)	19 (27.14)	51 (72.86)	70 (100)

Source: Structured interview (June, 2007).

Note: Values within parenthesis are percentages.

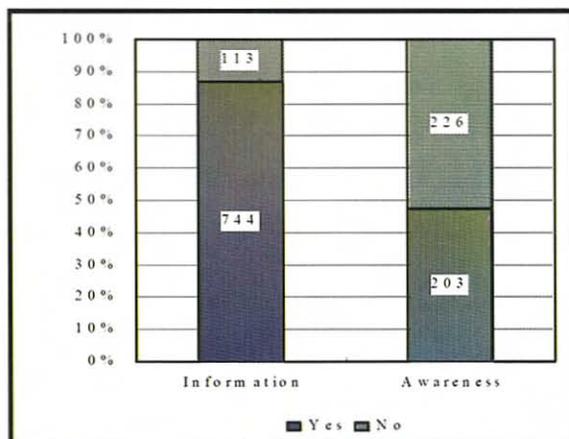


Figure (6) People's different absorption between information and awareness

Source: Structured interview (June, 2007).

In general, only some information received by means of formal and informal channels could reach to the stage of awareness. Figure (6) shows that in stage of information more than 87 percent of people accept it. Then when it is changed into awareness only 47 percent of the people could generate it.

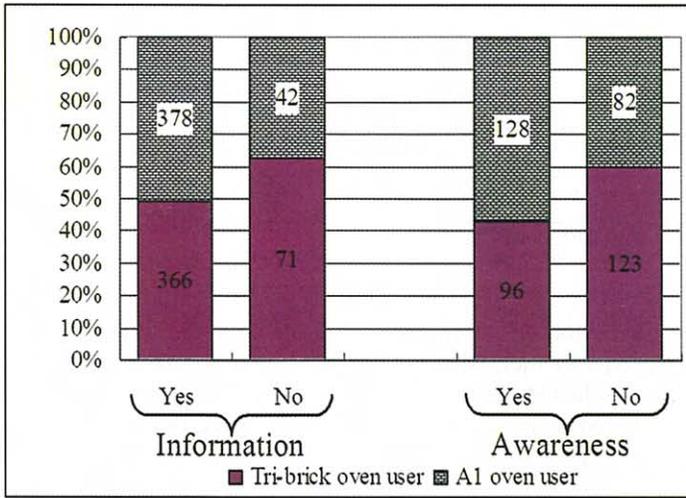


Figure 7 Difference information acquired and awareness between fuel saving and tri-brick stove user groups
 Source: Structured interview (June, 2007).

Since there are differences in acquired information and awareness between fuel saving stove user and traditional tri-brick stove users it could be considered that *“information and awareness also generate different practice and practice could also make different awareness and information”*.

Perception of people

People’s perceptions on different stove usage are questioned to counter check the difference between different stove users. The perception questions are as follows:

- Q11. How many house among your 10 neighbouring house use fuel saving stove?
- Q12. Have you ever thought that your village could be faced with firewood problem in the near future?
- Q13. Choose two types of stoves giving first and second priority not worrying about cost?

Q11 was asked to understand whether individual’s living environment (culture) could have an influence on different stove usage or not. Although the number of people using fuel saving stove based on 10 was asked in the question, the results were changed into percentages for convenience of comparison. Not surprisingly, fuel saving stove users perceives that more people are using fuel saving stove in their neighborhood than other stove types. From the response of fuel saving stove users 85 percent of the households in their surrounding are using fuel saving stove while tri-brick stove users perceive only 70 percent. In addition, although average value of fuel saving stove user is greater than tri-brick stove, the standard deviation value is smaller in case of fuel saving stove users (Table 6). It means that among the tri-brick stove users some people think that many households from their neighborhood are using fuel saving stove while others think that many people in their neighborhood are using tri-brick stove like them. Thus, from the former group it can be concluded that *cultural aspect could have an affect on the practice to a certain extent*. The latter group represents that except from cultural aspect other factors are also involved to become a practice.

Table 6 Perception of people that use different stove type

	Perception*	
	Average	SD
Tri-brick stove user	70.0	23.0
Fuel saving stove user	85.0	19.0

Source: Structured interview (June, 2007).

Note: * Perceptions are based on the question that how many percentages of people in your surrounding are using fuel saving stove?

The second perception question is related to the point that if people are not necessary to worry about cost and type of fuel, what type of stove will be used? It is interesting that many fuel saving stove users selected fuel saving stove, tri-brick stove and charcoal stove while tri-brick stove users preferred charcoal stove and tri-brick stove in their priority. Therefore, it is evident that fuel saving stove user actually knew the advantage of fuel saving stove and its environmental impacts through their practices compared to traditional tri-brick stove users. Therefore, even if they have a chance to select stove freely without considering cost, majority of them would select fuel saving. On the other hand, tri-brick stove user selected tri-brick stove from their familiarity and rejected fuel saving for its fragility (easily broken). Nearly half of the tri-brick stove users answered that they had used fuel saving stove before. But it was broken and have not yet bought a new one.

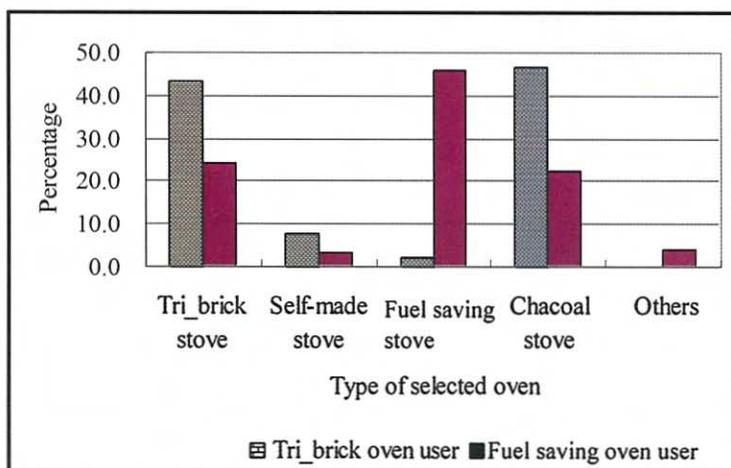


Figure 8 Preference of different stove users

Source: Structured interview (June, 2007).

Different socio-economic and stove usage

Generally it is assumed that socio-economic conditions of the individuals are important in practicing something. Although one knows that it is good to do something he/she could not practice because his/her economic and social situations do not allow to practice. Therefore, it is worthy to examine this aspect.

Table (8) shows the difference of socio-economic conditions between two groups of stove users. Family size, employment rate and per capita expenditure are used to represent socio-economic conditions of people. Some people urged that fuel saving stove is relatively

small and not suitable for large family for those who have to cook by using large utensils. Other urged that fuel saving stove is broken only if boiling rice brew fall into the stove while it is still hot. From the structured interview it is understood that some families with 8 to 10 members are also using fuel saving stove. Therefore, *Family size does not matter with different stove type usage*. Fuel saving stove users actually has even larger families than tri-brick stove users.

In case of employment rate fuel saving stove users has more employment rate than tri-brick stove users. It means that families with more economic convenience use more fuel saving stove than tri-brick stove. It is also proved from the per capita expenditure of different stove users. Although it is more effective and directive to represent economic conditions of people by means of per capita income, it is difficult to get such data for two reasons: afraid of imposing tax on interviewees, and people simply never calculated their income. Thus, average daily expenditure of a family was asked before calculating PCE by dividing family number and multiplying by 30 days. From the Table (7) it was evident that *fuel saving stove users has better economic conditions than tri-brick stove users*. Average per capita expenditure of fuel saving stove user is 17364 Kyats while tri-brick stove user expense 16980 Kyats per head. Some people give cost of stove as a reason for not using fuel saving stove. One fuel saving stove cost only 800 Kyat if it is bought from the plant located near the village. The cost will turn to benefit within 3 months by reducing the cost for firewood. But many households do not think up to this level. Many households using tri-brick stove also mentioned that once or up to very recently they had used fuel saving stove and at present they could not use it since it is broken. It is not necessary to worry about outbreak of fire during the wet season, hence many household used tri-brick stove again.

Table 7 Different social economic conditions and stove usage

	Family size (No)		Employment rate (%)		PCE (Kyat)	
	Average	SD	Average	SD	Average	SD
Tri-brick stove user	4.83	1.73	55	21.40	16980	5678.42
Fuel saving stove user	5.06	1.78	58	21.85	17364	6018.52

Source: Structured interview (June, 2007).

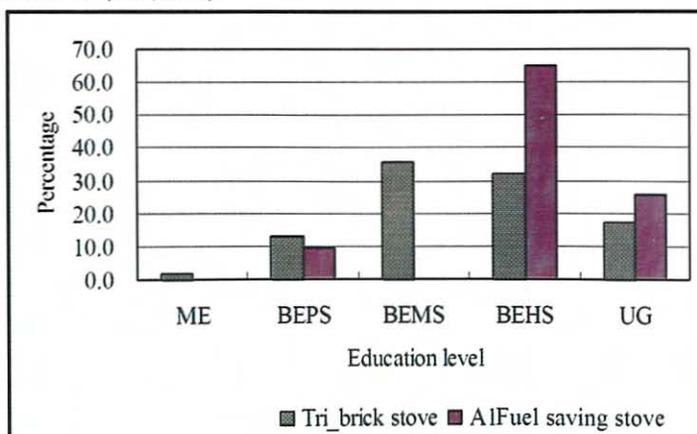


Figure 8 Education and different stove usage (N= 139)

Note: BEPS- Basic Education Primary School; BEMS- Basic Education Middle School; BEHS- Basic Education High School; UG- University Graduate

Source: Structured interview (June, 2007).

Knowledge, awareness and practices seemed to be related to the level of education. As mentioned in the research framework information does not become awareness when it is not combined with existing knowledge. Figure (9) shows variation of education level by different stove users. Most of the fuel saving stove user households has Basic Education High School and University Graduate Levels in their family while tri-brick stove users have various education levels. Therefore, it is fair to conclude that education level is also important in usage of different stove type.

Institutional and physical facilities

Although fuel saving stove had many advantages for both present and future sustainable socio-economic development of study area, institutional framework was relatively weak. Only when the plant was established, fuel saving stoves was distributed at 300 Kyats through authority concerns by one fuel saving stove per family basis. Since then, the encouragement for using of fuel saving stove was not made. In addition, authority concerns check the systematic usage of fire for cooking during summer and winter, to prevent fire out break. Fine for cooking before or after limited time is very high. If the stove is hot when authority concern checked it is valid to fine the family. Thus, many people pour water before the limited time to prevent themselves from punishment. It is one major reason for broken fuel saving stove. In addition, there is no formal information distribution about the advantages and manual guide of fuel saving stove. People were asked about the way of getting information for fuel saving stove. About 70 percent of surveyed households get fuel saving stove information by social contact while nearly 30 percent of household attended education talks in the administrative office of the village or in the stove plant. Therefore, it is clear that *the information distributions and education training from the institutions are no sufficient for usage of fuel saving by all villagers.*

Although institutional facilities are not too strong enough to encourage practice, physical properties of fuel saving stove is superior in various aspects except in its fragility. Thus, many wise and well aware people use fuel saving stove without institutional facilities or rule and regulation reinforcements. In addition, although design of the stove is economically superior, physical properties is weak to attract all villagers. Thus, when fuel saving stove is broken, people do not buy the new one at once. Therefore, physical properties of fuel saving stove have two aspects for practices. Its superior qualities enabling firewood reduction, smoke reduction, etc. encouraged people to practice it. On the other hand, fragility of fuel saving stove reduces people from using it.

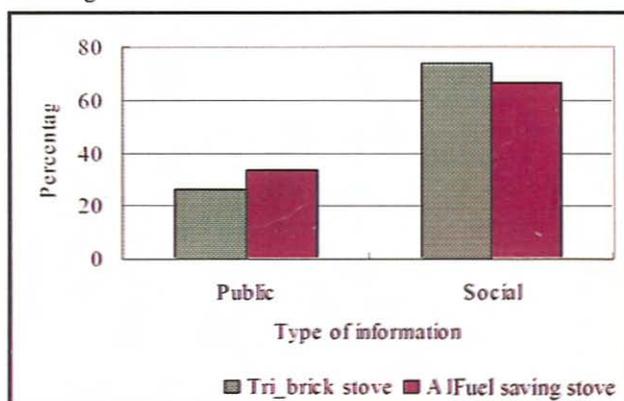


Figure (9) Major information sources of fuel saving stove for different oven users

Source: Structured interview (June, 2007).

Information, awareness and practice in Ywatharyar Village

From the analysis of different environment (institutional facilities) and individual constraints (socio-economic and cultural conditions) between fuel saving and tri-brick stove users following points can be concluded.

- (1) Information acquired by two different stove user groups is varied and fuel saving stove users have more information acquired than tri-brick users. It is because they could get more information and the information encouraged them to use fuel saving stove or by using fuel saving stove, they get more information about fuel saving stove.
- (2) The awareness is also different between the different stove user groups and fuel saving stove user group have more awareness about the environmental consequences of different stove usage than tri-brick stove user group.
- (3) Fuel saving stove users has better economic conditions than tri-brick stove users although they have relatively large families.
- (4) Cultural aspect looking from the living environment also reveals effectiveness on stove usage. If it is fuel saving stove using environment, more people living around it will use fuel saving stove.
- (5) Although institutional facilities are not too strong enough to encourage practice, physical properties of fuel saving stove is superior in various aspects except in its fragility.

4. Awareness and people participation in reforestation: A case study of Tebinseik Village Tract, Bogalay Township

The second study area is located in delta area of mangrove forest. As mentioned before reforestation works were carried out by the FREDA in the area. Since 1999 the area of mangrove community forest (CF) and number of household participating in the program have gradually increased. Up to 2006, CFs were established in 12 villages with 469 members and cover a total area of 2695.5 acres (1090.8 hectares) (Fig. 10). Of the 12 villages, Okpo-kwinchaung, Tebinseik, and Wagone Villages were selected as case study. These three villages also fall into the Tebinseik Village Tract. Twelve people from Okpo-kwinchaung (7 CF members and 5 Non-CF members), 24 people from Wagone (16 CF members and 8 Non-CF members) and 13 people from Tebinseik (6 CF members and 7 Non-CF members) were interviewed by means of convenience sampling method to get data.

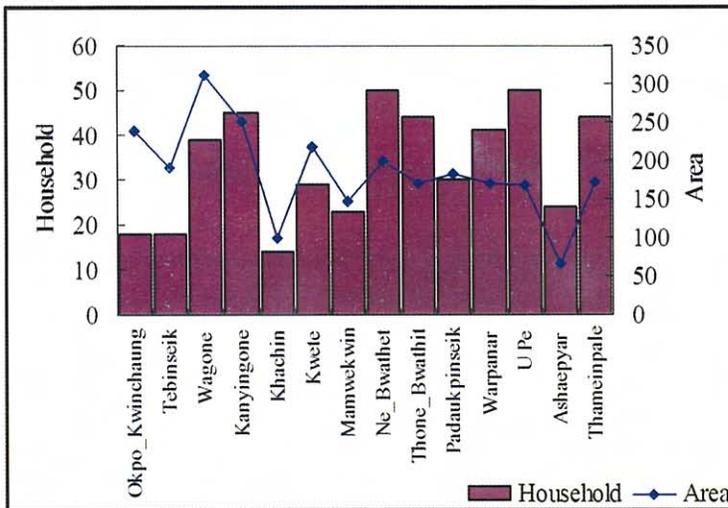


Figure 10 Number of household involved in CF and forest replanting area by FREDA
 Source: FREDA (1999 to 2006)

Information about the extraction of timber and firewood from their forest are omitted in the question since people definitely know about it. Thus, only two following information questions related to their direct economic benefit were asked.

Q1. Do you know that honey and traditional medicines could be collected from mangrove forest in addition to firewood and timber?

Q2. Do you know that some kinds of tree from mangrove forest could be used to feed cattle?

All the above mentioned information is well defined in the pamphlets issued by FREDA and people also experience those events in their environment. Therefore, it should be assumed that all people have already had this information in their mind. The actual answers are shown in Table (8). In average 65.5 percent of CF member know these two informations while 52.5 percent of Non-CF member know it. For Q1 nearly 80 percent of people know it while only about 40 percent of people know Q2. Some people urged that there is no tree that could be eaten by cattle while others answered that some plants such as *Thame* and vines such as *Byike* are eaten by buffalos. Therefore, even in information stage some information is difficult to reach people’s mind. It is evident from the point that some people answered “Yes” in the first question. But when we continued with question of “What kind of trees are eaten by cattle?” they could not answer.

There are differences in getting of information between two groups of peoples: CF member and Non-CF members (Table 8). In both Q1 and Q2, CF member responded more “Yes” answers than Non-CF members. It is because all CF members have attended many education talks about mangrove forest sponsored by FREDA.

Table 8 Difference in information receiving between CF and Non-CF members

	Q1			Q2			Information Total		
	Yes	No	Total	Yes	No	Total	Yes	No	Total
CF member	25 (86.2)	4 (13.8)	29 (100)	13 (44.8)	16 (55.2)	29 (100)	38 (65.5)	20 (34.5)	58 (100)
Non_CF member	14 (70.0)	6 (30.0)	20 (100)	7 (35.0)	13 (65.0)	20 (100)	21 (52.5)	19 (47.5)	40 (100)

Source: Structured interview (June, 2007).

Awareness of the people

Awareness of the people is examined with more difficult questions that need to combine acquired information with individual's knowledge. Following questions are asked to both CF and Non-CF members.

- Q3. Have you ever thought that mangrove forest could protect your village from storms and tides?
- Q4. Have you ever thought that mangrove forest could protect your village's embankment erosion?
- Q5. Have you ever thought that presence of mangrove forest could generate marine resources (fish, prawn, and crab)?
- Q6. Have you ever thought that presence of mangrove forest could persuade birds and other wild animals?
- Q7. Have you ever thought that establishment of mangrove forest could eventually lead to eco-tourism?
- Q8. Have you ever thought that presence of mangrove forest could prevent Tsunami?

The summarized results showed that nearly all interviewees answered "Yes" to Q4, Q5, and Q6 from their experience and knowledge. Embankment erosions occurred in the tidal creeks where mangrove forests are absent (Photo 2). In addition, nearly all interviewees experienced the period before the forest depletion from their age. They said that there are many large animals like tiger, deer, and wild-pig in the forest before the depletion of forest. In addition, mangrove traps sediments and provide many places for crabs, jelly fish, sponges, fish and prawn (Enger and Smith, 1992). With the wiping out of forest all the above mentioned wild animals were gone. According to CF member, wild-pig and deer are found again in the replanted mangrove forest recently. Therefore, people are well aware of it. Therefore, further analysis was made only for Q3, Q7, and Q8 and Q4, Q5 and Q6 were omitted.

Table 9 Difference in awareness of different people

	Q3			Q7			Q8		
	Yes	No	Total	Yes	No	Total	Yes	No	Total
CF Member	26 (89.7)	3 (10.3)	29 (100)	15 (51.7)	14 (48.3)	29 (100.0)	16 (55.2)	13 (44.8)	29 (100)
Non_CF Member	20 (100.0)	0 (0.0)	20 (100)	6 (30.0)	14 (70.0)	20 (100.0)	6 (31.6)	13 (68.4)	19 (100)

Source: Structured interview (June, 2007).

In case of Q3, all Non-CF members answered that mangrove forest could protect their village from storms and tides (Table 9). But 3 CF members answered that they simply did not think about tide and storm and simply participate in CF since their own land are not useful for paddy cultivation and other land use.

In case of Q7, the basic idea of FREDAs is that if mangrove forests are replanted in large area, its ecosystem will be created again with various animals, birds, and fishes, etc. Then, it could become a place for doing research and place for people who want to take rest in the natural environment. In this stage local people will benefit by serving many service sectors such as accommodation, meals, and local handicrafts, etc. However, many interviewees did not think about their future economic development based on ecotourism. Among the interviewees, however, CF members have more awareness (51.7%) than Non-CF members (30.0%) due to their acquired information and FREDAs well informed programs.



Photo 2 Protection of embankment erosion by mangrove trees in Tebinseik Village (Although residential areas were eroded by the tidal wave in the left-front, the area located in the back central part of photo was protected by presence of *Thame* trees)

Source: Taken by author, June, 2007.

Although large Tsunami occurred in December 2005 and it had not severely affected the study area and many people got the information from it. However, Q8 is related to the positive impact of mangrove forest in protection of village from Tsunami wave. Although they know about the benefits of mangrove forest and nature of Tsunami Wave, many people could not correlate these two events. Of the respondents, more percentage (55.2%) of CF member are aware this relationship while only 31.6 percent of Non-CF member recognized it.

In general, *awareness about the natural environment and ecosystem are varied between the CF member group and Non-CF member group* (Fig. 11). CF members were well informed by FREDA and actually by participating in the reforestation activities. As a result, they were more aware about cost and benefit of mangrove forest than Non-CF members.

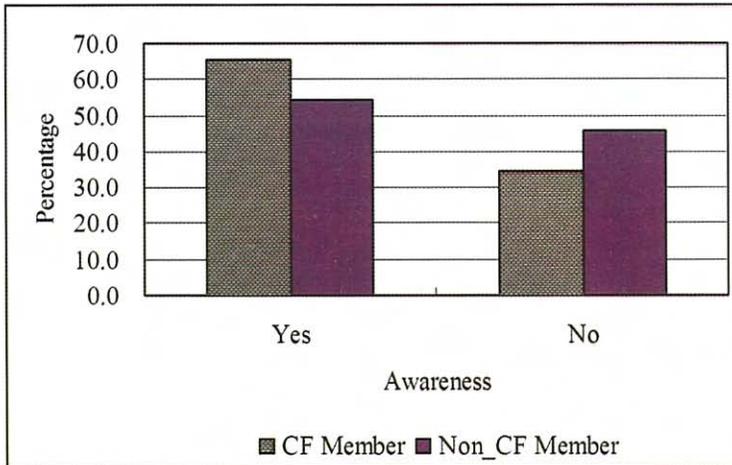


Figure 11 Different awareness between CF member and Non-CF member
 Source: Structured interview (June, 2007).

Socio-economic conditions and reforestation

To examine the role of individual’s socio-economic conditions in the practicing of awareness, respondents were asked about their family size, number of employed persons, monthly expenditure of household, etc. Then, it was calculated into employment rate, per capita expenditure, etc.

CF members have larger family size with lower employment rate than Non-CF members. From the value of standard deviation, it is also evident that although Non-CF member have smaller family size they are composed to both large and small families. From the interviews, it is understood that large family have many working member and they have well economic conditions while they possess large area of farm land or garden or *Dhani* garden. Small families of Non-CF member are generally poor and are engaged in fishing job.

Average value of PCE reveals that CF members expense more money than Non-CF members. In addition from the standard deviation values, CF members are composed of two levels: people who have many alternative economics rather than CF; and people who have to rely on casual job for their family (Table 10).

Table 10 Difference of socio-economic condition between CF and Non-CF members

	Family size		Employment rate		PCE	
	Average	STD	Average	STD	Average	STD
CF_Member	5.7	1.8	42.4	23.5	21049	12504
Non_CF Member	4.8	2.2	62.4	31.7	20329	8417

Source: Structured interview (June, 2007).

There are differences among the CF members in three villages. Majority of CF members from Tebinseik and Okpo-kwinchaung Villages are richer than CF members from Wagone Village. They have many alternative jobs as a wholesaler of crab and prawn, and/or running many acres of farmland and/or *Dhani* garden and coconut garden. It's location as an administrative unit also permits Tebinseik Village to develop many alternative jobs. Okpo-kwinchaung is a place where charcoal works had thrived in the early days. Although people from this village are not rich compared to Tebinseik Village they have alternative jobs.

Institutional facilities, physical facilities and reforestation

The physical environments also encouraged the changing occupation pattern of study area. In case of Wagone, present CF growing area was dense mangrove forest in the 1970s. With excessive extraction of timber and charcoal the forest had depleted. Then, farmlands expanded on the depleted forest and mangroves were totally wiped out from the roots. In this farmland expansion process embankment that prevented the intrusion of salt water play a vital role. However, the dispute occurred between farmers and fishermen cooperative for area of fishing and farmlands in Wagone Village in the early 1980s. The fishermen cooperative had got the right and farmers have had to break the embankment for the fishermen. Therefore, salt water intruded into the farmlands and the farmers could not grow paddy on their land since then. Although they possess their land they could not grow paddy due to low yield per acre.

Above wastelands (more than 300 acres) became usable for mangrove forest plantation when FREDa started reforestation project in 1999. At that time all people who had their own unproductive land participated in CF. Thus CF area of Wagone is more than 300 acres as a continuous forest. The CF member, however, are mainly engaged in coconut garden and generally received lower income than people from other two villages. In addition, more than half of the households in the village became CF members. In this situation they relied on the technology and capital aids of FREDa and relied on their own forest for the future. Therefore, Wagone Village became a model for the successful CF case in mangrove reforestation project.

On the other hand, CF members from the Tebinseik and Okpo_kwinchaung are relatively richer than people from Wagone Village. When CF started by the initiative of FREDa some people who have un-used farmlands due to salt water intrusion participated in the project. Many of them, however, have many alternative economies at that time. Therefore, although they changed their un-used land into forest area they are not interested on the aids of FREDa and do not care their forest. In addition, since percentage of CF members in Tebinseik Village is much lower than Wagone Village, it has some difficulties in protection of their CFs. Due to having many alternative jobs CF members seldom visit their forest and maintain the forest properly. CF members of Okpo-kwinchaung Village have same phenomena as that of Tebinseik Village. According to interviews, there are many Non-CF members who own farmland with yield less than 35 baskets per acre. Actually, the yield is less than profitable

margin. However, they have no intension to change their farmland or unused land into CF because they have many alternative economies. *Therefore, it could be considered that physical limitation of paddy filed encouraged farmers to participate in the mangrove reforestation project.*

From the interviews it is found that some illegal cutting occurs in the forest owned by Tebinseik Villagers very recently. FREDa and Forest Department take action against persons who conducted illegal cutting. Some Non-CF members urged that they want to change their land to CF if the yield per acres is less than 30 baskets. They said that instead of leaving their land unused it is reasonable to take protection of their naturally recovered mangrove under CF. Their reason is that although some mangrove forests are naturally grown in their long unused farmland, other villagers cut it for firewood and they are not in the position to prevent them from cutting, so if it is changed into CF it is not necessary to worry about protection (Photo 3).

FREDa also gave annual support to CF members for maintenance of mangrove forest by means of capital and material. This is another point that CF is relatively successful in Wagone (Photo 4). Since institutional facilities are very strong in terms of rules and regulations and various aids and technology transfer and educational training, many villagers participated in the reforestation project. Table (11) shows the difference in participation of different groups in education talks. It is evident that CF members have participated in education talks more than 7 times while Non-CF member participate only 2.2 times in average. It is also revealing the role of institutional facilities for the people participation because all education talks were sponsored by FREDa which is held in many places.



Photo 3 Community mangrove forest protected by rules in Tebinseik Village.

(In the right hand side, it is a signboard announcing that it is a property of FREDa project, and wood cutting, cattle ranching, forest firing, and settling are prohibited; if it is conducted action will take according to existing law by the Forest user group of Okpo-kwinchaung Village and Forest Department.)

Source: Taken by author, June, 2007.



Photo 4 Six year old replanted mangrove forest in Wagone Village

(Replanted mangrove forest need annual cutting of some branches and some trees for well development of the forest; above forest was well maintained and bottom of the trees are lack of weeds and each tree has sufficient space for well thriving)

Source: Taken by author, June, 2007.

Table 11 Different participation rate in education talks

	Average	STD	Sample
CF_member	2.2	1.56	8
Non-CF Member	7.7	5.97	29

Source: Structured interview (June, 2007).

Information, awareness and practice in Tebinseik Village Tract

People’s participation differed in mangrove reforestation project sponsored by FREDA. This different participation was generated by various factors. Information acquirement is the foremost and first step to get people’s participation. Only some people could change the information into awareness. In actual practice level, socio-economic conditions of individual give an important role. Its effect, however, is interesting in case of Tebinseik’s case study. We generally assumed that relatively poor people could not participate in some project due to their economic conditions. In case of our study, however, poverty encouraged people to give attention and to participate in the project more effectively since they are gambling their future on the success of the project. On the other hand, presence of many alternative jobs in the living environment (culture) also hindered people attention and full participation from Tebinseik Village. The most, distinguished fact in the present case study is the role of physical constraints and institutional facilities. It is found that people’s participations are mainly due to these two factors.

Conclusion

Acquired information by the people changed into awareness with the combination of individual's knowledge level. Many acquired information do not actually reach into the level of awareness.

In the second stage awareness has to pass through individual's situation (three filters: social, economic, and cultural filters) and environmental conditions (institutional and physical facilities/constraints). Personal filters could have both positive and negative impacts on the practices. In case of Ywatharyar fuel saving stove users has relatively higher education level (social) and fuel saving stove users has higher percentage of people using fuel saving stove in their environment. Economic filter is also important since tri-brick stove users are poorer than A1 stove users. In case of Tebinseik, however, poorer people are actively participating in the project while richer people have many alternative jobs and do not show interest on both their trees and aids from FRED A.

In addition, institutional thickness plays an important role in case of Tebinseik Village Tract. FRED A acted not only as a coordinator between Forest Department and FC members, they disseminated technology, capital and many other facilities required in the success of the project. On the other hand, the role of institutional facilities is missing or very poor in case of Ywatharyar. There is no encouragement to use fuel saving stove. No facility support is given since 2001 for usage of fuel saving stove.

Physical facilities play positive or negative roles for people practice. In case of Ywatharyar, people use fuel saving stove due to its physically superior quality. By using this stove people could definitely reduce the amount of firewood requirement, it is easy to cook and there is reduction in the amount of smoke. In case of Tebinseik Village Tract, physical facilities play a negative role from the different perspective. If the farmland could yield more than 40 baskets of paddy per acre people participation rate in the reforestation project will be lower. However, unproductive physical facilities forced farmers to change their un-used land (due to salt water extrusion from below) into mangrove plantation.

In general, there is a gap between awareness and practice and this gap was generated from two external factors (physical and institutional facilities/ constraints) and three individual's internal factors (social, cultural and economic filters) at various combinations.

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