THE DEVELOPMENT OF PARTICIPATED ENVIRONMENTAL EDUCATION MODEL FOR SUSTAINABLE MANGROVE FOREST MANAGEMENT ON EASTERN PART OF THAILAND

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ABSTRACT

The objectives of this study were to find factors and environmental education models affecting the participation of people in sustainable mangrove forest management to develop and to evaluate participated environmental education model for sustainable mangrove forest management in the eastern part of Thailand. This study employed the mixed method and was divided into 3 steps. In the first step, the quantitative method was used for studying facts and factors affecting participation of people to solve mangrove deforestation. The sample sampling was used to selected the samples as household in Chanthaburi province by using multiple-step sampling method. The second step employed the qualitative method for environmental education models design. The aimed of this step were to analyze environmental education model for mangrove forest management in successful institutes and find important compositions of environmental education. In the last step, the environmental education model arranged activities according to the process and was evaluated by quantitative method for validation, efficiency, and appropriateness. Research findings revealed that: 1) Knowledge, understanding and experience in mangrove forest management were the important factors affecting to participation of people in mangrove forest management on the eastern part of Thailand. 2) The most appropriate environmental education model for mangrove forest management on the eastern part of Thailand contained the procedures and compositions as objective of environmental education model, content about mangrove forest management, workshop, evaluation and special factors. 3) Assessment of the environmental skill in sustainable mangrove forest management. It was found that the experimental group had their environmental skill after workshop were statistically different at .05 significant level.

Keywords: Model / Environmental education

INTRODUCTION

Rational and Justification

Mangrove forest is valuable ecology beneficial for human living in both direct and indirect ways as the use of mangrove wood in various forms, coastal fishing communities still depend and make

their living around mangrove forest, and plants in mangrove forest have the potential in air purification. In Thailand, mangrove forest spread across the coasts in the eastern part, the central part, and the southern part, totally 23 provinces. It was found that Thailand had mangrove forest totally 1,723,781.25 rai, the eastern part occupied 142,181 rai, the central part occupied 60,318.75 rai, and the southern part occupied 447,193.75 rai. (Department of Marine and Coastal Resources, 2007). In conclusion of the latest " Thai environmental situation report " (2007) of World Bank indicates that the area of mangrove forest had decreased to 1,723,781.25 rai comparing to the survey conducted in 1961, indicating the area of mangrove forest at 2,299,375.00 rai. Mangrove forest in the eastern coast of Thailand occupy the area in 5 provinces such as Trat, Chanthaburi, Rayong, Chachoengsao,and Chonburi. The total amount of mangrove forest area was 306,250.00 rai from the survey that conducted by National Research Council and the Department of Forestry in 1975. The latest survey in 2004 was conducted that the total amount of mangrove forest area was 142,185.25 rai, the amount of mangrove forest area loss during 1975 − 2004 was 164,068.75 rai, or 53.57 percent of mangrove forest area in 1975. The loss of mangrove forest area in eastern coast can be compared by year as shown in table 1.

Table-1. Mangrove forest area in the eastern part of Thailand

Province	Amount of mangrove forest area (rai)				
	Year 1996	Year 2000	Year 2002	Year 2004	Year 2012
Trat	47,086.50	59,482.00	49,533.00	64,812.50	47,087.50
Chanthaburi	24,332.25	75,580.00	46,885.25	56,106.25	24,331.25
Rayong	4,103.00	11,764.00	5,946.00	10,450.00	4,100.00
Chonburi	575.00	4,461.00	1,900.00	2,781.25	575.25
Chachoengsao	3,015.75	10,917.00	3,015.75	8,031.25	3,018.75
Total	79,112.50	162,204.00	104,264.00	142,181.25	79,112.75

Source: National Research Council and the Department of Forestry, 2012

From table 1., the province with the most mangrove forest area in the eastern part of Thailand was Trat and the least mangrove forest area was Chonburi. The province that lost the most mangrove forest area was Chanthaburi, such amount 51,248.75 rai or 67.80 percent of the former area in 2000.

The important cause in the loss of mangrove forest area in the eastern coast of Thailand since 1991 have been the change of mangrove forest area for aquaculture purpose, mostly prawn breeding. In addition, the growth of industrial sectors and communities highly decreased mangrove forest area. The result from numerous losses of mangrove forest areas affected to life style of local people living nearby mangrove forest or the coast as marine resource used for living decreased, erosion was on riverside, the tide became more intense. The impact of the problem from numerous losses of mangrove changed living of people in mangrove forest areas in eastern provinces to poor quality of life corresponding to the condition and amount of mangrove forest area losses in each part of land. From these reasons, it was necessary to manage mangrove forest

in eastern provinces of Thailand appropriately. Many policies and measures have been determined to manage mangrove forest resource in order to increase and restore mangrove forest ecology. Furthermore, the government issued the policy of the integrated mangrove forest management by relying on the community's participation together with the good government's management and the extended role of the local administrative organization. Hence, the eastern provinces have various institutes and organizations as well as the groups of people or communities participated in managing mangrove forest, including provincial natural and environmental resources office, natural and environmental resources division or environmental department in provincial administrative organization, special administrative institutes, such as municipality, sub – district administrative organization. In addition, mangrove forest management acts was extended to various activities. However, the tendency of the losses of mangrove forest still left in the eastern part of Thailand, especially in Chanthaburi was facing problem of trespass and deforestation. It tended to lose more mangrove forest areas mostly done by human and the problem must be urgently solved. The information revealed that in the past, the eastern part of Thailand had many measures and policies to maintain and manage the mangrove forest. However, They were not able to decrease the deforestation of mangrove forest done by human. Thus, mangrove forest lost their balance until they had new methods or functions that could stop deforestation affecting to ecology and human living.

The summary of the problems about the mangrove forest management was mostly caused by people's behaviours or actions. The good solution directing to main point of the problem was to focus on the troublesome behaviours. At the same time, environmental education was the process developing people's understanding and changed behaviours to appropriate acts to mangrove forest. From the study on the application of environmental education to solve problems, including environmental problems such as, Sundarban swamp forest in India, solving environmental problem in Turkey's national park, it was found that although, the government of relevant institutes had various policies for solving problems, finally, environmental education was also applied for solving social problems such as the poverty in Ethiopia. Bekalo and Bangay (2002). Interestingly, the mangrove forest in the area of Yeesarn Sub – district, Amphawa District, Samutsongkhram Province, highly decreased due to prawn breeding, the extension of housing, and the use of mangrove wood for other utilizations. Although, the government had conducted activities, created legal measures, and supported reforestation, the situation was not getting better. Then, the environmental education was used as the method in developing mangrove forest management. This result was successful in mangrove forest management at Yeesarn Sub – district. People understood about the benefit of mangrove forest and participated in mangrove forest management (Amaraporn, 2007). From such reason, the researcher was interested in the model of non – formal environmental education because it has diverse scopes and methods covering the target extensively.

Objectives of Research

1) To fine the important factors influencing to people's participation for sustainable mangrove forest management in the eastern part of Thailand.

2) To develop the model of participated environmental education for sustainable mangrove forest management in the eastern part of Thailand.

3) To evaluate the model of participated environmental education for sustainable mangrove forest management in the eastern part of Thailand.

Scope of Research

This study contained 3 scopes of the main point. The first scope was the study on important factors influencing to people's participation for sustainable mangrove forest management on the eastern part of Thailand. The second scope was the development of participated environmental education model for mangrove forest management on the eastern part of Thailand. The last scope was an evaluation on participated environmental education model for sustainable mangrove forest management on the eastern part of Thailand. The target population was the heads of families living in all villages closing to mangrove forest area of the eastern provinces of Thailand, aquatic animal breeders around coastal area, community leaders, politicians in the eastern part of Thailand, representatives of private or independent institutes related to mangrove forest management in eastern provinces and representatives from the government institutes related to mangrove forest management in eastern provinces.

Research Conceptual Framework

This Research was the Development on Environmental Education Model. The Development Process was as Followed

The first step studied the problem of mangrove forest of communities in the eastern provinces of Thailand, awareness of problem as well as people's awareness about problem, and important factors influencing on people's participation. The second step was model development by using environmental education model, academic works, and information copied from primary or secondary document of projects or institutes successful in managing mangrove forest and developed appropriately for mangrove forest management on the eastern part of Thailand. The third step was the test on environmental education model for mangrove forest management. This step took environmental education model for mangrove forest management into environmental education process and inputted factors which were heads of the families, curriculum, activities, media and technology, understanding, and environmental educationalist. Before and after environmental education activity, evaluation was taken on knowledge about mangrove forest management, awareness and sensitivity on mangrove forest problem, supportive attitude and

felling on mangrove forest management, skill in solving mangrove forest problem, evaluation ability on mangrove forest measures, and participatory level in solving mangrove forest problem.

RESEARCH METHODOLOGY

In this research, the research divided the procedure into 3 steps as follows.

Step of Fundamental Information Review

The step of basic information review aimed to study about :

1) The basic information of mangrove forest management of sampled study areas in the eastern provinces.

2) The important factors that affected to people's participation in the sampled study areas in the eastern provinces.

The objective of basic information review was to support in the design of environmental education model. The researcher prepared the survey – basic information about mangrove forest management in the eastern provinces as follows.

Population and Sample Group

The sample study areas were randomed from 5 eastern provinces, including Trat, Chanthaburi, Rayong, Chachoengsao, and Chonburi. The result of study area sampling was Chanthaburi, where mangrove forest covered 5 districts such as Muang district, Lamsing district, Tamai district, Nayaarm district, and Klung district. To select the samples as household representatives by using multiple – step sampling method as follows.

1) To sample for 1 district from 5 target district by using simple random sampling. Lamsing district was selected.

2) To sample for 1 sub-district from previously chosen district by using simple random sampling. Bangsakao sub-district was selected.

3) To find the samples of sub-district level among 681 households in Bangsakao sub-district by applying statistic formula of (Yamane, 1973). The number of sample households was 252 or about 300 households.

4) To separate 300 sample households into sample groups of each village in ratio.

5) To find target households among sample groups of each village by drawing lots according to calculated number.

Table-2. The number of target households in each village of Bangsakao sub-district

Mangrove forest area		Number of	Number of target
Lamsing district	Bangsakao sub-district	households (family)	households (family)
	Mu.1 (Nern)	225	99
	Mu.2 (Klang)	103	45
	Mu.3 (Nernkland)	96	42
	Mu.4 (Konghin)	153	68
	Mu.5 (Lang)	104	46
Total	**5 villages**	**681**	**300**

Source: 2nd mangrove forest development station.

Research Tools

The tools consisted of questionnaires and tests. The details were as follows.

Part 1; it was general questions about target group, namely gender, age, occupation, educational level, income, number of family member, period of settlement, size of land possessed, being social group member, receiving information and source of information, experience in mangrove forest management or conservation.

Part 2. was knowledge test about mangrove forest management or conservation. The question were 10 true – false questions.

Part 3. was the evaluation of participation and frequency in mangrove forest management or conservation. The questions were multiple choices, namely used to, never, and number of participation.

Part 4. Was the interview questions about the development of participated environmental education for sustainable mangrove forest management in the eastern part of Thailand.

Data Collection

The data was collected for this part of the study consisted of 2 data types.

1) Secondary data included the information obtained from literature review that related to factors affecting to humans and mangrove forest management or conservation, information of study area, and relevant researches.

2) Primary data from the survey on target area and investigation, 300 heads of the families or representatives, who were able to give the information well, were chosen from target group living in target area.

Data Analysis

To verify collected questionnaires for completeness and correctness of the information by using Statistical Package for Social Sciences: SPSS was employed according to this following method.

1) General information of the population included gender, age, occupation, educational level, income, number of family members, period of settlement, size of land possessed,

receipt of information and information source, being social group member, and experience in mangrove forest management or conservation. The analysis was analyzed by using percentage, frequency distribution, mean, and standard deviation. Grouping of general information was calculated by adding or subtracting mean with standard deviation (X + S.D.).

2) Information about mangrove forest management knowledge was analyzed the information by using frequency, mean, and standard deviation.

3) Information about factors affecting to people's participation behavior in mangrove forest management or conservation, was analyzed the information by using Hierarchical Regression method and indicated mean, standard deviation, table showing factors related to people's participation in mangrove forest management, prediction power of other factors on people's participation in mangrove forest management and regression equation.

Environmental Education Model Design Process

Environmental education model design process aimed to:

1) Analyzed environmental education model for mangrove forest management in successful institutes.

2) Find important composition of environmental education and other factors or conditions manipulating to the success of the project or institute.

Objectives of environmental education model design.

To Obtain Appropriate Environmental Education Model for Mangrove Forest Management

The researcher prepared the process in environmental education process design as follows.

To Specify the Criterion Used To Identify Successful Projects or Institutes, Including

2.1) The projects or institutes that had achieved the goal. The duration of the project or the institute must be over 3 years.

2.2) The projects or institutes had systematization or constant systemic management.

2.3) The projects or institutes had sufficient basic factors for management, including officers, budget, management process, material and durable substance as well as appropriate communication and technologies.

2.4) The projects or institutes were approved or certified by reliable institutes of government or private sectors as successful project or institute.

Target Project

It was purposive sampling from previously determined criterion, including :

3.1) Kungkraben bay education and development center in royal idea, Chanthaburi.

3.2) 2 nd mangrove forest resource development station (Tasorn, Chanthaburi)

3.3) 3 rd mangrove forest resource development station (Klung, Chanthaburi)

3.4) Banprednai community in Huangnamkhao sub-district, Muang district, Trat.

Key Informant

38 Persons of representatives from government and private sectors related to mangrove forest management were chosen specifically (purposive sampling).

The Development of Environmental Education Model for Mangrove Forest Management

The research method was as follows.

5.1) To collectively study on successful environmental education model of each project or institute whether what model and important composition of the target institutes or projects successfully applied for mangrove forest management.

5.2) To collectively analyzed the most successful environmental education model of each project or institute. This means of environmental education model were used in target institutes or projects and found that it was the most effective for teaching the people and leaded to behavioral change, which was good for mangrove forest management, and important compositions.

5.3) To collectively synthesize environmental education model that appropriated for mangrove forest management in Chanthaburi.

After that, to assemble the information derived from primary study into new environmental education model under the principle by the researcher. At the same time, it must be under supervisor of the expert in the area of mangrove forest management and environmental education. The newly – obtained environmental education model would contain important constituent with common characteristics from the most effective environmental education model of successful institutes or projects. It consisted of these following compositions.

1) The Mangrove forest management goals and policies meant what the government required regarding to mangrove forest.

2) The environmental education model aims meant the result needed to occur to the persons, who passed environmental education process.

3) Types and structures of environmental education model meant characteristics and diagram showing environmental education activities.

4) The activity objectives of environmental education meant the result needed to occur to the participants after having attended such activities.

5) The content meant knowledge, skill, capability, and experience required to be learnt by participants.

6) The instructional objectives meant knowledge, skill, and capability required to be learnt by participants after studying on the content.

7) The activity strategy meant appropriate environmental education activities with regulation for the achievement of learning objectives.

8) The evaluation meant the learning assessment for the improvement, running activities, and environmental education model.

9) The materials and media meant documents, publications, films, CDs, and materials that supported quality and effectiveness of education.

10) The context conditions of each project meant special characteristics or limitation that affected to the success of the institutes or the projects.

Environmental Education Activity and the Evaluation of Environmental Education Model

Environmental education activity was implemented according to the process and the content of environmental education model derived from environmental education development and environmental education model evaluation. It aimed to:

1) Analyze and find the of environmental education model for mangrove forest management obtained from the development.

2) Evaluate efficiency and effectiveness of environmental education model for mangrove forest management.

The objectives of environmental education activity and environmental education evaluation to obtain environmental education model for efficient and effective mangrove forest management of Chanthaburi.

Sample Group

The sample group used in the test was one representative from each household in villages nearby mangrove forest in Chanthaburi, 1 village, 40 households.

Experiment Process

The form of experiment was one group pretest – posttest design without control group. Experiment process was that before environmental education activity, the samples were asked to complete the test before doing activity (Pre-test). After that, the samples did environmental education activity. Then the samples were asked to complete the test after environmental education (Post-test).

Data Analysis

Test for the difference of the average achievements of knowledge, understanding on mangrove forest management, awareness, attitude, problem – solving skill, evaluation ability, and

participation in solving mangrove forest issue before and after environmental education activity by using paired t-test statistic method.

RESEARCH RESULTS

Results of Primary Information Study

In the study on primary information, the presentation was separated into 3 aspects as follows.

General Information of the Samples

The receiving information about mangrove forest management, the most samples as 95.80%, received mangrove forest management information from television as the main source, 83,70%. It was also found that the most samples were social group members, 60.40% and the most of them were member of community leader group, 43.68%, from all samples that were social group members while the mangrove forest management experience among the samples, it was found that 79.50% of them had experience in mangrove forest management 2 times on the average (mean = 2.35), when the experience deposited level of mangrove forest management, it was found that the most samples had experience at low level, 42.00%.

Information about Mangrove Forest Management Knowledge

The information about mangrove forest management knowledge was analyzed by using the questionnaire, containing 10 questions, to measure knowledge and understanding in mangrove forest management. It was found that 288 samples had 8.04 average knowledge scores (from total 10 scores) and standard deviation was 1.749.When the score of mangrove forest management knowledge was classified to 3 levels based on the group and measured normal distribution of the information by using mean and standard deviation, it was found that the most samples, 188 persons, had medium level of knowledge (65.28%). The next group of samples, 67 persons, had high level of knowledge (23.26%). The samples in low level of knowledge were 33 persons (11.46%).

Information about Factors Affecting to People's Participation in Mangrove Forest Management in Chanthaburi

It was found that the number of time of people's participation in mangrove forest management in Chanthaburi in recent year from 288 samples were 2.68 times. The average age was 42.78 years. The average score of knowledge and understanding in mangrove forest management was 8.04 form total 10 scores. The average period of settlement was 27.02 years. The average time of social group membership was 3.54 years. The average experience in mangrove forest management was 2.35 times per year. The average household income was 251,848.13 Bath and the average size of land possessed was 10.00 rais.

From the study on prediction power, demographic independent variables or important factors included age, education, knowledge and understanding about mangrove forest management, period of settlement, period of settlement, social group membership, and experience in mangrove forest management. These influenced people's participation in mangrove forest management in Chanthaburi, it was found that the forecasting equation, consisting of demographic factors, was able to predict people's participation in mangrove forest management in Chanthaburi at significance level of 0.05 (F=9.692, P(sig.)=0.00) and prediction power was 19.50%. When the seven independent factors was considered on each variable, it was found that two independent variables with influence on people's participation in mangrove forest management in Chanthaburi at significance level of 0.05 were knowledge and understanding in mangrove forest management (Beta=0.13) and experience in mangrove forest management (Beta=0.379) respectively. While the study on prediction power of socio-economic independent variables or important factors included occupation, household income and size of land possessed. They had influence on people's participation in mangrove forest management in Chanthaburi. It was found that the forecasting equation consisted of socio-economic factors. They are able to predict people's participation in mangrove forest management in Chanthaburi at significance level of 0.05 (F=2.946, P(sig.)=0.008). However, prediction power was only 5.90%. When the six independent variables were considered each variable, it was found that only one independent variable had the influence on people's participation in mangrove forest management in Chanthaburi at significance level of 0.05, it was household income (Beta=0.149).

In the part of the study on prediction power of independent variables or important factors that had influence on people's participation in mangrove forest management in Chanthaburi, /2 groups of independent variables or important factors consisted of demographic independent variables, principally age, education, knowledge and understanding about mangrove forest management, period of settlement, social group membership, and experience in mangrove forest management, and socio-economic independent variables, especially occupation, household income, and size of land possessed. It was found that the forecasting equation, which consisted of demographic and socio-economic factors (full model) could to predict people's participation in mangrove forest management in Chanthaburi at significance level of 0.05 (F=5.942,P(sig.)=0.00). The prediction power was /21.90%. When thirteen variables were considered each variable, it was found that 2 independent variables had the influence on people's participation in mangrove forest management in Chanthaburi at significance level of 0.05, they were knowledge and understanding about mangrove forest management (Beta=0.13) and experience in mangrove forest management (Beta=0.359) respectively. In comparison of the first model (model.1), demographic independent factors included education, knowledge and understanding about mangrove forest management, period of settlement, social group membership, and experience in mangrove forest management.

In the second model (model.2), socio-economic independent factors included occupation, household income, and size of land possessed. The third model (full model.) consisted of the demographic and socio-economic independent factors. In each model, independent factors (variables) were able to predict people's participation in mangrove forest management in Chanthaburi at significance level of 0.05, the third model (full model) had the highest prediction power at 21.90%. This was better than the first model (model.1) 2.40% and better than the second model (model.2) 16%. The evidence came from comparison on each model to show that the best model was attained for prediction of people's participation in mangrove forest management in Chanthaburi, the third model (full model.). It had the coefficient in raw score form consisting of constant coefficient 0.187, age coefficient 0.004, primary education coefficient (edu1:(primary education: higher education)) -0.323, secondary education coefficient (edu2:(secondary education: higher education)) 0.03, coefficient of knowledge and understanding in mangrove forest management (totalknow) 0.169, coefficient of period of settlement (located_period) -0.004, coefficient of social group membership (status_term) 0.041, coefficient of experience in mangrove forest management (ex_activities) 0.382, coefficient of agricultural occupation (occupa1: (agriculture: fishery)) -0.24, coefficient of employee (occupa2: (employee: fishery)) -0.308, coefficient of trading (occupa3: (trading: fishery)) -0.38, coefficient of other occupations (occupa4: other occupations: fishery)) -1.268, coefficient of household income (h_income) 0.011, and coefficient of size of land possessed (area) 0.011. The forecasting equation could be presented in raw score form as follows.

People's participation in mangrove forest management in Chanthaburi, amount of participation = 0.187(constant) + 0.004*age − 0.323*primary education (edu1) + 0.03*secondary education (edu2) + 0.169*knowledge and understanding in mangrove forest management (totalknow) − 0.004*period of settlement (located_period) + 0.041*social group membership (status_term) + 0.382*experience in mangrove forest management (ex_activities) − 0.24*agricultural occupation (occupa1) − 0.308*employee (occupa2) − 0.38*trading (occupa3) − 1.268*other occupation (occupa4) + 0.011*household income (h_income) + 0.011*size of land possessed (area). In conclusion from the study on primary information, it was found that knowledge and understanding about mangrove forest management and experience in mangrove forest management were important factors affecting to people's participation in mangrove forest management in eastern part of Thailand. The most people had knowledge and understanding about mangrove forest management at medium level. They had experience in mangrove forest management 2.35 times per year on the average.

RESULTS FROM ENVIRONMENTAL EDUCATION PROCESS

Environmental Education Model for Successful Mangrove Forest Management

The results of the study on good or successful environmental education model for mangrove forest management and important compositions of environmental education model though analysis of environmental education model used in successful project or institute. The good environmental education model for mangrove forest management was a workshop, informal environmental education model, consisting of these following compositions, especially the main point, the purpose and the government policies about mangrove forest, the goal of environmental education, the objectives of environmental education activity, activity strategy, and evaluation.

The Other Special Factors and Conditions That Supported the Project or Institute In Successful Mangrove Forest Management

The result from the study on 2 government institutes, 1 project in royal ideas, and 1 successful community in mangrove forest management, it could be concluded that the other factors and conditions that promoted or supported successful projects and institutes responsible for mangrove forest management consisted of:

> 1) The participation of the community in every process.

> 2) The characteristic or method in mangrove forest management was not complex. It was compatible with community lifestyle.

> 3) The local administrative organizations and local institutes supported or participated in mangrove forest management.

> 4) The institutes or the projects analyzed the conditions and factors that caused the problems. They also provided the solutions to reduce the difficulties in mangrove forest management.

The Appropriate Environmental Education Model for Mangrove Forest Management on the Eastern Part of Thailand

The results from the development of participatory environmental education for sustainable mangrove forest management on the eastern part of Thailand, there are 5 important compositions of the participatory environmental education model for the sustainable mangrove forest management on the eastern part of Thailand, including: the objective of expected environmental education model, the curriculum contained the content about mangrove forest management, the activity process that was the participatory workshop, the assessment to examine the achievement of the environmental education model, and the augmentation or expanding of the other special factors and conditions promoting or support workshop – approach environmental education model for successful mangrove forest management, including: the participation of the community, the activity method compatible with community lifestyle, the result of activities causing apparent

benefits for the community, and the local administrative organization and local institutes supporting mangrove forest management. The concept of the participated environmental education model for the sustainable mangrove forest management on the eastern part of Thailand attained to the phase of development for environmental education model was combined with the study of primary information. It was found that knowledge and understanding, and experience in mangrove forest management were important factors affecting to people's participation behavior in mangrove forest management in the eastern part of Thailand. The 2 important factors were found in target group taken into the participated environmental education model for the mangrove forest management, leading to the success of mangrove forest management. The result of such study, important target group that could be identified were community leaders.

Preparation of Environmental Education Activity and Evaluation of Environmental Education Model

It was found that the samples had more knowledge after workshop at 0.48 scores averagely, significant at the level of 0.05 when to compare the difference between the attitude before and after workshop by using Paired t-test statistic, it was found that after workshop the samples had better attitude at 3.98 scores averagely, significant at the level of 0.05, to compare the difference of awareness before and after workshop by using Paired t-test statistic, it was found that after workshop the samples had better awareness at 4.63 scores averagely, significant at the level of 0.05, to compare the difference of the problem – solving skill before and after workshop by using Paired t-test statistic, it was found that after workshop the samples had better problem – solving skill at 4.23 scores averagely, significant at the level of 0.05, while studying in participation before and after workshop by using Paired t-test statistic, it was found that after workshop the samples had better participation at 1.53 scores averagely, significant at the level of 0.05, furthermore comparing evaluation ability before and after workshop by using Paired t-test statistic, it was found that after workshop the samples had better evaluation ability at 3.90 scores averagely, significant at the level of 0.05.

Procedure for Determination of Community's Regulation and Local Plan Derived from the Participated Environmental Education Model for the Sustainable Mangrove Forest Management on the Eastern Part of Thailand

After administrating participated environmental education activity for sustainable mangrove forest management in Sanamchai sub-district, Nayaarm district, Chanthaburi, the result from the workshop concluded 2 following methods.

1) The community's mutual agreements or regulations for mangrove forest management.

2) The plan of the community or project contained in the plan of sub-district administrative organization.

DISCUSSION

Important Factors Affecting to People's Participation in the Sustainable Mangrove Forest Management on the Eastern Part of Thailand

The study on important factors affecting to people's participation in mangrove forest management on the eastern part of Thailand, it was found that the knowledge and understanding of mangrove forest management and experience in mangrove forest management were the important factors affecting to people's participation in mangrove forest management. However, in the research of Samran (2005), he found that the factors relating to people's participation in the mangrove forest management included education level, period of settlement, major occupation, household income, size of land possessed, training, experience in mangrove forest management and experience in working with the officers. The research of Surasak (2004) also stated that social and economic related to people's participation in mangrove forest conservation or management, including age, education, minor occupation, and being member of social group.

The Development of the Participated Environmental the Education for Sustainable Mangrove Forest Management on the Eastern Part of Thailand

The result of study found that the best environmental education model was non – formal environmental education in workshop form. The important compositions included content, objective, government policies regarding to mangrove forest, purpose of environmental education, activity strategy, and evaluation. The result corresponded to academic document of Kasem (1993). He stated that workshop was a form of non – formal environmental education administrating for finding the good practice for solving the certain problems comprehensively. This proceeding attained the mutual resolution, causing the solution to be accepted by everyone. This was appropriate for solving the community's mangrove forest issue in the eastern part of Thailand. The other important factors and conditions supporting the successful mangrove forest management included community's participation in every step of the mangrove forest management and the proceeding characteristic or practice in the mangrove forest management was simple and compatible with community's lifestyle. The such finding corresponded to the research of Col Prachoom Maturamon (2002), he stated that the participation or support of the people or target group in successful activities was unearthed when the target group learned and comprehended the objective and strategy of the operation.

The Administration of the Environmental Education Activity and Evaluation of Environmental Education Activity

This was the test of the participated environmental education for the sustainable mangrove forest management in the part of Thailand. The Sanamchai sub – district was chosen and the environmental education for the mangrove forest management and the important factors which

47

were target population, environmental education project, activities, and the environmentalist, were brought into the environmental education process. Then, the evaluation was brought to the results of the participated environmental education model for the sustainable mangrove forest management. The result showed that the participated environmental education model for the sustainable mangrove forest management for the eastern part of Thailand or workshop for the sustainable mangrove forest management was able to enhance knowledge, attitude, awareness, problem – solving skill, evaluation ability, and participation in mangrove forest management, corresponding to the research of Waraporn (2008). She found that after the collective activity of professional practitioners specialized in the garbage eradication, such as seminar or opinion exchange and network, the group had increased knowledge, attitude, and problem – solving skill.

CONCLUSIONS AND RECOMMENDATIONS

In the conclusion from the primary information, it was found that the knowledge , understanding of the mangrove forest management and the experience in the mangrove forest management were the important factors affecting to people's participation in the mangrove forest management on the eastern part of Thailand. The development of the participated environmental education model for the sustainable mangrove forest management on the eastern part of Thailand contained the objective of the environmental education, the curriculum, the activity process, the evaluation, and the other special factors or conditions. In the part of the evaluation of participated environmental education model for the sustainable mangrove forest management, it was found that the knowledge, attitude, awareness, problem – solving skill, evaluation ability, and participation in mangrove forest management before and after environmental education managing were different significantly. This implied that the developed environmental education model increased knowledge, attitude, awareness, problem – solving skill, and evaluation ability as well as the participation in the mangrove forest management.

Policy Suggestion

From the result of this study, to be success for mangrove forest preservation, participation of people in such communities should be provided because they have more power to protect such mangrove forest. However, the knowledge for management should be provided to them too.

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