The Participatory Characterization Based on STEM Education in the Restricted Area for Fishing at Tha Song Korn Temple in Khon Kaen Province

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Abstract. This study aims to investigate the participatory characterization based on STEM Education in the restricted area for fishing in front of the temple on the banks of Tha Song Korn River. The qualitative research methodology was used in this study. Data were collected by using field study methods along with in-depth interview and observation. Data were analyzed by using documentary analysis by using triangulation techniques. The results showed that the participatory characterization in the conservation area for fishing in front of the temple on the banks of Tha Song Korn River developed due to the collaboration of local government agencies, community, and villagers. It was found that the temple helped improve the water pollution in front of the temple by promoting the collaboration of all the stakeholders based on STEM Education in four steps; planning, implementation, taking benefits, and evaluation. The abbots and monks transferred the knowledge of water conservation to villagers along with the assistance of government agencies and the governors in the community, the surrounding area can be developed to be tourist attraction of the public. This holistic method derived from combining knowledge of science, mathematics, technology and engineering design based on STEM education leads to sustain management in the community.

1. Introduction
Natural resource plays a key role in everyday human living. In particular, Thailand is an agricultural country that villagers massively depend on water consumption for their farming e.g. rice farming and fish farming. Recently, the community has rapidly expanded while fish farming along the river is growing [9]. The economic-driven expansion of community causes not only the water pollution problems but also the decrease of fish which affects farming along the river. Thus, the effective management of natural resource is vital to ensure its sustainability and quality [2,5].

The local temple, as one of the religious institutions, is a main source of education for village members in Thais’ society [12]. Buddhist monks teach village members about ethics and morality connected with Buddhist ways of living. Conducting Buddhist virtue approaches in physical and mental manners to ethics leads village members to live peacefully together. Religion tightly holds villagers’ soul and spirit as it located in every village. Therefore, temple as a heritage of the community is required effective collaboration of all stakeholders in the village to respect and foster sustainably [7].

Likewise, controlling the restricted fishing area around temple is an approach that aims to improve fish farming along the river, strengthen the collaboration among villages, temples, and community,
and develop community in long term [3]. The restricted fishing area helps increase number of fish, which in turn, helps the villagers to generate more earnings from fish farming sustainably and wisely. Hence, teaching and learning based on STEM Education should be adopted in the community’s sustainable management of natural resources.

Teaching and Learning based on STEM Education using activities, for example, projects that combined knowledge of science, mathematics, technology, engineering design allows greater opportunities to villagers to construct their knowledge and enhance skills in four areas of knowledge by themselves. The campaign of controlling the restricted fishing area around temple leads the village members to learn how to conserve the natural resources, starting from understanding its importance and current issues to seek solutions and prevention of the issues [10].

The village members are encouraged to brainstorm and generate ideas to determine objectives, plan, make decisions, and implement the plan to achieve the goals collaboratively with 4-step collaboration; including planning, implementation, taking benefits, and evaluation. The outcomes of the campaign may or may not be as expected due to the downturn of economic circumstances; however, [7] the sustainable management of natural resources must be seriously taken into action to solve the environment of the nation. Therefore, the village members must be informed about the issues so that they become aware of their participation in natural resources conservation, which means to its sustainability.

2. Objectives
To investigate the participatory characterization of village members in fish farming around Wat Tha Song Korn Temple located on bank of Nam Phong River in Khon Kaen Province.

3. Population
1. Key Informants are providers of in-depth data related to aquatic animal conservation around Tha Song Korn Temple located on bank of Nam Phong River; including
   1.1 3 Monks
   1.2 4 Temple committees
   1.3 6 Village leaders
2. Casual Informants are 5 people implementing the aquatic animal conservation around Tha Song Korn Temple located on bank of Nam Phong River.
3. General Informants are 10 Villagers, male and female living in Tha Song Korn Sub-district.

4. Research tools
The study was conducted between March 10, 2061 and April 20, 2061. The qualitative research methodology was used as follows:
4.1 Focus on the phenomenon of the overall picture from various aspects. Adhere to the meaningful concepts from several theories, rather than one concept.
4.2 Follow a long-term plan to investigate the changes and dynamic of the society which can be up to a year period.
4.3 Study the phenomena in the natural environment from the field research method with no control in the laboratory.
4.4 Consider the human nature of the participants. The researcher must respect them and their rights to participate in the research to build a good relationship and trust.
4.5 Analyze with descriptive analysis, rather than statistical analysis.
4.6 Focus on factors or variables reflecting meaning in thoughts underlying in human behavior.
5. Objectives
The research tools used in this study to collect the data are as follows:

5.1 Basic Survey is used to explore the primary data in the community area

5.2 Interviews consisted of structured and unstructured types

1.2.1 structured interviews.

1.2.2 unstructured interviews are mainly open-ended questions to interpret the meaningful data by conducting in-depth interviews with key informants, casual informants and general informants.

5.3 Observation to observe collaboration of villages in the community.

1.3.1 Participant observation: The researcher visited the village and used questionnaire, taking note of the participant's fish farming behaviour.

1.3.2 Non-observation.

5.4 Focus Group: Discussion conducted in group approximately 5 to 10 participants; including monks, monks, conservationists, and villagers.

5.5 Workshop was also held for the meeting among 10 participants who were key informants, casual informants, and general public to provide information about the collaboration for sustainable management of fish farming along the river.

6. Data Analysis
Data were analyzed by using descriptive statistics analysis, including mean, standard deviation. The researcher presented the results of data analysis according to the purpose of the research [8].

7. Results
It was found that two main factors influence the community collaboration of aquatic animal conservation at the bank of the temple as restricted area. First, the government initiative has been paid to develop river conditions and increase the number of fish to solve the water pollution problems. Moreover, the guidance on sustainable fish farming was provided for the villagers. The policies regarding how the river should be conserved, especially around the temple was explained to the monks, village leaders and head villagers so that they can implement the policies appropriately.

The second reason was that the similar pattern requirements of other communities occurred and found to be successful; as a result, the abbots and monks transferred the knowledge of water conservation to other temples. Along with the assistance of government agencies and the governors in the community, the temple along the river and surrounding area can be developed to be tourist attraction to the public. This holistic method derived from combining knowledge of science, mathematics, technology and engineering design based on STEM education leads to sustainable management in the community.

The community collaboration in fish and water conservation at Tha Song Korn Temple on Nam Phong River in Khon Kaen Province can be explained into following four main aspects.

1. The process of collaboration in planning of fish conservation management around the temple in allocating conservation zones should be determined by the designated conservation committee.

2. The process of collaboration implementation requires the staff who is responsible for monitoring the river and report when anybody violate the rules of the restricted area or fish conservation zone. Thus, the conservation zone must be declared to the villages to gain social acceptance.

3. The process of collaboration during taking benefits in both concrete and abstract types. People can gain concrete benefits as they have greater water source for fish farming and safer for breeding, which increases the amount of fish in the river. Moreover, the villagers can obtain the abstract benefits of social and community collaboration as a unity. The elected conservation committee also feel honored to participate in community services.

4. The process of collaboration evaluation. The villagers are self-assessors. In practice, the reflection of the opinions of the villagers and those who have contributed to the project is considered as an
indicator in the effectiveness of water and fish conservation. The implications are to be used for further development.

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