

Participatory on Organizing Civil Forum in Preserving Canal Lines on Both Sides of Phra Phimon Racha Canal, Bang Bua Thong District

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ABSTRACT

This research aims to 1) strengthen the community organizations' capacities to coordinate cooperation and maintain water quality in the Phra Phimon Racha Canal, 2) promote and push community organizations to create innovations in water quality restoration and care through appropriate technology, and 3) to support the community in organizing cultural activities in the canal area communities and the public can learn the benefits of canal maintenance concretely. It is a Participatory Action Research (PAR). Research tools include evaluation forms of field participatory observation. A target group is the villager researcher from community leaders as volunteers. The data collected from the Observation form Let us do a content analysis of the qualitative target group and then use the information gathered from interviews. The research results showed community organizations' potential to cooperate to maintain water quality. Community leaders and representatives of communities, including organizations/agencies in the area, to gain potential in knowledge, skills, attitudes, self-concept, traits, and motivation for working together to maintain water quality. The community has developed and created innovations to restore and care for water quality in the Phra Phimon Racha Canal, namely grease traps and green tanks. Moreover, organizing cultural activities to maintain canals. For example, the community had traditionally held boat races and fish coop farming to increase income.

Keywords: Community capacity building; Innovation; Water quality restoration; Water quality care

การมีส่วนร่วมในการสานสัมพันธ์ประชาคมดูแลรักษาสายคลองชุมชนสองฝั่ง คลองพระพิมลราชา อำเภอบางบัวทอง

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บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อ 1) เสริมสร้างศักยภาพองค์กรชุมชนในการประสานงานความร่วมมือและรักษาคุณภาพน้ำในคลองพระพิมลราชา 2) ส่งเสริมและผลักดันองค์กรชุมชนให้สร้างสรรค์นวัตกรรมในการฟื้นฟูและดูแลคุณภาพน้ำผ่านเทคโนโลยีที่เหมาะสม และ 3) เพื่อสนับสนุนชุมชนในการจัดกิจกรรมทางวัฒนธรรมในพื้นที่ชุมชนริมคลอง และประชาชนสามารถเรียนรู้ถึงประโยชน์ของการบำรุงรักษาคลองอย่างเป็นรูปธรรม ซึ่งเป็นการวิจัยเชิงปฏิบัติการแบบมีส่วนร่วม (PAR) เครื่องมือวิจัยประกอบด้วยรูปแบบการประเมินการสังเกตแบบมีส่วนร่วมภาคสนาม กลุ่มเป้าหมายคือนักวิจัยชาวบ้านจากผู้นำชุมชนเป็นอาสาสมัคร ได้ข้อมูลที่รวบรวมจากแบบฟอร์มสังเกตการณ์ให้เราทำการวิเคราะห์เนื้อหาของกลุ่มเป้าหมายเชิงคุณภาพประกอบกับข้อมูลที่รวบรวมจากการสัมภาษณ์ ผลการวิจัยแสดงให้เห็นถึงศักยภาพขององค์กรชุมชนในการร่วมมือเพื่อรักษาคุณภาพน้ำ ผู้นำชุมชนและตัวแทนชุมชนรวมทั้งองค์กร/หน่วยงานในพื้นที่ได้รับศักยภาพในด้านความรู้ ทักษะ ทักษะ ทักษะ แนวคิดในตนเอง คุณลักษณะและแรงจูงใจในการทำงานร่วมกันเพื่อรักษาคุณภาพน้ำ ชุมชนได้พัฒนาและสร้างสรรค์นวัตกรรมเพื่อฟื้นฟูและดูแลคุณภาพน้ำในคลองพระพิมลราชา ได้แก่ บ่อดักไขมัน และถังรั้วโลก นอกจากนี้ยังมีการจัดกิจกรรมทางวัฒนธรรมเพื่อรักษาคลองเช่น ชุมชนมีประเพณีการแข่งขันเรือและเลี้ยงปลาเพื่อเพิ่มรายได้

คำสำคัญ: การเสริมสร้างศักยภาพชุมชน, นวัตกรรม, การฟื้นฟูคุณภาพน้ำ, การดูแลคุณภาพน้ำ

Introduction

(1) The problem of Phra Phimon Racha canal.

The achievements in economic development since the 1960s have resulted in Thailand's continued urbanization. Bangkok has been the province with enormous population growth, resulting in 2010 the number of people living in Bangkok reaching 9.6 million, which have been considered megacities (as defined by the World Bank). As for the Bangkok Urban area, more than 60 percent of the population lives outside Bangkok. This growth has spread to various provinces, adjacent to Bangkok (Pasu Decharin, 2010). These included Nakhon Pathom, Nonthaburi, Pathum Thani, Samut Sakhon, and Samut Prakan provinces.

For Nonthaburi Province, urbanization consists of the distribution of prosperity. Thus, Nonthaburi is not only the perimeter province close to Bangkok. But it also plays an essential role as the second city of Bangkok people (Nonthaburi Real Estate Trade Association, 2020). Actually, in the past, Nonthaburi was an agricultural city with more fertile soil making the Durian Muang Non so famous in the past. But now, the durian orchards are very few because the plantation has transformed into a housing estate, housing, and built roads. As a result, Nonthaburi land has misused its potential without being able to resist the demand for investment in non-agricultural businesses. The expansion of urban society has impacted the added value of income other than agriculture, i.e., Cities have created new opportunities. Community businesspeople could have more easily reached the target audience with purchasing power.

In this area, Khlong Phra Phimon, a canal dug with the length from the mouth of the canal at sluice, Bang Len District, Nakhon Pathom Province, passing through Nonthaburi Province at Sai Noi District, it goes out to the Bang Bua Thong Canal for a distance of about 32 kilometers. There are people living on both sides of the canal. Especially within Phimonrat municipality and Bang Bua Thong new municipality, Bang Bua Thong District Nonthaburi Province. The canal plays an important role in transportation, fisheries, and agriculture. It must go through a general water quality improvement process if it is used for consumption. (Chollada Hong-ngam, 2020). The canal area of Bang Bua Thong District, Nonthaburi Province, has been an example that has shown the advancement of urbanization.

(2) Causes and solutions for community environmental problems.

The attendees focused on concrete problems as follows: 1) wastewater from housing estates and factories in the area. The community members preferred that the problem has affected the community in a wide range and has been a problem that was solved urgently and required many parties to cooperate. 2) Burning garbage, rice straw, and garbage into the canal. These problems happened in the end. But the correction has required many parties to cooperate in the discipline, 3) Shallow canals, this problem has not been urgent and required many parties to cooperate and resolve; and 4) water hyacinths cover the canals. This problem has happened sometimes. And this problem in the past, villagers could have fixed themselves by bringing water hyacinths to make fertilizer or other processing.

The problems that have arisen made the people on both sides of the Phra Phimon Racha canal emphasize the importance of solving environmental problems caused by the discharge of wastewater into the canal. Dr. Wijarn Simachaya, (2021) director of the Thailand Environment Institute says that wastewater is one of the most affecting to the environment and nature. We use about 150-200 liters of water/per person/day from various activities in one day. Causing more than 70 percent of the bile to become wastewater, the main cause comes from the community, especially the urban communities along the famous river. Regarding the amount of wastewater, it was found that in 2018, Thailand had more than 9.7 million cubic meters of wastewater generated from the community/day, 27% of

which was treated by the centralized wastewater treatment system. But at present, the community wastewater treatment system can operate only 40 percent of the total system capacity. Because less wastewater can be collected into the system Waste water collecting pipes into the system are not covered. Including the budget for wastewater treatment is limited (Thai-German Cooperation, 2022).



Figure 1: Priority of Problem Setting

(3) In terms of the potential and strength of the community.

The participants in the self-assessment were as follows. The people of the community in this area were aware of the environmental problems caused by the development. Nevertheless, few people in the community could come together to care for the environment. Most of the community is fragmented and lacks the knowledge and skills to solve environmental problems. The Indigenous communities had been affected by issues. They were not supported by other communities that had moved to new settlements in the area. In other ways, the income of the people in the community has increased. Improved utility services and higher prices of land and real estate also had the opposite effect. The primary environmental problem, in terms of garbage, wastewater, dust, traffic jams, etc., in general, these problems have required various methods. The improvement of the rules applying folk wisdom has been using new technology. These issues have also been relevant to a wide range of people. Solving problems requires cooperation with many people in an integrated way.

The participatory action research was mentioned as a learning-enhancing process to solve the water waste problem. It needs to systematically strengthen the unity of traditional communities along both sides of the canal. It is sparking strength in other community groups to coordinate with relevant agencies to support the community and enhance the ability to create innovations to conserve the environment. And then know to apply the appropriate technology, including continuing the creative activities of the community annually to increase the potential to improve the quality of life for the community.

Managing to make the impossible possible things, “The heart of sustainable development lies in Communities are organized into community organizations. The community is learning together, and learning must be active learning, not teaching. The knowledge that arises must be learned and made useful (Prawet Wasi, 2015). Importance of potential and community strength is also identified in national development mechanisms, according to the principles of Thailand 4.0, which is under the constitution of the Kingdom of Thailand 2017. The concept focuses on strengthening communities and networks Making communities strong and sustainable able to manage the community by themselves is able to solve problems and respond to the needs of the community by community itself (Research and Development Office of Personnel Systems, 2017).

Furthermore, if the operation is successful, it would have to be extended to neighboring communities along the river, resulting in conservation and sustainable development. Collaboration among civil society or a group of people who feel they belong together has to create. It must consist of being able to identify together that they are the same, having an unfamiliar relationship live on rights and having acceptance some rights of each other. Therefore, the community arises from the participation of all stakeholders in the activities of the community on shared responsibility, create a system and mechanism for managing the common needs of community members which arising from joint learning and create mutual benefits in a balanced way (Nithi Eawsriwong, 2015).

The project has planned the following steps in work:

- Search for research problems, set up a research team, and draft research projects;
- Empowering community organizations and leaders in participatory research;
- Collecting data, analyzing data,
- Communicating and coordinating with stakeholders; and
- Summary of results and dissemination of research results.

This approach is in line with Krirk University's strategic principle, which mentioned to promote the creation of research and academic works as a body of knowledge for community and social development Therefore, the research team agrees to conduct a research project to solve environmental problems in this area. (Krirk University. 2021). Krirk University's academicians team went to the Phra Phimon Racha Canal on both sides to survey community conditions from groups. They have come together under "Rak Rong Suad" and jointly organized a workshop to find research problems in community environmental issues.

From the previous, the author attaches great importance to presenting a methodological approach and contents to build the capacity of group/community organization networks and community leaders to participate in research to manage the quality of rivers and canals for sustainable use by processing the following relevant documentary.

Objectives of the research project

(1) To strengthen the capacity of community organizations to coordinate with other organizations and related agencies to participate in a community of cooperation to maintain water quality in the canal.

(2) To promote and push community organizations to develop and innovate in restoring water quality in the community's canals by appropriate technology.

(3) To support the community in organizing cultural activities in the canal area so that the community and the public can learn the benefits of canal maintenance in a concrete way. Generate household income and develop as a foundation economic source.

Research framework

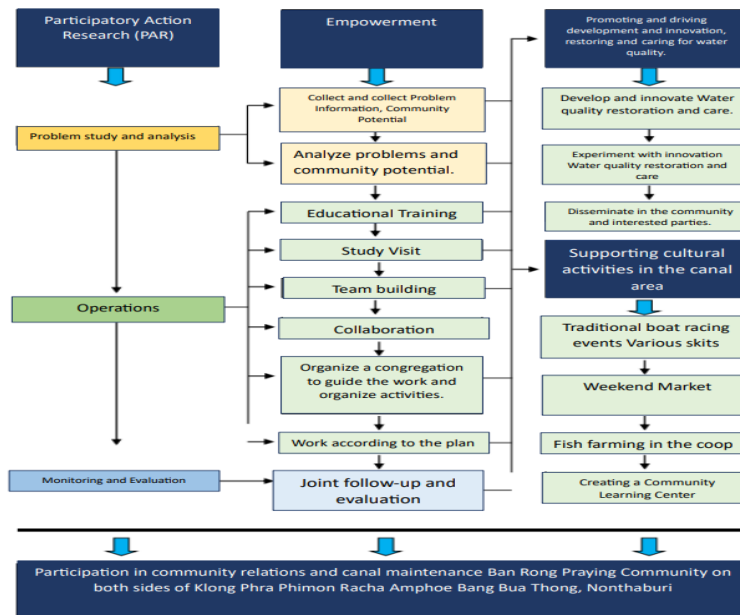


Figure 2: Research framework

Research target audience

The target groups of the research project are as follows:

- (1) Community leaders on both sides of the canal, representing traditional and new communities; ten people. Target groups are selected using purposive sampling methods.
- (2) Representatives of communities on both sides of the canal, representing traditional and new communities, 20 people. Target audiences are selected using purposive sampling.
- (3) Local organizations/agencies in 7 locations, namely Bang Bua Thong New City Municipality, Pimonrat Municipality, Tambol Rong Krajom Health Promoting Hospital, Ban Rong Krajom Child Development Center, Pracharat Rat Bamrung School, Bamrungwit Suksa School, Target audiences are selected using purposive sampling.

Research Procedures

This research is divided into 3 phases according to the research objectives as follows:

- (1) Strengthening the capacity of community organizations to be able to coordinate with other organizations and related agencies, which strengthens the target group to cooperate with various agencies, both public and private, to participate in the maintenance of water quality in the canals of the area by using the capacity building techniques of A-I-C (Appreciation – Influence – Control) and AAR (After Action Review).

- Collect data on the potential of communities and localities that are partners in environmental work that must be proposed in the community forum.
- Analyze the potential of community and local researchers who can be partners in environmental work. That must be proposed in the community forum, such as the

water supply point and the amount of wastewater in the area. Related Laws The level of spoilage and attitude of the target audience.

- Organize training to educate community researchers and community residents to be able to coordinate. Unity with other organizations and related agencies for maintaining water quality in Phra Phimon Racha Canal.
- Organize study visits in the area/community where wastewater is managed. As a result, environmental problems can be effectively achieved, successful, and indeed solved.
- Creating a team to promote the teamwork of researchers, Community Researchers, and community leaders on both sides of the Phra Phimon Racha Canal.
- Cooperate with various agencies, both public and private. Contribute to cooperation in maintaining water quality in Phra Phimon Racha Canal.
- Organize a community forum to discuss guidelines for work and organize various activities to maintain water quality in Phra Phimon Raja Canal.
- To carry out the work according to the work plan obtained from the community forum to determine the guidelines for the operation of the work.
- To monitor and evaluate the results of the work together.

(2) Promoting and pushing community organizations to be able to develop and innovate in the restoration and care of the quality of the canals of the community by appropriate technology with the following tasks:

- Development and innovation of water quality restoration and care
- Experimenting with water quality restoration and quality assurance
- Dissemination of innovations so that community residents can produce tools or products to recover household water or wastewater quality before releasing it into the canal with appropriate technology.

(3) Supporting community residents in organizing cultural activities in the canal area so that community residents and the public can learn the benefits of canal maintenance concretely. Generate average income per kitchen, ship, and foundational economic development. The work is carried out as follows:

- Supporting the community in organizing boat races, and various skits, selling goods and exhibitions, and caring for canals in the area along the Phra Phimon Racha Canal.
- Encouraging community groups and local entrepreneurs to gather to organize a flea market. On weekends and public holidays, water activities are provided, and products are sold in the wastewater produced by the community.
- Encourage community residents to raise fish in the coop to increase their income.
- Supporting the creation of community learning centers.

Data collection and research tools

This research is Participatory Action Research (PAR), so we use qualitative tools and methods to collect data recommended by experts; Assoc. Prof Dr Kanchana Keawthep, Assist. Prof. Peerachai Koonlachai, Assoc. Prof. Dr. Suvimol Wongsingthong, and Assist. Prof. Passarintr Phannan, as follows.

(1) Focus Group to analyze community and local potential The context on both sides of the Phra Phimon Raja Canal and the community's wastewater problems.

(2) Guidelines for organizing a community forum.

- Strengthening the capacity of community organizations to coordinate with other organizations and related agencies to participate in a community of cooperation to maintain the water quality in the canal.
- Promoting and pushing community organizations to develop and innovate to restore water quality in the community's canals using appropriate technology.
- Support the community in organizing cultural activities in the canal area so that the community and the public can learn the benefits of canal maintenance concretely. Generate average income per household and create a foundational economic source.

(3) Participatory observation record We were involved in various community activities. At the same time, they will interview and take note of the information they need to be more detailed.

Data monitoring and analysis

We examined and analyzed qualitative data with triangulation techniques and used the data classification analysis method. (Classification) obtained from the collection of information from documents. Participatory observation, group discussions, and community forums systematically divide the data into categories. And link data correlation through logical interpretation analysis. Logical reasoning coupled with context analysis of the study area.

Research Results

(1) The form of activities to strengthen community cooperation.

The research found the methods to strengthen the capacity of community organizations to be able to coordinate with other organizations and related agencies to cooperate in maintaining the quality of water in Phra Phimon Racha Canal. There are 9 activities:

- Collecting community and local potential data,
- Analyzing community and local potential,
- Provide training to educate community and community researchers to be able to coordinate with other organizations and related agencies for the maintenance of water quality in Phra Phimon Racha Canal,
- Study visits in areas/communities where wastewater is managed,
- Team building,
- Collaboration with various public and private agencies to participate in water quality maintenance in Phra Phimon Racha Canal.
- Organizing a community to establish guidelines for the operation and organize various activities to maintain the quality of water in The Phra Phimon Raja Canal.
- The implementation of the work plan obtained from the congregation and
- Follow-up and evaluation of joint operations.

It was found that the community leaders canal and representatives of communities on both sides of the canal and local organizations/agencies have the potential to gain knowledge, skills, attitudes, values, personalities, and motives for harmonization. Cooperation in maintaining water quality while developing and innovating in restoring and

maintaining water quality in the canal and organizing cultural activities that are beneficial to the maintenance of the Phra Phimon Racha Canal, as well as generating average income per household in the foundation economy.

Table 1 shows the training course activities on capacity building of community organizations for coordination. Create cooperation to maintain water quality.

Order	Training Content	Training Objectives	Duration
1	Knowledge of the basics of community planning and practice in building. Research Tools (Figure 3)	1. Create a positive attitude of the villagers/leaders towards the research. 2. Self-learning for teamwork 3. Practice community research tools	4 Hours
2	The role of the state in wastewater management and water quality measurement. (Figure 4)	1. Concepts and situations in wastewater 2. Knowledge of government policy, law, and role 3. Academic water quality measurement.	5 Hours
3	Study the work of communities that have experienced success in managing wastewater in the community and bring lessons to analyze themselves. (Figure 5)	1. Increase the hearts of the villagers and dancers in the struggle to achieve success. 2. Learn lessons and guidelines for managing municipal wastewater. Apply the lessons learned to analyze themselves and determine their attitude toward stakeholders.	8 Hours
4	Analysis of methods and handling of issues.	1. Practice capturing content. 2. Practice data management, content analysis, and connection	4 Hours



Figure 3: Self-learning for Teamwork



Figure 4: Wastewater Workshop



Figure 5: Observation Trip to Achieve Success

(2) Innovation to restore the quality of community water.

Innovation to restore the quality of community water with appropriate technology. Promoting and encouraging community organizations to develop and innovate in restoring the quality of water in community canals by appropriate technology through participatory action research and the implementation process. There are 3 steps:

- Development and innovation of water restoration and quality care in Phra Phimon Racha Canal.
- Experimenting with innovations to improve water quality restoration and quality care in Phra Phimon Racha Canal and
- Dissemination of knowledge. Innovation in restoring and maintaining the quality of water in the canal to the community and interested parties. It was found that the community has developed and innovated in restoring the communities' water quality along both sides of the canal, namely grease traps and green tanks.

(3) To support in organizing cultural activities in the canal area.

Organizing cultural activities for canal maintenance Supporting community residents in organizing cultural activities in the canal area so that the community and the public can learn the benefits of canal maintenance in a concrete way. The activities are,

- Supporting the community in organizing traditional events, boat races, various skits, selling goods, and exhibitions of canal care in the area along the Phra Phimon Racha Canal.

- Encouraging community groups and local entrepreneurs to organize flea markets on weekends, weeks, and public holidays by providing water activities and selling products in the wastewater produced by the community.
- Encouraging community residents to raise fish in the coop to increase income and,
- Supporting the creation of community learning centers.

Table 2, Shows the activities according to the plan of work from the coordination of cooperation to maintain water quality.

Order	Activity	Activity Purpose	Sub-activities
1	Fish farming in the coop (Fish farming in the coop is wastewater management using deterrence social measures).	1. Prevent the discharge of wastewater into the canal 2. Create life value from the water line (Figure 9:)	1. Mapping 2. Establish a group of fish breeders 3. Create a group of fish breeders 4. Record water quality measurement results
2	Install solar water turbines (solar water turbines are waste management using social distancing measures symbolically deterrence).	1. Prevent the discharge of wastewater into the canal 2. Create quality water lines for animal life (Figure 7)	1. Mapping 2. Assemble and install solar turbines
3	EM-balls (waste management based on community knowledge) (Figure 6)	Prevent the discharge of wastewater from soi canals into the big canals.	1. Mapping 2. Assemble and install EM-balls emission system
4	Installing grease traps in schools Community, waste management by creating innovations that are community knowledge	Remove fatty water before releasing water into the canal	1. Mapping 2. Assemble and install the grease trap system
5	Installation of green tanks (waste management by processing waste for good)	Process food waste from grease traps into fertilizer and fish feed.	1. Mapping 2. Install the earth's bucket. 3. Reconditioned grease-trapped food waste into fertilizer/fish feed.
6	Cultural activities (boat races are an expression of the importance of the canal culture). (Figure 8)	1. Let the people of the community join hands to organize a boat race. 2. Provide boat racing activities Disseminate and continue	1. Organize a rowing boat competition in the Phra Phimon Racha Canal 2. Organize a drawing contest for youth about boat racing activities.



Figure 6: EM-Ball



Figure 7: Solar Water Turbine

Figure 8 : Rowing Boat Competition



Figure 9: Fish Farming in the Coop

Discuss the findings.

From this research, we will discuss ;

1. Results from research objective 1 found that capacity building of community organizations to coordinate with other organizations and related agencies to participate in the form of a community for cooperation in maintaining water quality in the canal. This may be because The priority is for community researchers, community leaders, communities, and related parties to see the importance of canal maintenance as a priority, along with enhancing their capacity in knowledge on various related matters necessary for the relationship of the community to maintain the canal line in Ban Rong Saud community on both sides of the Phra Phimon Racha Canal. To create the potential to build community relations to maintain the community line to maintain the community canal line Ban Rong Saud on both sides of the Phra Phimon Racha Canal, which is in line with Tun Chomchuen and Thasanee Thungwong's research (2019) Capacity building of community household waste management in Mae Kham Nam Lat Health Promoting Hospital Service Area Mae Chan District, Chiang Rai Province. The first activity is to provide knowledge related to waste management. Raise community awareness through poster documentation. Providing knowledge through voice calls with representatives or community leaders as communicators and monitoring performance for encouraging and pushing community organizations to

develop and innovate in restoration. Use appropriate technology to care for the water quality in the community's canals.

2. Results from research objective 2 found development and innovation in water quality restoration and care in the Phra Phimon Racha Canal. This may be because the process consists of 3 steps:

- Development and innovation in water quality restoration and care in the Phra Phimon Racha Canal, in which community researchers, community leaders, and network partners have applied the knowledge gained from many parts of training together with their experience in building and developing grease traps and green tanks to be in line with the usage conditions of the Ban Rong Saud Conservation Community. The grease trap acts as a built-in food waste trap. Fat and food waste will be transferred to the green tank to be composted as fertilizer for growing vegetables in the kitchen garden.
- Experimenting with innovation,
- Dissemination of knowledge. Innovation in restoring and caring for water quality in canals in communities and interested persons and installed and used in Pracharathbumrung School. The approach to development and innovation has a process like that of Pramookh. Srichaiwong and Chatnarongsak Suthamdee (2023), who conducted a study on community innovations for water security stability for the subsistence of people in the Lapathao River Basin, Muang District, Chaiyaphum Province, found that the creation of innovations and suitable alternatives to water management through the process of community participation is the application of knowledge and selection of appropriate innovations for use in spatial development. It focuses on innovations that people in the area can access. It has a hassle-free execution process. Cheap costs can supply materials locally. Putting innovation into practice together is a source of learning and broad expansion.

3. Results from research objective 3 found that organizing cultural activities for canal maintenance Supports community residents in organizing cultural activities in the canal area so that the community and the public can learn the benefits of canal maintenance in a concrete way. This may be because the approach to development and innovation has a process that corresponds to the ways of their life like that of Pramookh. Srichaiwong and Chatnarongsak Suthamdee (2023), who conducted a study on community innovations for water security stability for the subsistence of people in the Lapathao River Basin, Muang District, Chaiyaphum Province, found that the creation of innovations and suitable alternatives to water management through the process of community participation is the application of knowledge and selection of appropriate innovations for use in spatial development. It focuses on innovations that people in the area can access. It has a hassle-free execution process. Cheap costs can supply materials locally. Putting innovation into practice together is a source of learning and broad expansion.

Research recommendations

From the research results, The researcher has suggestions as follows:

1. Suggestions for applying research results

1.1 Results from research objective 1 found in terms of building community organizations to coordinate with other organizations and related agencies, the capacity to

participate in a community of cooperation to maintain water quality in the canal. Therefore, relevant agencies should take action. As follows :

- It has led to the creation of 10 team collaboration agreements. It enables the community researchers to adapt their roles and responsibilities to work energetically to achieve the goals. Therefore, the group should use this activity to build the capacity to work together in other parts of the community.
- From training in measuring wastewater by checking the oxygen content in water with scientific equipment, the trainees have the skills to use the equipment at the laboratory level. Therefore, this knowledge should be applied to measure water lipids, also a factor in wastewater.
- From the study visit to the Samut Sakhon Green Project at Bang Ping Subdistrict Municipality, Muang District, Samut Sakhon Province, until the participants had a perspective on water quality prevention and maintenance, communities on both sides of the Phra Phimon Racha Canal should be developed as a study site to continue to monitor the prevention and maintenance of water quality.
- Based on the analysis of the potential, the research team selected a water quality management project, namely the E.M. Ball project, the water turbine project, and the grease trap project. Green Tank Project There were six fish farming projects and traditional boat racing projects, but when implemented, some projects exceeded the team's potential, making it only partially operational. Therefore, it is proposed that a government agency be directly responsible for it.

1.2 Results from research objective 2 found that promoting and pushing community organizations to develop and create innovations in the restoration and maintenance of water quality in community canals by appropriate technology. Therefore, relevant agencies should take action. As follows:

- From the effect of water quality care. The community research team has used E.M. Ball, which is the body of knowledge gained from community sages. Therefore, a group of production enterprises should be established to distribute and expand to other Phra Phimon Racha Canal Line communities to monitor and maintain the quality holistically throughout the line.
- From the effect of water quality management with solar turbines, alternative energy with economic value. Therefore, it was agreed to increase the number of turbines in the canal line to deter wastewater discharge into the canal symbolically by coordinating with neighboring communities along the river.
- Effect of water quality care with grease traps installed at schools in the community can serve as an example for residential buildings where fat is released into canal lines. Therefore, the installation of grease traps in buildings should be expanded. Houses, shops, and markets where fat will likely be released into the following canal line.
- The effect of water quality management with green tanks is the removal of contaminated food waste from entering the canal line that is easy to prepare and can also be processed to create value. Therefore, it is desirable to campaign for all households with areas adjacent to the canal line to have green tanks.

1.3 Results from research objective 3 found that supporting community residents in organizing cultural activities in the canal area so that the community and the public can learn the benefits of canal maintenance concretely. Generate average income per household and

develop a foundational economy. Therefore, relevant agencies should take action. As follows:

- The fish farming project in cages has reduced household expenditures and increased protein for participating students due to learning the benefits of canal maintenance.
- Learning the benefits of canal maintenance with traditional boat racing projects and painting contests on both sides of the Phra Phimon Racha Canal construct the youth aware of the value of the river to the culture that has been passed down. However, due to the disruption during the COVID-19 pandemic, community residents should be encouraged to continuously restore boat racing activities on the Phra Phimon Racha Canal.

2. Suggestions for next research

This research has found how to participate in Organizing Civil Forums to preserve canal Lines on both sides of Phra Phimon Racha Canal, Bang Bua Thong District The important thing is community innovation by themselves. It can be applied to the other sides, especially, next to the side of Phra Phimon Racha Canal, Ban Rong Suad village. We should give importance to the community next to it. For the next research issue, research should be done on issues related to the others next to Ban Rong Suad village because they have affected the same canal line.

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