Community Water Resources Management For Sustainable Agriculture

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Abstract

Water is very important for all lives. The agriculture needs the water for the growth and to be food security. The physical planet has changed such as climate change, drought and others and these changes have made the water unstable. The hypothesis was "The water resource management and collaboration have a profound effect on sustainable agriculture". The objectives were to 1) study the nesscessity of water for agriculture 2) study the collaboration and 3) find "community water resource management for sustainable agriculture approach". This research was a qualitative study which was conducted based on Walter Wallace Wheel's Diagram, documentary research and indepth interviews in four areas.

The research found that: the valuable ideas and theories, roles and responsibilities for community water resource management for sustainable agriculture as 18 findings created an approach called "Community Water Resources Management for Sustainable Agriculture Approach: CWRMSAA Approach". Thus the public sector, the private sector and the civil society need to work together for sustainable agriculture.

Therefore, the final needed impaction will be "Sustainable Agriculture" which consists of quantity of water, quality of water, future need of water, wellbeing, good mental health, water security and food security in order to be the quality of life of our future.

Keywords: Community, Water Resources, Management, Sustainable, Agriculture

Introduction

"**Sustainable Agriculture**" is consistent with Sustainable Development Goals in various issues such as 1) No poverty 2) Zero hunger 3) Good health and Well-being 12) Responsible consumption and Production 13) Climate action 15) Life on land and 17) Partnerships for the goals. Therefore, the researcher has been interested in the topic "**Community water resource management for sustainable agriculture**" in order to encourage "World Sustainable Development" in this conference. The researcher has focused on the issues of community water management because water is the source of sustainable agriculture and also a source of food security.

Water is one of the major natural resources for human being, wildlife, manufacturing and agriculture over the world. The physical planet has been changed by the use of natural resources such as deforestation, burning of fossil fuels, emissions of toxic gases from factories etc. And we have recently seen a number of unwanted natural phenomina: global warming,

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climate change, greenhouse effect, drought, el nino event, la nina event and others. These changes have made the volume of water and food unstable. Furthermore, in the next 30 years the world population will be increased from 7.7 to 9.7 billion people (United Nations Population Division, 2019) that will impact on water and food security unavoidably.

The United Nations, UN, recognizes the importance and has determined the 22nd March of every year is the "World Day of Water" since 1992. Worldwatch institute evaluated the use of water at a global rate of 70 percent for agricultural farming, 19 percent for industrial use, and 11 percent of the consumption of the consumer. The countries that use the most water are India, China and the United States (Capua J., 2013). International Water Management Institute, IWMI, has defined water scarcity as the relationship between water demand and quality. The World Bank, International Financial Institutions and the World Water Council also focused on large-scale water resources development projects to solve the current water crisis that has impacted on the environment such as human being, wildlife being, forest, ecology and people migration for better life.

However, the researcher focused only on the benefit of the water resource management for sustainable agriculture to find out the reasons for the research hypothesis.

Background and the importance of the problems

For centuries, Thailand has been an agricultural country. The lifestyle of Thai people is simple; however, the current climate change has impacted on water and food security in Thailand like other countries in the world.

From the statistics of water resource usage in 2019, a total of 151,750 million cubic meters access to water resources was 102,140 million cubic meters only. (Royal Irrigation Department, 2017) However, the demand of water resource varies with the character of the land use as follows:

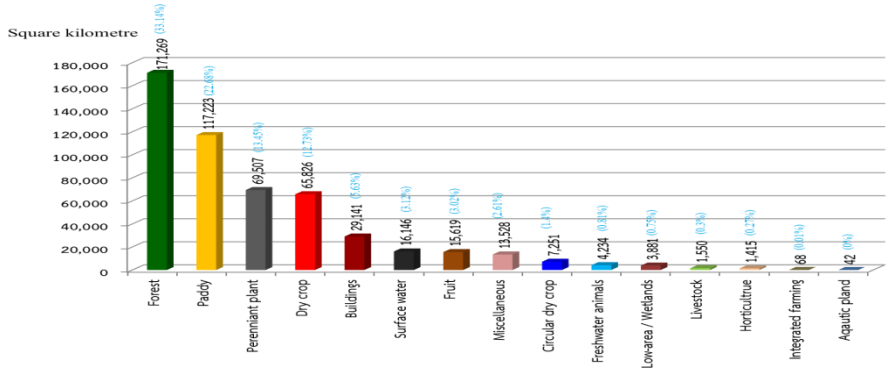

Figure 1: Summary of the land use in Thailand (2019) and the total area 516,822.63 square kilometer

Source: The Ministry of Agriculture and Cooperatives. (2017)

This diagram shows the land use in Thailand (2019). The area of 323,014,142 Rai has the forest 33.14 percent, paddy 22.68 percent, perennial plant 13.45 percent, dry crop 12.73 percent, buildings 5.63 percent, surface water 3.12 percent, fruit 3.02 percent, miscellaneous 2.61 percent, circular dry crop 1.40 percent, freshwater animals 0.81 percent, low-area/wetlands 0.75 percent, livestock 0.30 percent, horticulture 0.27 percent, integrated farming 0.01 and aquatic plant 0.00 percent. And all land use must rely on water resources from 25 basins across the country inescapably.

Objectives

The objectives of community in the water resources management were to 1) study the necessity of water for agriculture 2) study the collaboration and 3) find "Community Water Resource Management for Sustainable Agriculture Approach" for quality of life.

Hypothesis

The hypothesis of this research was “The water resource management and collaboration have a profound effect on sustainable agriculture”.

Research areas

The four particular and outstanding research areas were 1) Loa Chee Kui village, located in Tambon Patung, Amphoe Maejun, Chiang Rai. 2) Don Rug village, located in Tambon Don Rug, Amphoe Nonggik, Pattani. 3) Huy Ta Klae village, located in Tambon Talang, Amphoe Tayang, Phetchaburi and 4) Kra Seaw Dam area, located in Tambon Danchang, Amphoe Danchang, Suphan Buri.

Theories, concepts, and reviewed literatures

- Self-Reliance of Farmers due to the Royal Majesty in King Rama 9. (The Chaipattana Foundation, 2019) The concept of Farmers' Self-Reliance Development of Royal Initiatives are concentrated in Self-Reliance.
- Civic Public Administration, CPA. (Laothamatas, A., & Rattanaset, W., 2014).

The concept of CPA uses the principle of citizenship.

- New Public Service, NPS (Denhardt,J.V., & Denhardt, R.B., 2007)

The concept of NPS uses the conditions for listening to opinions of the service recipients.

- Participatory theory. (Panacha, S., 2015) The concept of Participatory theory uses the People’s participation in all dimensions.
- Self-Reliance Principle. (Taya, M., 2019) The concept of Self-Reliance Principle uses 5 principles: Natural Resource Self-Reliance, Economic Self-Reliance, Social Self-Reliance, Psychological Self-Reliance and Technological Self-Reliance.

Methods

This research was designed as a qualitative study. The following research tool was based on Walter Wallace Wheel's Diagram, documentary research and indepth interview from the Key-informants.

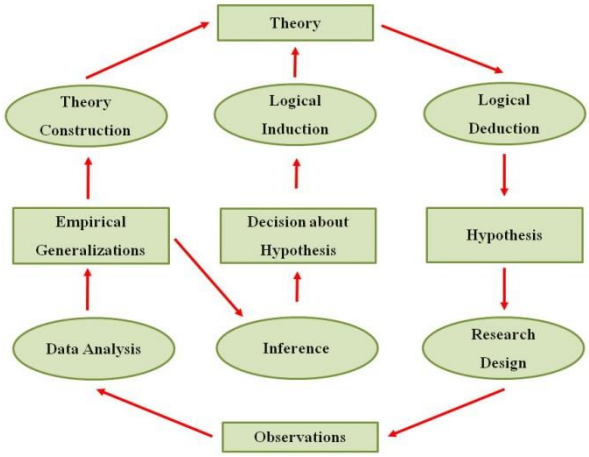

Figure 2: Walter Wallace Wheel
Source: Aldine. (1971)

Qualitative research is the way to find out the truth from situations, environments etc. in order to understand the insight of the holistic unit of analysis context. Some researchers call this research naturalistic research which let it be natural and not manipulate anything. The Walter Wallace's Wheel is one of research types. There are 8 or 10 steps in its solution. First, the researcher has to set up the hypothesis statements from documentary research and research problems, hence the researcher often refers to these variables: measures, operational definitions, manifest variables, etc. A hypothesis is a prediction or extrapolation that a particular relation will be found in a research area. Second, the research design is carefully set by the researcher's imagination which is the decisions about the case studies, research areas, focus groups, interview, method of data collections, method of measurements, and procedures. The findings should support the researcher's hypothesis. Third, the observations are data collection which impact on facts and senses in order to use for our findings. Fourth, the data analysis is used for breaking into small pieces and being classified. Fifth, the empirical generalizations are the groups of data which group carefully. Sixth, theory construction is the step of building the focus of each group. Then it becomes the theory as the seventh step for using in our research. Finally, the logical deduction is shown and the new generation researcher may abolish this theory because it may be out of date.

For the other way after the fifth step, the inference is the evaluation of the empirical generalizations to be a decision about hypothesis for the logical induction. Thus, it becomes the theory alike as the diagram above.

Results

The first outstanding research area is Loa Chee Kui village, Yoa Thai Mountain community. This community in the early stages did not have any village water source so their lives were tough. To improve their quality of life, HRH Princess Sirindhorn initiated a development project that created a reservoir for water conservation for them.

For the water resource problems at this village, it found that water resource management requires careful thinking of conflict among the people in the village because there is small amount of water for consumption, agriculture and livestock. The village committee was established to participate and collaborate in water resource management. Water users cause the exchange of ideas, work, responsibility and sharing of interests. The officers of the Royal Irrigation Department have continually provided knowledge of water resource management to them as mentors. It makes the cooperation between people in the community and the officers to be better and better. The villagers have the foundation for love to live together according to ethnography as a large family until now.

The second outstanding area is Don Rug village which is a multiculture area between Muslim and Thai. There are 1,200 households and the area is about 1,000 rai and relying on water resources from Pattani Dam for consumption, agriculture and livestock. What are the factors that make this community succeed in the midst of different cultures? The research found many interesting factors in this community for sustainable success such as 1) the good relationship between the people although there have been different religion and culture for a long time. 2) the Royal Irrigation Department officers act as a facilitator in the process of inviting farmers to participate and collaborate in various ways of thinking to share the water that has been optimized thoroughly and fairly. The farmers are mostly interested in related field trips in order to apply for their sustainable agriculture. 3) this community received rice seed support from the National Science and Technology Development Agency such as Hom Cholasit Rice and planting methods. 4) When there is excess water resources, villagers will use many methods of digging ponds and keeping water resources for use when water is scarce in their field. There is a pipe linking together and a water diversion to help the other reservoirs where the water is depleted, called "Sa Phuang". It makes amount of water all the time. This activity reflects the sharing that maintains commitment and sustainable relationships. 5) The effective communication between the Royal Irrigation Department officers to farmers and farmers to farmers make it very complete. 6) The groups of water user have been established from the advice of the Royal Irrigation Department officers continually. 7) Inspiration which this community has confidence in their thoughts or actions that can happen in concrete for sustainable agriculture as National Irrigation Water Farmer Institute. 8) The people in this community has been honored as an agricultural learning Center in 2016 and the farmers have worked as teachers.

The third small area, Huy Ta Klae village receives the water from Khao Moo Reservoir which is a small reservoir and has a storage volume of not more than 10 million cubic meters.

It is an area that has failed to manage the water resources. Since the use of water resources from the water source is free for everyone, there is no limit for all activities in their village. It does not cause proper performance of water resources. When the water shortage occurred, there was a conflict between the farmers and the water user group. The disputes and conflicts will appear between the people as Edward Lawrence said in a Chaos theory. (Halpern P., 2018) The last great area, located in Kra Seaw reservoir Danchang, is a highly successful area which was awarded the Public Service Quality Award in 2010 and the United Nations Public Service Awards 2011. What were the factors that made it succeed completely? It is appropriate to be the water resource management model by participation principles. The irrigation management committee was established consisting of representatives from 4 parts: the farmers, the water use groups, the Royal Irrigation Department officers and the private sector organizations. The total service recipients of approximately is about 7,000 people in this area. It can cultivate more than one time per year, the farmers have more income and reduced conflicts in the community. The problems, interferences, hindrances and obstacles during the first phase of the operations were the unacceptable attitude of Royal Irrigation Department officers in irrigation management methods, lack of integration skills in large irrigation areas and the large number of the water users. It can be found that many factors that make the water resource management of the Kra Seaw reservoir succeed to receive important awards include participation and collaboration systematic coordination, having the farmer's volunteers, getting support from the private sectors and every sector see the future together.

Discussions

Based on the document research, the research found 7 concepts and theories such as 1) The integration of government 2) The social learning 3) The community network 4) The public participation 5) The good governance principles 6) The local wisdom and 7) The knowledge transfer. And there are 11 issues in the field such as 1) Civic Public Administration and New Public Services 2) The participation and collaboration of all sectors 3) The learning culture of the local communities 4) The theory of accustomed or the boiled frog theory 5) The self-esteem 6) The inspiration 7) The integration 8) The communities and networks 9) The Chaos theory 10) The local democratic community self-reliance and 11) The leadership of community leaders and the entrepreneurs associations. From the above, 18 findings, they are consistent with the concept of Civic Public Administration (CPA), New Public Management (NPM), New public services (NPS) which can be used to manage community water resources for sustainable agriculture as follows:

Civic Public Administration, CPA, means the government administration focused on creating citizens changing the poor or the lower class to strengthen and know their roles and duties under the law traditions and traditions can be self-reliant ready to cooperate with the

government sector to create prosperity for the nation and strengthen civil society with sustainability. (Laothamatas, A., & Rattanaset, W., 2014)

The creation of citizenship is evident through the foundation of the administration of three public affairs such as the civil society, the public sector and the private sector.

In the early era it was in accourdance with the Old Public Administration, OPA, which was the ideal bureaucratic system of Weber. There are 6 principles such as 1) There was a clear administrative boundary 2) Adhere to the structure of organization and the hierarchy 3) The centralize power 4) Adhere to training and expertise to determine the position 5) Hiring full-time staff and 6) The administration was in accordance with rules that were not flexible.

From that time of the absolute rules of the civil rights of the people as citizens as the recipient of the order and only followers, the central authority was in the central government and participation is still relatively unknown. Subsequently, there was the democratic form of government in which the representatives of the people elect the representatives in the area to act on their behalf in all of fields, separation of politics from administration, politicians act as policy makers, and government officials act as practitioners. People have a duty to receive benefits and impacts from all policies. Participation and collaboration in various activities were not yet visible and clearly enough.

Due to the accumulation of various problems in government management, economic crisis, technology, new policies, including the change of people's needs according to the current of the world, the second era appeared in the name of New Public Management, NPM, reformed of the public sector management that changed the perspective for people to be like customers based on the business sector concept. There was a competition to reduce monopoly, using the marketing mechanism in the preparation of public services. It was the important time for reducing government size and decentralization management according to the command line as a contract management. There was a system for measuring performance, determining the indicators and standards of the work in order to maximize the efficiency of the public sector to be as professional, economic and cost effective. There was a performance evaluation focussing on public service to be the important mission. They used the civil society participation and collaboration to find the ways to develop their communities.

The current era is the time of the New Public Service (NPS). It is a concept in the perspective of public administration that searches for many real problems from the public services that government and civil society should cooperate with. There are discussions which are consistent with the democratic governance in creating people to be citizens and bringing the accurate public benefits that meet the objectives of service recipients while there are limited natural resources. The relationship with democratic form of deliberative democracy focuses on the discussion and explanation and uses the principle of participation and collaboration as an important issue.

The New Public Service (NPS) consists of 4 key points: 1) Theories of democratic citizenship 2) Models of community and civil society 3) Organizational humanism and the New Public Administration, and 4) Postmodern Public Administration. (Denhardt, J.V., & Denhardt, R.B., 2007)

The New Public Service (NPS) has the democratic framework, citizenship and services to obtain public benefits as the best choice. The Civic Public Administration (CPA), the New Public Service (NPS) and Participation and Collaboration between civil society, the private sector and the public sector must have a corresponding role and duty so that we can apply this to sustainable water resource management in the community to be a "**sustainable agriculture**" for wellbeing, good mental health and quality of life in our future.

Suggestions

The topic "**Community Water Resource Management for Sustainable Agriculture**" is a guideline for spatial development for quality of life. We should find what, when, where, why and how the real problems are occurring in the interested area and carefully put many ideas into many solutions. There should be a public relations plan, campaigning for all stakeholders to recognize the importance of participation and collaboration in the issue of opinions on problems that arise. The facilitator must be a person who has been trained and has enough skills to lead the conference. The appropriate forms of stakeholder meetings must be studied. The summary of the problems and solutions must be done in a professional, fair and clear way. Allocation of the water resources to agriculture should depend primarily on the civil society or the stakeholder in the area, not orders from the government or politicians. We should set up a volunteer irrigation group from people with public mind and should have water storage based on the amount of water used at an appropriate rate.

Conclusions

The research found "**Community Water Resource Management for Sustainable Agriculture Approach: CWRMSAA Approach**" as follow:

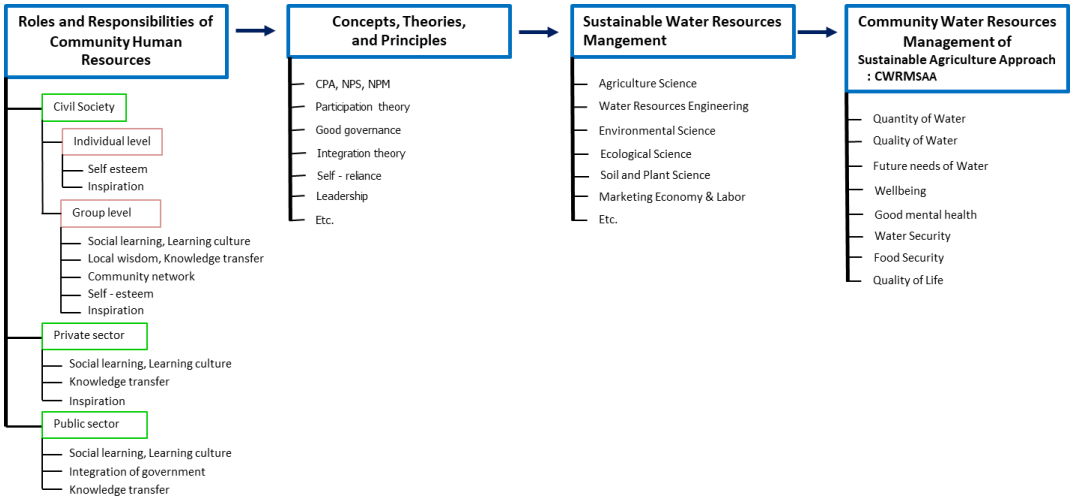

Figure 3 : Community Water Resource Management for Sustainable Agriculture Approach: CWRMSAA Approach

The Community Water Resource Management for Sustainable Agriculture Approach: CWRMSAA Approach above demonstrates the importance of the community to have a systematic concept in community water resource management for sustainable agriculture. The roles, responsibilities, participation and collaboration of the community human resources must be qualified of civil society, private sector and public sector. Concepts, theories and principles of management are needed. Many different sciences are also needed to be used to solve problems as an integrated way such as Agriculture Science, Water Resources Engineering, Environment Science, Ecological Science, Soil and Plant Science, Marketing Economy and Labor etc. Therefore, the final impaction needed will be "**Sustainable Agriculture**" which consists of quantity of water, quality of water, future need of water, wellbeing, good mental health, water security and food security in order to be the quality of life of our future.

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