ENVIRONMENTAL EDUCATION FOR SUSTAINABLE AGRICULTURE MANAGEMENT

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ENVIRONMENTAL EDUCATION FOR SUSTAINABLE AGRICULTURE MANAGEMENT

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ABSTRACT

The general objective of the research was to present a model of environmental education for sustainable agriculture management. There were 3 specific objectives: 1) studying the community environment related to farmers, management, agricultural occupation and environment; 2) designing a model of environmental education emphasizing farmers' participation for sustainable agriculture management; and 3) evaluating the efficiency of the model. Data was collected from informants who were the heads of farming households living in Banglen District, Nakhonpathom Province. There were 4 groups of informants: 1) 75 farmers for collecting data on the community environment; 2) 37 farmers for collecting data on the activity of the environmental education process; 3) 18 farmers for collecting data on the actual implementation; and 4) 10 local experts being interviewed for the model confirmation. Thus, the observation, interview and questionnaire were available for data collection.

The research findings revealed that the major causes of the farmers to have low income and environmental problems in community. As the farmers did their plans of agricultural occupation emphasizing the production factors. This was the reason why a model of environmental education for sustainable agriculture management which was integratedly based on concept of environmental education and principle of project management covering 7 steps: 1) studying the existing of environment in the community; 2) designing the environmental education model; 3) placing the model in a part of resources of environmental education; 4) processing the environmental education; 5) evaluating the achieved learning of environmental education; 6) doing the environmental management; and 7) being healthy people living in a healthy environment. However, the environmental education was considered to reach the quality of environment and the project management was considered to get higher income for the farmers. The model efficiency evaluation presented that the farmers got higher skills of management and were able to write a plan related to their agricultural works which would enable them to get higher income and ensure the quality of the environment. Furthermore, the intention to act on the plan was very high and there were statiacally significant reference at 0.05 when compared the farmers learning before and after providing the environmental education activity.

Moreover, the research recommendations related to agricultural occupation leading to have higher income and quality caring of environment in community, a concept of environmental education and principle of project management need to be integrated and emphasized the production process to reach goal of the occupational plan for the farmers or the organization related to farmer development as well.

KEY WORDS: ENVIRONMENTAL EDUCATION/ MANAGEMENT/
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บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์ทั่วไปเพื่อสร้างรูปแบบกระบวนการสิ่งแวดล้อมศึกษาที่ทำให้เกษตรกรสามารถจัดการอาชีพเกษตรกรรมที่ส่งเสริมคุณภาพชีวิตและสิ่งแวดล้อมในชุมชนอย่างยั่งยืน มีวัตถุประสงค์เฉพาะ 3 ประการ ได้แก่ ประการแรกเพื่อศึกษาสถานการณ์ปัจจุบันเกี่ยวกับเกษตรกร การจัดการ การประกอบอาชีพเกษตรกรรม และสิ่งแวดล้อม ประการสองเพื่อสังเคราะห์รูปแบบสิ่งแวดล้อมศึกษาที่เน้นการมีส่วนร่วมของเกษตรกรเพื่อการจัดการเกษตรกรรมอย่างยั่งยืน และประการสุดท้ายเพื่อประเมินประสิทธิภาพรูปแบบสิ่งแวดล้อมศึกษาเพื่อการจัดการเกษตรกรรมอย่างยั่งยืน กลุ่มตัวอย่างประกอบด้วยผู้ให้ข้อมูล 4 กลุ่ม ได้แก่ กลุ่มแรก เกษตรกร จำนวน 75 คน สำหรับรวบรวมข้อมูลทั่วไปในชุมชน กลุ่มสอง เกษตรกรจำนวน 37 คน สำหรับการจัดกิจกรรมสิ่งแวดล้อมศึกษา กลุ่มสาม เกษตรกรจำนวน 18 คน สำหรับการทดลองปฏิบัติจริง และกลุ่มสี่ ผู้ทรงคุณวุฒิ จำนวน 10 ท่าน ทั้งนี้ได้รวบรวมข้อมูลโดยใช้การสอบถาม การสัมภาษณ์ และการเสวนาผ่านกระบวนการกลุ่ม

ผลการวิจัยพบว่า สาเหตุสำคัญที่ทำให้เกษตรกรมีรายได้ไม่เพียงพอและประสบปัญหาสิ่งแวดล้อมในชุมชน เนื่องจากเกษตรกรวางแผนการประกอบอาชีพเกษตรกรรมโดยเน้นปัจจัยการผลิตเป็นสำคัญ ด้วยเหตุนี้รูปแบบสิ่งแวดล้อมศึกษาเพื่อการจัดการเกษตรกรรมอย่างยั่งยืนจึงเป็นการบูรณาการระหว่างแนวคิดสิ่งแวดล้อมศึกษากับหลักการบริหารโครงการบนฐานของทฤษฎีระบบ ประกอบด้วย 7 ขั้นตอน ได้แก่ *หนึ่ง* การศึกษาสิ่งแวดล้อมในชุมชน *สอง* การสังเคราะห์รูปแบบสิ่งแวดล้อมศึกษาเพื่อการจัดการเกษตรกรรมอย่างยั่งยืน *สาม* การนำรูปแบบฯไปเป็นองค์ประกอบในปัจจัยนำเข้าทางสิ่งแวดล้อมศึกษา *สี่* การจัดกระบวนการสิ่งแวดล้อมศึกษา *ห้า* ผลการเรียนรู้สิ่งแวดล้อมศึกษา *หก* การจัดการสิ่งแวดล้อม และ*เจ็ด* คุณภาพชีวิตและสิ่งแวดล้อมในชุมชน อย่างไรก็ตามสิ่งแวดล้อมศึกษาถือเป็นปัจจัยสำคัญที่นำไปสู่การพัฒนาคุณภาพสิ่งแวดล้อม ส่วนการบริหารโครงการจะเป็นแนวทางนำไปสู่การมีรายได้เพิ่มขึ้นจากการประกอบอาชีพเกษตรกรรม ทั้งนี้ผลการประเมินประสิทธิภาพรูปแบบฯดังกล่าวพบว่า เกษตรกรสามารถวางแผนการประกอบอาชีพเกษตรกรรมที่นำไปสู่การมีรายได้เพิ่มขึ้นและมีความตั้งใจที่จะจัดการอาชีพเกษตรกรรมที่เป็นมิตรกับสิ่งแวดล้อมในระดับมากที่สุด นอกจากนี้ผลสัมฤทธิ์เกี่ยวกับการเรียนรู้ของเกษตรกรก่อนและหลังการจัดกิจกรรมสิ่งแวดล้อมศึกษาพบว่า มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติที่ระดับ 0.05

ข้อเสนอแนะเกี่ยวกับการประกอบอาชีพเกษตรกรรมที่นำไปสู่การมีรายได้ที่เพียงพอและการจัดการสิ่งแวดล้อมในชุมชนอย่างมีคุณภาพนั้น เกษตรกรและหน่วยงานที่เกี่ยวข้องกับการพัฒนาเกษตรกรควรดำเนินการเชิงบูรณาการระหว่างแนวคิดสิ่งแวดล้อมศึกษากับหลักการบริหารโครงการโดยเน้นแผนงานหรือโครงการที่ให้ความสำคัญกับวิธีการที่สามารถบรรลุวัตถุประสงค์ตามความต้องการของเกษตรกรได้อย่างมีประสิทธิภาพ
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CHAPTER I
INTRODUCTION

1.1 Rationale and Justification

The classification of agriculture in the past was developed from the specific design for the community which was based on ecological, economic, social and cultural conditions. Production systems were arranged to match with those conditions and transformed into knowledge and wisdom passed on to the next generation. Furthermore, the farmers emphasized the diversity of production to provide self support and to exchange excess products for other products that they were unable to produce themselves (Paiboon Hengsuwan and Associates, 2004: 11; Vitoon Pannyakul, 2004: 36). With the recent application of the National Economic and Social Development plan, 1st edition, for developing the country, agricultural development has been directed at exports by growing single crops for commercial benefit (Department of Environmental Quality Promotion, 1999: 75). It is being done to meet market demand in both quality and quantity (Office of Economic Agriculture, 1992: 5) as well as to respond to growing demand in agricultural products, especially main crops for export, such as, rice, cassava, para rubber and corn. This has made farmers change the production system from traditional mixed crops to a single economic crop (Office of National Economic and Social Development Council, 2001: 1). After such a crop is exported for a certain period, the price of the main crop in the world market begins to decline and fluctuate which causes farmers to continue facing problems that directly affect their incomes (Office of National Economic and Social Development Council, 2000: 1).

As well as its effect on farmers' incomes, the single crop grown for commercial or modern agriculture or chemical agriculture has emphasized the use of

external production materials to increase production per rai. For example, the application of agriculture technology such as fertilizer or chemical to eliminate pests, improved crop seeds and agricultural machineries have also caused many problems in the loss of bio diversity and ecosystem, and in illegal deforestation to make way for agriculture. Farmers' debts from heavy investment are increasing through the use of fertilizer and pesticides, including the application of various production technologies (Sustainable Agriculture Foundation, 2003: 146; Department of Policies and Environmental Planning, 1997: 1-2). Furthermore, natural resources which are fundamental factors for agricultural production, i.e., soils and water, have continued to decay from natural resources utilization without conservation and restoration (Office of National Economic and Social Development Council, 2000: 1). Besides, the use of chemicals and their residue has meant that they have accumulated in the human body (Annusorn Unno, 2003:96) and also destroyed natural and friendly insects, leaving residues on produce and environment (Veera Katunyukul, 2004: 4-6). Existing problems have had effects on life quality and the environment and have become a critical issue for farmers and consumers whose existence depends on the environment and natural resources (Department of Environmental Quality Promotion, 1999: 75).

Agriculture as previously mentioned has continued to damage natural resources and environment without balancing between foundation resources, agriculture technology, and the environment. This has caused an inconsistent relationship in the activities of man, animals, plants and environment which has resulted in non sustainable action. Sustainability should be adapted as an integrated holistic practice by joining all relevant factors together (Phrathampidok, 2000: 62-63). And sustainable development is development tha last, sustainability is an in – built feature of all natural environmental system provide that human interference is absent or minimised (Chris Park, 1997: 23). Sustainable agriculture is mainly involved with resources and environmental friendly agriculture with the emphasis on complimentary relationships between humans, animals, plants and environment (Sompun Techaartik, 2001: 62). Therefore, a significant turning point in Thai agriculture occurred with the implementation of the National Economic and Social Development Plan that was directed at developing economic growth and pushing for industrial economic

expansion (Paiboon Hengsuwan and Associates, 2004: 12). Furthermore, the trend for developing the national economy has failed to develop agriculture systematically. The development has been directed only at industrial development in public utilities and welfare (Boonchu Rojanasathien, 2003: 110). Many factors which have caused changes in agriculture, i.e., increasing population, the world market system, new agricultural technology for production, the economy, social changes and politics have resulted in changes from traditional agriculture to commercial agriculture (Paiboon Hengsuwan and Associates, 2004: 12; Vitoon Panyakul 2004: 9). Such events have become crucial problems that the public and private sectors and farmers have expressed their interest in and actively tried to solve through concepts of sustainable agriculture. This is a production system in agriculture which favors restoration and preservation of natural resources, and balancing ecosystems and the environment. The system would yield economic return and righteousness to society as well as promoting life quality development among farmers and consumers, leading to sustainability eventually (Office of National Economic and Social Development Council, 2000: 1).

The unsustainability has become a critical problem that needs to be solved urgently. Those problems are being included in the national policies and planning for Thailand Sustainable Development in accordance with Agenda 21: Programme of Action for Sustainable Development, part of the Sustainable Agriculture and Rural Development plan (Ministry of Foreign Affairs, 1994: 37; Office of Policies and Environmental Planning, 2004: 98). Furthermore, there have been large numbers of illnesses and deaths from chemical pesticides on a yearly basis (Office of Policies and Environmental Planning, 2002: 126, 2547: 96). Moreover, each region has encountered problems of lacking land for living, water management for production, prices of agricultural products, farmers' debts, cooperatives and shorelines fisheries. Every problem is connected with each other with cause and effects that have become setbacks for sustainable development. All of the problems have originated from farmers, government policies and problem-solving processes lacking a holistic point of view (Nation Economic and Social Advisory Council, 2003: 105-106).

Agriculture consists of 3 related elements (Green Earth Foundation, 1994: 24-25). The first element is resources which represent the foundation factor for production and define the method for agriculture. The second element is agricultural technology for traditional agriculture which needs the application of technology in certain levels since agriculture has been man-made instead of nature made. Agriculture has developed and become successful to the point of being able to multiply food supply for adequate consumption. However, excess application of technology could result in disruption of natural fertility and eventually create environmental pollution. The third element is the current state of environment which has received wide concern because pollution and toxic chemicals from agriculture may be harmful to humans and other living creatures. Sustainable agriculture should maintain a balance of all 3 elements through maintaining natural resources and conserving the environment.

Agriculture is a complicated process that is not only a matter of growing crops or raising cattle but also managing production processes and existing technology to match with the ecosystem, economy, society and environment so that production can be planned by farmers (Vitoon Panyakul, 2004: 33-34) who apply sustainable agriculture in management of resources for successful agricultural production. The process must involve decision making in choosing resources for production and appropriate technology that should yield proper economic rewards for farmers and also ensure adequate food supplies for all families in Thailand without damaging the environment (Charun Chunlukana and Pakapan Sakulman, 2003: 7-9). Also, sustainable agriculture has not set its goal only in household consumption but also it has defined production management for extending production in the long run. At the same time, there must be management for balancing the system (Vitoon Panyakul, 2004: 30). Agricultural management must constantly involve decision making for planning short, medium and long term operations, especially in goal, process, resources and time frame of agriculture management. As for decision making for planning, it must be associated with other factors in the physical area, internal and external factors, including economic, social and cultural systems that require farmers to reduce production risks to the minimum (Vitoon Panyakul, 2004: 40-41).

Considering other existing agricultural problems which have caused non-sustainability and had direct effects on agricultural occupations among farmers, it may be stated that management is the most significant problem facing farmers at this moment. The current problem facing Thailand originates from the country's mechanisms and management in the government, business and people sectors which are inappropriate for many reasons. When the country faced rapid changes in environment from the globalization fever, the economy and Thai society became weakened and headed towards imbalance and non-sustainable development (Office of National Economic and Social Development Council, 2001: 7). Many problems facing farmers resulted from inaccurate and improper management even though factors in management still remained with farmers (Manmas Chunlukana and Associates, 2005: 324). When farmers were unable to manage the agricultural system, products became inferior in quality and production ineffective (National Economic and Social Advisory Council, 2003: 105). Such management is important for individuals since management should prepare them for appropriate resources allocation to achieve set objectives effectively. It would include decision making for fundamental processes (Nutapun Kaejonnun and Chatraporn Samaechai, 2005: 37). According to the principles of agricultural development, there must be planning that is clearly defined in management procedures (Sukhothai Thammathirat University. 1983: 476) through management by farmers as well as self-planning for proper production in the area (Office of National Economic and Social Development Council, 2000: 3).

Another way to solve problems directly related to management must be aimed first at the individual who has caused problems (Department of Environmental Quality Promotion, 1997: 17). It must be done by developing knowledge and understanding in management among farmers so that they could manage and plan goal, process, resources and time frame in sustainable agriculture. Management is the most important thing for activities which involve plants, animals, time, labor, funds and community participation. The activities must blend and compliment each other, leading to sustainable agriculture through demanding awareness of proper management among farmers (Nunthiya and Narong Huranuvat, 2004: 108-114).

In this research, the researcher applied the environmental education process so that farmers could manage sustainable agriculture through the environmental education model that enabled them to sustainably promote quality of life and environment in the community. This research was carried out as participatory action research (PAR) at Banglen District, Nakhonpathom Province because most of population of Banglen District made their living mainly from agriculture. The area is fertile from being low lying land watered by the Ta Chin River. Most soils are clay originating from accumulation of soil sediments which has made Banglen District suitable for agriculture such as growing rice in the paddies, fruits in the orchard, breeding shrimps and fishes, and raising ducks and fowl. Presently, agriculture at Banglen District has not been done as sustainable agriculture since farmers are facing problems in resources management and production through the excessive use of chemical pesticides and fertilizer in agriculture. In general, growing rice or general farming of Banglen District is intended mainly for high production regardless of initial production costs and subsequent effects. This practice has deteriorated water and soils quality as well as affecting life quality and people's health (Banglen Research project (2003: 2). These are only some of the results from agriculture at Banglen District, even though there were many previous problems. Therefore, there must be some studies and analysis, leading towards proper management and sustainable problem-solving in making a living from agriculture in the community.

The researcher aimed at making environmental education for management of sustainable agriculture as an important model for managing agricultural occupations, and developing the farmers in environmental education objectives and management skills. In addition, it was important that they get more income to give security in economics, products and production, the environment and sustainability at all levels together. Moreover, this research takes environmental education as a process which can help the farmers manage their agricultural occupation to get more income, improve the quality of lives and the community environment. There were 4 research questions: 1) Did the environmental education process help farmers manage their agricultural occupation to get more income and supporting quality of lives and environment? 2) How did the community environment relate to farmers, management,

agricultural occupation and environment? 3) How did the model of environmental education process emphasize farmers' participation for sustainable agriculture management?4) How efficient was the model of environmental education for sustainable agriculture management?

1.2 Objectives of the Research

The general objective of the research was to present a model of the environmental education process to allow farmers being able to manage their agricultural occupations that promote the quality of sustainable life and environment in the community, with 3 specific objectives as the following;

1.2.1 Studying the environment in the community related to farmers, management, agriculture and environment.

1.2.2 Designing a model of an environmental education process emphasizing farmers' participation for sustainable agriculture management.

1.2.3 Evaluating the efficiency of a model of environmental education for sustainable agriculture management.

1.3 Scope of the Research

This research had the main purpose of presenting a model of an environmental education process to allow farmers to manage their work to promote sustainable life quality and environment in the community. There were 4 aspects: 1) studying the environment in the community in relation to farmers, management, agricultural occupations, the environment, environmental education learning of farmers, problems and recommendations by using documentary research, interviews and questionnaires; 2) Designing a model of an environmental education process emphasizing farmers' participation for sustainable agriculture management. This model was linked to the environmental education concept and project management principle and developed by an expert group process; 3) Evaluating the efficiency of a model of environmental education for sustainable agriculture management. The researcher treated the activity of environmental education for the farmers. In addition, the evaluation of efficiency of the achievements of the farmers was composed of 2

levels: environmental education learning and agricultural occupation management: 4) Collecting data from the informants who were the heads of farming households and who earned a living on plantation and/or animal raising in Banglen District, Nakhonpathom Province.

1.4 Research Conceptual Framework

The conceptual framework of this research was to present 4 items in relation to the community environment: farmers, management, agricultural occupation and environment. Then, the data was analysed and synthesized to create a model of environmental education for sustainable agriculture management which emphasized the participation of farmers. Moreover, this model was linked to the environmental education concept and project management principle so that the farmers would achieve the objective of environmental education and management skill. Then, then the model was used to assess the efficiency by treating the activities of environmental education. After that 3 steps were evaluated: 1) environmental education learning of farmers; 2) writing of the agricultural occupation plan and; 3) implementation in the farmers' fields according to following the plan. The achievement of environmental education and management skill can make the farmers manage their agricultural occupations to get more income and a higher quality community environment. Each process followed the conceptual framework of environmental education and principle of project management. The research conceptual framework is shown in figure 1.

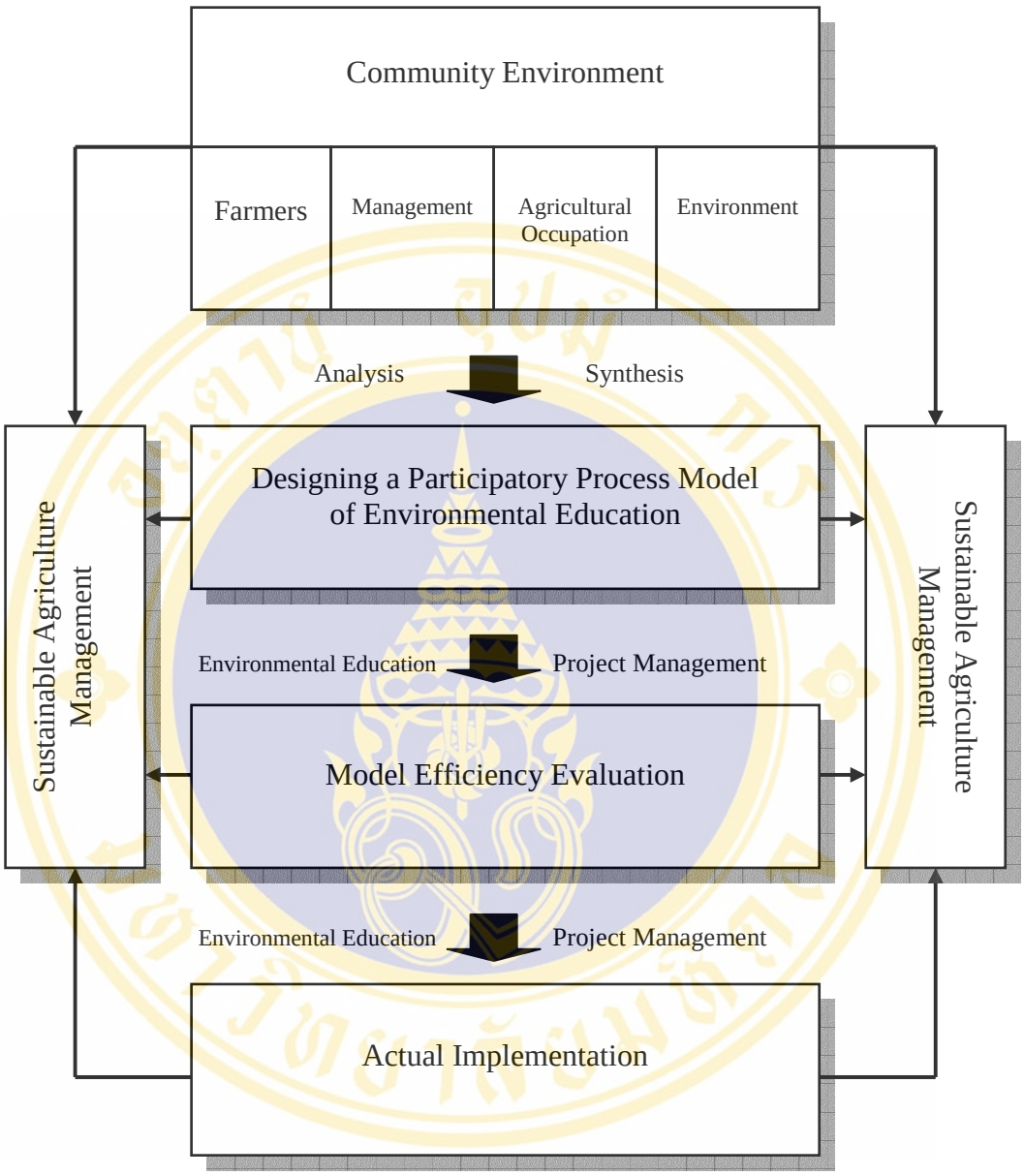

Figure 1 Conceptual Framework of Environmental Education for Sustainable Agriculture Management

Source: The Research Findings

1.5 Definitions of Operational Terms

1.5.1 Environmental education model is defined as the process to display relationship of steps in developing farmers to manage agriculture in a community friendly environment.

1.5.2 Environmental education is defined as a process of education to make the farmers being able to manage agricultural occupations which produce sufficiently their yearly income with effective caring to community environment.

1.5.3 Sustainable agriculture is defined as agriculture in a community friendly environment.

1.5.4 Farmers are defined as the persons holding agricultural occupations related to plantation and/or animal raising.

1.5.5 Management is defined as a decision making process for efficiency of agricultural occupations related to goals, processes, resources and time frame as the followings;

1) Goal is defined as the sufficient amount of yearly income with effective caring to community environment.

2) Process is defined as the production methods and planning to achieve the project objectives..

3) Resources are defined as employment by hiring and purchasing materials, equipment and raw materials as well as locating capital for agricultural occupation.

4) Time frame is defined as the period of plantation and / or animal raising which specific of main plants or animals within a year.

1.5.6 Agricultural occupation is defined as crop plantation and/or animal raising which consists of agricultural activities, distribution methods, grouping of members and training as follows:

1) Occupation is defined as major and minor occupations, duration in making a living from agricultural occupation and reasons for following an agricultural occupation.

2) Classification of agricultural occupation is defined as the agricultural pattern which consists of either growing single plantation crops, animal raising only, or growing single plantation crops and animal raising together.

3) Method of distribution is defined as selling agricultural commodities which consists of marketing and market places.

4) Group member is defined as participating in a group through membership while maintaining an agricultural occupation. It consists of being part of the group and attending a number of group meetings.

5) Training is defined as participation in receiving knowledge in agricultural occupations from different divisions while pursuing an agricultural occupation. It consists of training experiences in training subjects and numbers of training sessions, and studying training data on agricultural occupation.

1.5.7 Community environment is defined as soils, water, air, energy, crops and animals, conceptual culture, organizational culture, usage or behavioral culture, and object culture.

1.6 Expected Results

1.6.1 The farmers will be getting more income and participate in development and conservation of the community environment.

1.6.2 Agricultural occupations will become friendly to the community environment.

1.6.3 The community environment can be sustained from the agricultural occupation with friendliness to environment.

1.6.4 The people in the community will enjoy healthy living under the sustainable environment.

1.6.5 It will support the economic sufficiency theory, Agenda 21: sustainable development and the policy of sustainable agriculture management at community, national and international level.

1.6.6 This model is a pilot project which should be a guideline for farmers to manage their agricultural occupation to support the quality of lives and environment in other areas.

CHAPTER II
LITERATURE REVIEW

The research on environmental education for sustainable agriculture management was conducted as participatory action research: PAR. This research has set its general objective in presenting environmental education model which enabled farmers to manage agriculture occupation in order to promote sustainable life quality and environment in the community. It was involved with 4 specific objectives as follows: First, it was aiming for the study of general conditions of farmers, management, agriculture occupation and environmental study in community. Second, it was aiming for developing model in participatory process of environmental education. Third, it was aiming for conducting model actual implementation. Fourth, it was aiming for model efficiency evaluation.

Therefore, the study of this research in conceptual framework, theories and relevant researches had been divided into the following sections:

2.1 Environmental Education
2.2 Management
2.3 Sustainable Agriculture
2.4 Related Theories.
2.5 Related Research

2.1 Environmental Education

2.1.1 Principle of Environmental Education

Principles of environmental education involved with building environmental education in mind (internal knowledge), then display as behavior to protect the environment (external knowledge). Therefore, environmental education is

defined as educational process which emphasized on relationship between human and environment. And learninig for a sustainable future and interactive participation (John Fien, 1999: 32). From one person to another for creating environmental education. From the meeting at Tiblish, The Soviet Union in the year 1997 had defined principles of environmental education as the following; (Department of Environmental Quality Promotion, 2001: 6).

1) Environmental education should consider as holistic environment to environment in technique and social in economic, politic, technology, culture, history, ethic and beautiful scenery.

2) Environmental education must be life learning process for pre school to all levels formal and informal.

3) Environmental education must be educational process by interdisciplinary for combining knowledge together.

4) Environmental education have to check environmental problems in different regions to local, country and world levels. In addition, the learners can thoroughly understand in environment and all issues.

5) Environmental education have to emphasize on current environmental situation and considering the past situation.

6) Environmental education have to extensive the value and necessity to combile in preventing and solving environmental problems to local, country and between countries.

7) Environmental education have to consider in environment carefully for planning to develop and progress.

8) Environmental education have to help learners to plan experiences learning and provide opportunities for decisions making and accept consequences.

9) Environmental education have to link sensitivity, knowledge and skill in problems solving and environmental values with learners in all ages and emphasised on sensitivity toward environment in own community to child learners.

10) Environmental education have to help learner to search for nature and fact of environmental problems.

11) Environmental education have to emphasize on the complexity of environmental problems and necessity to develop thinking skill and solve problems.

12) Environmental education have to use multi learning by emphasizing on the practice and direct experience widely open for environmental learning.

2.1.2 Environmental Education

The concept of environmental education is originated from The World Conservation Union or International Union for Conservation of Nature Resources: IUCN which arranged the meeting in environmental education worldwide. As a result, in 1975 Belgrade Charter had been invented as the concept and practice in environmental education. (Office of Environmental Policies and Planning, 2004: 270). In addition, the Belgrade Charter mentioned the aim of environmental education and guidelines because environmental education is process to develop human for environmental friendly, create values, awareness and understanding of combile existing of environment in nature, economy, social and political by giving everyone the opportunities to develop knowledge, attitude, skill, how to make decisions for changing in attitude and behavior in order to prevent and improve environment. It is included the construction of model for environmental new life-styles for individual, group and society (Environmental Quality Promotion Department, 2001: 5). According to, the definitions of environmental education as the following;

Environmental education is the process for educating value appreciation and concept to develop skill and attitude for understanding to relationship between human and natural environment, including proper behavior in environmental quality preservation (Environmental Promotion, 2001: 128-129).

Environmental education is the process for developing learner to know and understand in environment and association between human and environment. In addition, aware to own duties for living in environment, having attitude and positive action toward environment, and having participation in the conservation and development of sustainable environment (Office of Environmental Policies and Planning, 2004: 270).

Environmental education is the process which aimed to construct among world population related to awareness and concern in environment and other problems. Moreover, having the knowledge, attitude, skill, intention and determination to solve facing problems as well as preventing new problems to arise himself or others. (Environmental Promotion, 2000: 15)

Environmental education is the process to provide knowledge to people with systematically, especially by applying the technological education to transmit environmental knowledge to individual and all levels to maintain the quality of environment. (Kasaem Junkaew, 1993: 71)

Therefore, environmental education is the process for changing behavior to individual or people. In addition, emphasized the relationship between human and environment by having aware to combile the environment with friendly. The objectives of environmental education as the following; (Environmental Promotion, 2543: 15; 2545: 129).

1) Awareness: environmental education provide basic knowledge to individual to make them understand knowledge and environmental problems including understanding how nature works, association between man and his environment as well as understanding environmental problems and guidelines for solving problems.

2) Knowledge: environmental education give individual value and create environmental concern as well as motivating individual to practice prevention and solving environmental problems.

3) Attitude: environmental education give individual value and create environmental concern as well as motivating individual to practice prevention and solving environmental problems.

4) Skill: environmental education helps individual to access skill and practice necessary for correcting, improving and protecting environment as well as solving environmental problems.

5) Participation: environmental education allows individual participation in correcting, improving, developing and protecting environment in all levels.

6) Evaluation on ability: environmental education allows individual to forecast situation as well as make decision to properly handle environment.

2.1.3 Significance of Environmental Education

UNESCO had arranged the meeting in 1975 at Belgrade to layout the draft of environmental education which contained the necessary statement that the learner must perceive environment as holistic, whether being natural or man-made environment which link between ecological system, politic, economic, technology, social, laws, culture and beauty (Earth Foundation, 1994: 77). Since the principles and concepts of environmental education confirmed the serious need to include environmental education in the curriculum. Therefore, environmental education relaated to build environmental consciousness and regarding to construct the awareness among Thai people to recognize the necessity of preserving environment for improving life quality. In addition, building holistic knowledge, understanding environment by including environmental education in the curriculum in all levels and systems to imbed correct attitude and value in the conservation of natural resource, environment and culture, including building consumer behavior as environmental friendly and awareness in the right to participate in environmental management (Thai Environmental Institute, 2001: 21; National Economic and Social Development Office, 2001: 66) .However, environmental education is still lifetime learning with the application of knowledge in various disciplines and the study that yield the best result is the participation in preventing and solving problems by studying world environmental problems and differences in local problems (Green Earth Foundation, 1994: 77). The study of environmental situation both present and future, including the study of relationship between progress and development with environment by putting the emphasis on the environment as well as including contents that promote value and point to the need for cooperation in all levels from the local to the world for solving environmental problems.

2.1.4 Practical Guidelines on Environmental Education

The guidelines of learning in environmental education sat up by international students consisted of 3 guidelines as follows: 1) learning about environment, 2) learning in environment and 3) learning for environment. From the concepts and value of environmental education. Thus, environmental education is to

integrate all three guidelines together to create holistic learning as the following; (Environmental Promotion Department, 2001: 6; Office of Environmental Planning and Policies, 2004: 271).

1) Learning about the environment is giving learners to know and understand the work of natural and environmental system, including the effect from human activities in local, country and world levels.

2) Learning in the environment is giving learners to had the experiences from self-practice in the natural or direct surrounding which is crucial for development for training in decision-making and problems solving.

3) Learning for the environment is giving learners to get the implementation of knowledge from learning in the practice valuable to environment and nature in real life.

2.1.5 Environmental Education in Thailand

Environmental education in Thailand started from School to higher learning to community. Environmental education is consisted of 3 types: first environmental education in school, environmental education in higher learning and informal environmental education (Office of Environmental Planning and Policies, 2004: 271-273). Therefore, has applied environmental education as the strategy leading to sustainable development and conservation by having environmental activities such as field trip, group process implementation, case study and field study.

1) Environmental education in school is reforming the curriculum which emphasized on contents of learning in environment as the process in sustainable environmental education in and practice as well as reforming school management practice as defined, reforming teacher and provide teaching approach in environmental education to teachers. Curriculum development involved teaching in environmental education in 2 ways as the following;

1.1) To take the environmental education in to the curriculum in all subjects and levels by integrating environmental education with teaching contents so that learning can have different perception.

1.2) To integrated the process by emphasizing on thinking concepts, analysis, problems solving, decisions making and communication to create understanding with environmental education activities, leading to learning from direct experience on natural resources and environment as well as linking acquired knowledge with daily practice.

2) Environmental education in higher learning is emphasized on giving knowledge, staff development and preparing curriculum with environmental education activities such as staff training, publicize on concepts and process of environmental education to outside divisions, media developing, the practical meeting for teachers in primary and secondary schools, providing services in environmental education in the community, schools, public and private sectors and being the source for knowledge and youth training.

3) Informal environmental education or community is managing sustainable environment by starting to learn about compatible and sustainable living with environment which can be learned from the surrounding. Therefore, informal environmental education is making learners part of solving environmental problems facing the community and emphasized learning from nature by giving advice and sharing knowledge, leading to awareness and suitable and proper practice. The constructing of community to favor learning with local experts in caring for resource, and executive as well as providing activities to create learning such as camping, nature classroom, and community learning center. Moreover, this activities were the factor for successful in informal environmental education by the related division such as department of informal learning education to arrange environmental education in the community.

From previously-mentioned guidelines of environmental education to apply as environmental education for farmers, environmental education for farmers can be stated as informal environmental education by being learner center with contents in local curriculum with integrated of knowledge in learning as outdoor learning.

2.2 Management

Management is the operational tools of the organization which comprised of members who cooperated together to achieve certain goal and differed in physical, characters and spirit. Therefore, management must be applied to facilitate successful operation. Organization and management work hand in hand and need for accomplishment (Nattapan Kajornnun and Chattraporn Sameajai, 2005: 18) as the following;

Nattapan Kajornnun and Chattraporn Sameajai, 2005: 18) gave the meaning of management as the ability to define goal, arrange order and resources allocation to achieve desire task effectively.

Peter F. Drucker (cited Thonchai Santivong, 1998: 11) gave the meaning of administration or management as performing task by relying on others to complete the task.

Mayuree Arnumanratchaton (2005: 6, cited Donnelly et.al.) defined management as the mission of either one practitioner or others to coordinate work that had been failed from separated work to successful operation.

Siriwan Sareerat and Associates (2002: 27) gave the meaning of management as the process of aiming toward the same goal from working together with the use of various resources or being the process for design and preserve environment with group cooperation to achieve the same goal effectively.

Somyot Naveekarn (2002: 18) gave the meaning of management as the planning process, organization management, giving order and controlling organization’s member effort, leading to achievement in the organization’s goal.

From the above-mentioned definition, management can be defined as planning process for resources utilization to make operation success and achieve the set goal effectively. There are definitions provided for organization as follows:

Nattapun Kajonnun and Chatraporn Samaejai (2005: 98) gave the meaning of organization as social system from 2 people or more decided to cooperate and interact together and related to external surrounding systematically and distinctively to

achieve desire objectives, as clearly until becoming abstract or concrete object such as school, university, hospital, church, charitable organization and convenience store.

Thongchai Sunthivong (1996: 11) gave the meaning of organization as a group of individual getting together and doing activities together. These activities had been well coordinated to achieve same objective or many objectives together.

Siriwan Sareerat and Associates (2002: 27) gave the meaning of organization as gathering a group of individual to achieve specific purpose or being the administrative system that had been designed and operated to achieve specific purpose or being a group of individual that worked together to achieve the same goal. The organization must have the executive. Examples of organizations are as follows: college, Universities, government, churches, government section, and computer producers.

Somyot Naveekarn (2001: 185) defined organization in 2 meaning as first any institute or group based on duties such as business, hospital, government division. Second meaning referred to process of organization management, guidelines in order and allocation between members so that organizational goals can be done effectively.

From the above-mentioned definition of the organization, it can be stated that organization is a group of working people or having done activities together by managing and coordinating work so that other activities can proceed as plan or achieve the same goal effectively.

2.2.1 Management Process

Management is important process for the manager to operate with knowledge, skill and experiences which must be adapted to coincide with each situation. Management is the Continuous Process which comprised of Management Functions in 5 issues: first as Planning, second as Organizing, third as Staffing, fourth as Leading or Directing and fifth as Controlling (Nathapun Kajonnun and Chatraporn Samaejai , 2005: 18).

1. Planning

Planning is the beginning of management which is quite important for executive to study, analyze and decide to define the desire goal, including the search for guidelines and building approach for successful operation, as effective under the timeframe and limitation of each task (Nathapun Kajonnun and Chatraporn Samaejai , 2005: 18) by planning steps for defining goal and consider the approach to achieve that goal (Siwan Sareerat and Associates, 2002: 20). Planning of different organizations is related to Thinking about future of the organization. Planning has important essence at the thinking process which must be covered in all aspects to derive at Strategy for working (Thongchai Suntiwong , 1998: 79). Therefore, different plans are aimed at organization and the best practice for work. Planning should make the organization enabled to gather resource needed by the organization for all activities as well as being able to test and measure progress of the organization (Somyod Naveekarn, 2001: 24).

2. Organizing

Organizing is arranging structure, work system, gathering group activities, defining scope of authority and assigning work for each subordinate. This is the management of system, Order and Relationship in the work division (Nathapun Kajonnun and Chatraporn Samaejai , 2005: 18). After the goals had been defined and plan developed to ensure the success of the goals (Somyod Naveekarn, 2001: 24). Duties in this organization started with considering activities that needed to be done to achieve as set plan. Then, the executive prepared the activities or work assignments for different groups. Any similar works were grouped together to be assigned for each executive (Thongchai Santhiwong, 1996: 80).

3. Staffing

Staffing is the way to define need, searching, selecting, hiring, training, developing, maintaining and motivating staff under the control to operate as desire based on the principles that staffing must be done to suit work and timeframe (Put the right man on the right job at the right time) (Nathapun Kajonnun and Chatraporn Samaejai , 2005: 19).

At present, there is the staffing in the organization with the step and resource applied for work to achieve the set goals (Siriwan Sareerat and Associate, 2002: 20-21). Staffing is to be extended process from organizing. In another words, organizing, position and duties are listed to define scope and difficulties of work in each position. To accomplish work, the executive plan the right person for different positions as well as assessing the available staff and selecting individual with ability suitable for the position, including giving advice so that staffs can perform better (Thongchai Santiwong , 2006: 81).

4. Leading or Directing

Leading or Directing is when the Leader used the ability and influence to motivate Follower which could be the subordinate or other individuals to display behavior or willingly perform at the fullest ability to achieve the set objectives (Nathapun Kajonnun and Chatraporn Samaejai , 2005: 19).This is the step to motivate enthusiasm and encourage staff effort to help achieve organizational goal which involved the effort of the manger to motivate staff with the highest potential in performance. Therefore, leading should help to complete work, build good feeling and motivate subordinate (Siriwan Sareerat and Associate, 2002: 20-21). Furthermore, it also involved Directing of the leader in motivating the subordinate to perform and related to influencing and assisting the subordinate (Somyod Naveekarn, 2001: 24-25). Leading is for the executive to practice and follow as the leader with ability to recognize approach in providing advice and control among the subordinate as desire the most (Thongchai Santiwong , 2006: 82).

5. Controlling

Controlling is the monitoring process, checking and comparison results of the actual practice with the set objectives based on measures and standard, including the study and analysis existing problems, leading to improvement and developing effective and efficient performance. It can be stated that controlling is checking the success of planning (Nathapun Kajonnun and Chatraporn Samaejai, 2005: 29) by having the executive to control standard for proper practice, enabled to compare performance with the set standard and conduct the analysis (Siriwan Sareerat and Associate, 2002: 373). Therefore, controlling is related to the following 3 issues: first

in setting standard and performance, second in measuring the performance and making comparison with the set standard and third in the improving performance results under standard (Somyod Naveekarn, 2001: 25).

2.2.2 Project Management

Current project management is widely used in the operation of the organization and society, aiming for the organization to achieve objectives better than using management has been used for regular work. Project management is not done regularly but rather being the tools to operate complicate activities for maximum benefit of the organization from the use of available resource under the timeframe, conditions of internal and external organization (Mayuree Anumarnratchathon, 2003: 1-2). Then, project management is the process to operate unique activities with new approach to achieve the set objectives under the timeframe and budget which is quite different from regular management. Project management is consisted of 5 objectives in scope, organization, quality, cost and timeframe. Since project operation based on objectives in each area related to the risk, the risk may the 6th objective of the project. Regular management is usually emphasized on the quality, cost and timeframe only while project management is concentrated only in objective in one area by the project executive usually emphasized on timeframe because it contains the most clarity (Mayuree Anumarnratchathon, 2003: 6-7).

Therefore, conclusions can be made that project management is to define approach to achieve objectives under resource and limited time frame. Managing project is to work under the limited timeframe which must be operated to achieve the set objectives with the use of existing factors or resource for maximum benefits. Components of project management are comprised of objectives, approach, resource and time frame.

2.2.3 Differences between Project Management and Management

Under the rapid change of social, economic, technology and politic, there had been the revision on concepts and model of Management that made Project

Management applied in various operation with approach different from other management but maintain the same result. Project Management and Management are different from each other in the following issues (Mayuree Anumarnratchathon, 2003: 10-11).

Project Management	General Management
1.Having unique feature, unlike the others	1.Having same feature
2.Having definite timeframe	2.Having indefinite timeframe
3.Involving with big change	3. Involving with big change gradually
4. Irregular operation	4. Same operation
5.Giving weight to objectives unevenly create changes in previous stage	5. Giving weight to objectives eventually to maintain in the same stage
6.Building temporary team for operation	6.Building permanent team for operation

Source: Mayuree Anumarnratchathon (2003: 11)

2.2.4 Project Preparation

Making proposal for project or project preparation is crucial and must be done in steps. The preparer must understand the whole project first to write a good proposal as well as understanding details in preparation such as listing activities for project preparation, analyze the primary need, making request for project and writing proposal (Mayuree Anumarnratchathon (2003: 39).

1. Prioritized activities for Project Preparation

Project preparation usually used with specific nature, quite important to organization or society, speedy activities or need experts in specific area. Therefore, preparation for project is quite important because it is the project presentation with contents and data such as operational cost, details of the products, product standard, name of organization to handle the project, name of project administrator and project feasibility (Mayuree Anumarnratchathon, 2003: 39-40). Therefore, before making any proposal, the presenter must study data to be sent to the decisions-maker.

2. Need Analysis

Analysis of products and services need is necessary for starting the project to derive at data to confirm that the project is in need. Idea for starting the project derived from 2 issues: first problems or need in the organization and society or problem about to happen in the organization or expected to happen in the future so there must be ways to prevent the problem from happening. Second, if the product or service under the study is not in demand, the project may end. Where the project needs to start first and find out the demand for such product, project must be arranged in priority (Mayuree Anumarnratchathon, 2003: 40).

3. Basic Education

Findings after analyzing the need, if the product is in the market demand, the study would be conduct primary to define details of products and services to response to such need in the feasibility of product such as in technique, social, economic or survey (Mayuree Anumarnratchathon, 2003: 43).

4. Petition for Project proposal

If the project is being assigned to outside division, there must be the request to sent proposal and intention for presentation to assign suitable organization for the project and know the cost of the operation as well as giving the chance for interested parties to bid for the project. Sometimes the petition for proposal is being called petition for bidding or petition for procurement. In general, petition is the request for sending project proposal with contents related to various issues such as, the background of the project, product from the operation, details and standard of product, investment funds and making report (Mayuree Anumarnratchathon, 2003: 49-50)

5. Making Project Proposal

Making Project Proposal is providing opportunity to project writer to present the whole project operational plan. Project Proposal is done differently based on the type of organization. Project writer may only fill in the form requesting project proposal or presenting details from problems that needs to be improved, approach for problem, project expenses, operation timeframe and responsible parties for project that needed the application of technology, list of major and minor tasks, expect date to complete project, staff work schedule and facilities, project management, forecast

budget, date of delivery, and reporting schedule. Since the senior executive has little time to read all details of the proposal. Abstract should be prepared for 1-2 pages with core contents (Mayuree Anumarnratchathon, 2003: 50-51).

6. Writing proposal

In writing proposal, the writer is only fill in the form for requesting proposal or may present project in other forms. Project proposal can be done in 2 forms: conventional approach and continuous table of reasons as following; (Mayuree Anumarnratchathon, 2003: 40)

6.1) Conventional Approach

Conventional approach is consisted of 12 basic components as follows: first in project name, second in name of responsible division and or name of responsible project executive, third in the significance and source of project or reasons, fourth in objectives and or/ project goals/ five in scope of the project, six in project approach, seven in timeframe and step for project operation, eight in project resource, nine in the budget, ten in project result assessment, eleven in appendix (Mayuree Anumarnratchathon, 2003: 52-53).

6.2) Continuous Reason Table

Continuous reason table is the approach to present data to show the relationship between various factors of the project with internal system of 4x4 matrix and display the objectives of the project, how to measure success of the project , where to get the data and how to present the project. Details of project in each table are reasons presented in vertical and horizontal with 4 basic standards as follows (Mayuree Anumarnratchathon, 2003: 61-62): first success determinant in summarized core content of the operation is consisted of 4 areas, program purpose, project objective, output and resource. Second, determinant is consisted of objectively verifiable indicators, third, determinant is means of verifiable and fourth is important assumptions.

2.3 Sustainable Agriculture

2.3.1 Sustainable Agriculture

FAO/UN, World Bank and UNDP stated that sustainable agriculture is the resource management for successful problem to response to human change and still maintain environmental quality and conserve nature (Charun Junlukkana and Pakapun Sakulmun, 2002,: 7-8). Definitions have been given on sustainable agriculture as the following;

Ministry of Agriculture Cooperative (2000: 20) defined sustainable agriculture as farming with the support and favors each other in the nature and ecological system such as the growth of plants and animals species in the forest. In another words, trees, soils, water and animals are rotated as chain of foods continuously. Plants need water and soil nutrients in sustaining life. Roots help to prevent soils surface from being washed. Animals eat plants and finally carcasses decayed and return nutrient to the soils. The circle keeps rotating this way at all times.

Commission Office of National Economic and Social Development (2000: 6) defined sustainable agriculture as farming system quite important to ecological system by helping to restore and conserve resources in the field and environment as well as greatly reducing dependency on external production factor. In practice, it is the feasibility practice with enough compensation for farmers to make living in sustainable agriculture .

Consultative Group on International Agricultural Research (cited Vitoon Punyakul, translator, 2004: 2) gave the meaning of sustainable agriculture as resource management system to produce agricultural products to response human needs and necessities and at the same time maintaining and restoring environmental condition, including the conservation of natural resources.

Paiboon Hengsuwan and Associates (2004: 177) stated that sustainable agriculture is the production system based on 2 important basic principles as follows: Principles of Diversity and Principles of Integrated, support and balance which may

have outstanding approach such as using local species, chemical-free, use local raw materials, reducing dependency of external factor, emphasizing on production for consumption and sell the excess, without damaging ecological system, having cultural dimension, stressing on supporting each other within the community.

Sompun Techaartik (2001: 55-56) mentioned about farming concept for sustainable agriculture and natural resources management as having the same concepts and meanings in the same direction because sustainable agriculture and natural resources management related to each other with the support of natural resourced in soils, water and forests which are the basic factors available in the land. These factors help to promote good sustainable agriculture as well as balancing natural resource management.

From the above concepts and meanings of sustainable agriculture, sustainable agriculture if farming with planning the use of resources to support between human, plants, animals and environment with numerous and suitable activities in the system, including the conservation and preservation of natural resources without impacts to ecological system and environment which should create stability in 4 areas as follows Sompun Techaartik (2001: 55-56).

1) Environmental security from not using chemical in farming activities to build balance and assist each other without environmental impact.

2) Occupational security when farmers are able to farm continuously and still extend to the offspring.

3) Economic security derives from farmers earning income regularly and enough to sustain life.

4) Production security comes from farmers receiving products from sustainable agriculture and natural resource management continuously with quality. Sustainable agriculture must have diversified internal system whether from growing crops, raising animals, fishery to assist each other within the system and farmers are self-sufficient and depended on external factor minimally.

Furthermore Gips stated that sustainable agriculture must consist of 5 conditions as follows (cited Vitoon Punyakul, 2004: 2-3).

1) Harmonization to Ecological System

Harmonization to ecological system is maintaining natural resource at perfect stage, including holistic agricultural ecological system, whether being non-living matters such as soils, water, or living creatures such as human, plants or animals, including small living organism in the soils should also receive caring for healthy living by applying the system to improve soils conditions as well as caring for plant, animals and human welfare through biological process(self-controlling) , including the use of local resource. At the same time, there are the measures for preventing nutritional loss, bio mass and energy together with the prevention of pollution, including encouraging more use in replaceable resource and energy such as sunlight, and wind current.

2) Economic Feasibility

Economic feasibility is farmers should have ability to produce enough products to sustain family and sufficient income, including proper compensation for labor or other product costs. In consideration of economic survival, it should not be judge only products directly from the farm, instead consider other benefits such as reducing expenses in daily life, resources conservation and risk reduction.

3) Social Justice

Social justice is the distribution of resource and power to the people to guarantee that each person deserves response in necessities and standard structure for equal production, including having guarantee the right to use land, sufficient funds, technical assistance and marketing distribution some threat to the whole society, including the agricultural system as well .

4) Humanities

Humanities are all living organisms (plants, animals, human) with the right to live comfortably. All human-being should be treated equally, including all associations should be based on the correct value, especially trusting each other, loyalty, self respect and respect others, united and love your neighbor. Principles of culture and social spirit must be preserve and develop further.

5) Flexibility

Flexibility is the ability of local community to adapt with changes in the situation, either change in population or market policies which confirmed that there must be the development of proper technology and social cultural change together.

2.3.2 Principle of Sustainable Agriculture

Sustainable agriculture is the principle for directing farming products in the future by stressing resources management for successful farming to response the demand of human that have been changed and at the same time being able to maintain or improve environmental quality and conserve natural resources. Farming products must consider 4 factors: farmers' ecosystem, economic situation, social farmers' factor, technical and the academic (Charun Junlukkana and Pakapun Sakulmun, 2002: 39-41).

1) Farmers ecosystem for sustainable agriculture must consider factors related to ecosystem by choosing suitable farming which yields good produce without destroying nature and ecological system.

2) Economic situation is choosing suitable farming system that worth investment without destroying environment and natural resources.

3) Social farmers Factor is choosing of farming system to coincide with culture, tradition, religious, life necessities, welfare and security of farmer' family.

4) Technical and academic which must be included in the production as basic knowledge and local wisdom in order to develop agricultural technique and production technique without depending too much on external factors.

Furthermore, Paiboon Hengsuwan and Associates (2004: 42-43) mentioned about the basic principles in sustainable agricultural development as the application of agricultural concept based on 2 basic principles in diversity and principles of integrated, assisting and balance.

1) Principles of Diversity

Any sustainable agriculture, whether being integrated, organic agriculture, natural agriculture of agro-forestry must have the diversified components or various production activities in plants, animals and other living creatures. The principle is base on growing for consumption and use first and the remaining land if any should be used for growing economic plants for earning income. Diversified production is not only giving farmers varieties of production for consumption but also reducing risk in being destroyed with diseases and pests, the need for labor in growing or harvesting the same time and able to mange production in excess of consumption or without the outlet.

2) Principle of integrated, assisting and balance

Plants and animals species in agricultural system would be arranged to benefit each other to balance the system reduce production cost and resource from external production factors. In agricultural system, farmers must bring plants that need moisture, sunlight, nutrients, including different roots and tips of plants mixing together evenly. If there are animals included, such system would take part in the control and destroy weeds and pests, as well as being organic fertilizer. Mostly, sustainable agriculture would emphasize the use of plant species and animals with local genetic because it can blend with the area with tolerance and farmers can extend and develop species as well. Present genetic has been developed and improved with chemical and pesticide to yield high products which made farmers unable to support themselves. As for non-diversified production such as single organic farming which is dine in accordance to food policies on bringing Thai foods to world kitchen. Agricultural product based on outside factor such as organic fertilizer and bio element outside which made farmers unable to support themselves.

2.3.3 Determinant for Sustainable Agriculture

This research selected literatures to review sustainable agricultural in 3 issues: first in determinant for sustainable agriculture, second in determinant for sustainable agriculture and pilot model of successful farmers for sustainable;

1) Determinant for Sustainable Agriculture

Determinant for sustainable agriculture are divided into 3 types: first as biological determinant, second as physical determinant, and third as socio-economic and legal Determinant (Charun Junlukkana and Pakapun Sakulmun, 2003: 27-36).

1.1) Biological determinant is consisted of 3 determinants; first, in source of genetic and improving plant and animal species such as conservation in biodiversity and source for plant genetic and local species for good quality and not being extinct. Second, in pest such as protection and getting rid of pest, diseases and insects, including other enemies through integrated approach and third, health and animals nutrition such as the reduction of diseases spreading among animals or animals foods abundant.

1.2) Physical determinant is consisted of 4 determinants; first, in soils such as having complete nutrients and foods and sufficient for growing plants and raising animals. Second, water such as the availability of water source including maintaining water for shortage and third, energy such as wind power, heat, solar as well as reducing the burning which may cause green house effect or damage soil or increasing effectiveness in the use of energy that may effect agricultural product and fourth application of chemical in agriculture such as correct application of pesticide and the reduction of chemical use may decrease cost but incur economic loss.

1.3) Socio-economic and legal determinant is related to government support such as the active support in agricultural development, economic policies favor agricultural sector , marketing system, production factor and proper and fair loan, promotion, research and training in agriculture and transmitting agricultural technology, rights of farmers to occupy lands as well as laws and regulations regarding the management and conservation of resources and environment for sustainable agriculture.

2) Determinant for Changing to Sustainable Agriculture

Determinant for changing to sustainable agriculture can be identified in many ways, leading to the pilot model which is consisted of first determinant in changing viewpoint, second in having knowledge and ability to develop knowledge and skill and third in economic self support (Nanthiya and Narong Hutanuwat, 2004: 15-16) as the following;

2.1) Changing viewpoint

Changing viewpoint is the most crucial because sustainable is not only involved with changing production approach or economy but also reversing main agricultural principle and consumption fever. Farmers must change the belief and thinking process, including satisfaction to reach spirit to remain active.

2.2) Capable of developing knowledge and skill

Farmers must have knowledge and ability to develop knowledge because sustainable agriculture is non stop production. It is dynamic production by having farmers to adjust to the change of environment as well as adapting to the economic, social and political situation. Therefore, farmers must constantly search for knowledge and improve with actual practice in own land to solve problem .In addition, farmers need to add knowledge in economic, social, politic and environment to improve sustainable agricultural production and having indepth understanding.

2.3) Economic self support

Economic self support is the most important determinant because without sustainable agriculture, farmers cannot be self-dependent and continue with sustainable agriculture. Economic self support does not mean only farmers earning incomes from selling the product, instead it means having enough foods for the family to reduce food cost. Production is included the fertility of land for agriculture and savings as knowledge and ability to search for knowledge.

3) Successful of the model farmers for sustainable

Developing sustainable agriculture based on diversity and assistance, farmers are important components in linking components to work together systematically and building spirit. Therefore, such farmers must be full with knowledge in managing the system in own agricultural area for self-sustain. The success of farmers' model or local scholars is expressed in the following steps (Paiboon Hengsuwan and Associates, 2004: 43-46);

3.1) Step 1: there are the sufficient foods for family consumption with diversified product in the agricultural plot.

3.2) Step 2: there are the income security with planning for excess products to sell for family income. Farmers must plan and analyze proper production

and timeframe in the short run, medium run and long run. Planning about excess products should provide farmers with main income eventually.

3.3) Step 3: developing for balance as environmental-friendly which is producing natural products, chemical or toxic free as the alternative for consumers. Besides making farmers live better, sustainable agricultural system should yield the highest return when the developing activities lead to balance of ecosystem.

3.4) Step 4: favor returning to society when farmers had reached the set goal in 3 steps. Farmers should have the conscious for sharing knowledge and volunteer to participate in solving social problems, especially solving problems for farmers who still used single chemical for commercial. These local scholars would be happier and more satisfied with returning good things to society and environment which is the system development with intelligence, reason , truth and righteous.

2.3.4 Classification of Sustainable Agriculture

Current sustainable agriculture is being divided into 5 types as follows: first as Natural Farming, second as Organic Farming, third as Integrated Farming, fourth as Agro-forestry, and last New Theory as the following (Commission Office of the National Economic and Social Development, 2000: 6-7);

1) Natural farming has 4 main important principles: first no plowing, second no application of chemical of any kind, third not killing weeds, fourth not getting rid of diseases and pests. Furthermore, farming is done naturally, using organic fertilizer, farmyard manure, compost, and green manure (Sompan Thechaartik, 2001: 64).

2) Organic farming is farming without the use of chemical of any kind, instead applying organic matters such as farmyard manure, compost and green manure. As for controlling pests, natural elements would be used such as Siamese neem tree, lotin, tobacco, rotating crops, using bio fermented liquid, herbicide, including the use of insects (Paiboon Hengsuwan and Associates, 2004: 92).

3) Integrated farming is mixing farming with 2 activities up in the same issues such as growing crops and or raising many types of animals (Paiboon Hengsuwan and Associates, 2004: 80). These activities associate and favor each other

without environmental impacts. Furthermore, it is emphasized on building sufficient foods source or sufficient for family consumption (Sompan Thechaartik, 2001: 64).

4) Agro-forestry is the combination of farming mixing between forest trees and crops such as growing crops in the forest or growing crops together with raising animals in the forest. Furthermore it includes farming as close as natural forest ecological system with dense trees for shading and high moisture (Paiboon Hengsuwan and Associates, 2004: 96).

5) New theory is farming with many products by dividing land ratio estimated 30: 30: 30: 10 for growing rice, crops, digging ponds and building shelters based on area suitability.

2.4 Related Theories

2.4.1 System Theory

Systems theory is the conceptual trend for administer organization to match with surrounding environment (Sirivan Sareerut and Associates, 2002: 55). System is the sub component with interaction and performing task to accomplish set objectives (Sin Punpinit, 2001: 411). Organization or Administration is comprised of 4 parts, input, process, production and feedback (Siriwan Sareerut and Associates, 2002:55-56, Sin Punpinit, 2001: 411-412).

1) Input: the inputs of significant management are comprised of resources in physical, human, data, financial and technology.

2) Process: the process or transformation process is the through put process of taking to organization resources in form of input and changed or raw materials to convert or synthesis, mix or integrate together properly. This is done to create desire results. Resources would be taken to process through activities of workers, administration, technology and practical operation and production.

3) Output: output is the production or outcomes or final outcomes are resulted from process that comprised of products and services, financial outcomes, staffs' operational outcomes and customers' satisfaction.

4) Feedback: feedback or data feedbacks or feedbacks of management are data on conditions and outcomes as related to organization activities. These data are being used for improving input and process in administering outcomes for more satisfaction, i.e., staffs' opinion, admiration or existing conflicts.

Therefore, systems theory can help manager to define organization boundary and subsystem which are interactive system internally. The manager who had the system thinking would look at organization as if it had been reacted with surrounding environment. In closed system, there has not been any reaction with surrounding environment with self completion. And open system, it would be system that reacted with surrounding environment and contained feedback. Therefore, every organization are open system (Siriwan Sareerut and Associates, 2002: 57).

2.4.2 Theory of Adult Learning

Learning is a relatively permanent change in the frequency of occurrence of a specific individual behavior (Hellriegel Slocum Woodman, 1995: 139). Adult is able to support himself from life-learning experiences. They are willing to acquire more knowledge because they have recognized learning value and benefits as well as being able to apply with existing problems. Therefore, adult learning is emphasized more on problems than other matters (Somkid Isarawatana, 2000: 23-25) and defined target in higher learning than memorize and understanding levels. This has been agreed with adult characteristics because he has experiences which contributed to his thinking, practice and linking former knowledge together (Somkid Isarawatana, 2000: 124). Therefore, there were 2 theories related to adult learning: adult learning and characteristic of adult learners as the following;

1) Adult Learning

Human learns through 5 touching senses which are seeing, hearing, touching, smelling and tasting. Therefore, adults can learn with those senses also. These senses are comprised as the following (Virut Kongkajum, 1992: 109-110);

1.1) Seeing

To make learning more realistic, adult teaching needs to have pictures accompanied with. Picture with distinctive meaning would yield more benefit than lots of explanation as well as creating imagination among learners.

1.2) Hearing

Teaching adults needs clear explanation, correct and accurate as well as having VCD to promote better understanding among learners.

1.3) Touching

Teaching adult needs demonstration accompanied the lesson to provide opportunities for learners to touch.

1.4) Smelling

Through learning sometimes adults should practice with such sense.

1.5) Memory

Each learner possesses different ability to memorize but instructor can help boost their memories with the following approaches;

1.5.1) Instructor should be certain that the learning atmosphere is pleasant enough for the learners with informal feeling and healthy mind.

1.5.2) Instructor should pay much interest to the learners and provide distinctive teaching, especially clearly demonstration.

1.5.3) Instructor should impress learner with words, pictures with clear explanations and colors to attract learners.

1.5.4) Instructor must present all data in good chronological order

1.5.5) Instructor should present sensible questions so that learners can think by themselves as well as encouraging more questions from the learners.

1.5.6) Instructor should use phases or mottos to accompany teaching so that instructor can understand better.

1.6) Intellectual

In general, adults are as intelligence as children, but they normally learned slower than children because of aging and inferior nerves. Therefore,

instructor must adapt proper teaching approach to suit the learners. Instructor must constantly aware of not teaching too much if to fast.

1.7) Learning interest

Learning interest of learner must be constantly aroused during the teaching period. Furthermore, learning and teaching should comprise with arousing items, such as competition, pride in success , praises . These arousals can create learning interests.

2) Characteristics of Adult Learners

Since adult has differences in the ability, age and intelligence, teaching adult needs understanding in adult attributes to make learning accomplished. Adult attributes are as follows (Virut Kongkajum, 1992: 109-111).

2.1) Learners want to learn voluntarily from having purposes and desire to receive new knowledge and skills development.

2.2) Learners are interested in subject related to own experiences and working together with other to improve own work.

2.3) Learners desire to learn by acting.

2.4) Learners need to develop new ability just to benefit working.

2.5) Learners are able to think and understand own problems and willing to discuss own problems with the group.

2.6) Learners desire to receive training and useful news.

2.7) Learners does not like force learning.

2.8) Learners have enough experiences which can be used for solving problems at work.

2.9) Learners has received very little formal training or never.

2.10) Learners have responsibility to the family which influence learners' attitude.

2.11) Learners are independent and more concern about themselves.

2.12) Learners refuse to learn unwanted subject. Then, learning is voluntary.

1.2.3) Learners may have attitude habit conflicting with some learning.

1.2.4) Learners does not like the meeting or learning in a hurry, instead prefer to discuss in each topic thoroughly.

1.2.5) Learners' interests have been reduced from getting old.

1.2.6) Learners may be slow learning new skills due to aging process such as eyesight, hearing and muscle.

1.2.7) Learners are not interested to solve problems with reading books because of limited reading ability or bas vision or not good enough.

2.4.3 Innovation Acceptance among Farmers

Roger and Shoemaker (cited Sin Punpinit. 2001: 90-92) had stated that targeted farmers are consisted of head of the household or senior farmers, female and youth farmers. Each has individual difference, for examples, incomes, education, intellectual, value, attitude including traditions and customs. This had influenced their acceptance and ability to classify set goal for degree of acceptance. There are 5 types as the following;

1) Innovator

Innovators are consisted of farmers who adapted to the changes in innovation or technology faster than other group because they are full of knowledge, eager to experiment and well to do. Moreover, they have strong desire for achievement. They are also diligent, creative, preferred changes and challenges with advance thinking. Besides quickly accepting changes, they have brought new innovation to society. Sometimes, these farmers are being called "Fast learners, fierce fighters". Community has given the most respect to these farmers because they are considered as Leader of Change. These farmers are the least in society or 2.5 percents.

2) Early Adopter

These farmers are middle class people with above average education. They like to participate in social events and possess good attitude towards changes as well as being accepted by society. Even though they have been ready for constant changes, they would always reconsider. They are being appointed for auditor for verifying before accepting new innovation. Therefore, changes must be evaluated

before making decisions. Sometimes, these farmers or 13.5 percents are being called “Wait and see”.

3) Early Majority

Early Majority farmers are being placed in the middle of 5 farmer groups which may take longer than 2 former groups but faster than 2 latter groups. This group is not the first to try new item but not the last to wait for disappearance of old item. They are being driven by desire for achievement and readiness for innovation. Even though they are lacking of the opportunity to be social leader, they have been constantly contacted with society. Before accepting any innovation, they would carefully consider to avoid unnecessary risk from those changes. Sometimes, these farmers or 34 percents of society people are being called “Wide eyes hesitation”.

4) Late Majority

Late Majority farmers are comprised of farmers with poor economic status, low level of education with less motivation for achievement, afraid of error, failure and risk because lack of funding when making wrong decision. Therefore, they must wait for most people in the society to change before they could change themselves. Sometimes these farmers are being called “Pigheaded rotation or suspicious mind”. In order to make this group accept changes, motivation must be done through friends to change their attitudes as well as providing valuable information to create confidence without risk as well as giving loan or other production factors. These farmers are 34 percent of society people as equaled to 3rd type of people.

5) Laggard

Laggards are those farmers who had little education and limited investment funds. They are still firmly believed in old traditions and customs or being unreasonable old-fashioned with negative attitude towards changes as well as being lazy, without leadership and anti-social. They are persons who resisted to innovation and refused to accept civilization. They need friends or social and economic pressure to push them to accept innovation or changes. Sometimes, they are being called “Old-fashioned farmers or laybacks” which occupied 16 percent of society.

2.4.5 Intention to Act

Intention to act is defined as the possibility of individual to display behavior with the final aim for learner. In another words, intention to act intention to act is the determinant for practice or displaying the behavior. Measurement of behavior in any topics can be measured with intention to act. Since intention to act is closely related to the display behavior came from consciousness or desire that had been judged already. Most behavior remains under the control of attitude before choosing whether to act or not to act. In another implication, measuring intention to act is the prediction of behavior individual intended to display (Martin Fishbein and Icek Azjen cited Chakris Cheanchom, 2530: 13; Theerapat Ritthong, 2532: 47; and Nutnicha Putho, 2538: 50).

Therefore, it should be stated that intention to act is to forecast level of determination to display individual behavior toward any issues. Such display had been judged before choosing to act or not to act in that issue.

2.4.6 Participatory Action Research

Participatory action research is the research technique involving with quality research that combined action research with participatory research. Action research is the research aiming to solve problems or develop work or need for changing the operation in the organization, division or community which may involve either the researcher or other people in the organization or community in the research. It is similar to experimental research without controlling the repeat variable because it must be test in the normal situation. The derived results are to be used in improving, developing or solving encountered problems. As for participatory research, it is the research that involved many concern parties in every step of research activities, starting from problem analysis, data collection and research conclusion. This research had not been done only to correct problem or develop organization or community. When combining practical research together with participatory research, it is being presented as participatory action research which directed at problems solving or developing the organization, division or community by following the set guidelines in

the research, starting from beginning to the end of the research process. Furthermore, participatory action research is the research to study community by directing at the analysis of the problem, the study of problems solving, planning operation for solving problems, following plan and monitor results. In every research step, community members had been participated in the study. Participatory action research did with the following steps (www.thai-folksy.com/ELearning/Research/Way/06-PAR.html);

1) Studying and Analyzing Problems

This is the step that involved all the concerns in the study, analysis problems and cause of problems in the community as well as specifying alternative in the development or solving problems based on priority under the situation and available resource.

2) Planning Project

This is the step for preparing plan or project in order which must include data in 2 parts as follows: first in community data and second in researcher data. Community data is comprised of community opinion such as local belief toward problems, relationship between groups of people in the community. As for researcher data, it is comprised of academic data and guidelines for solving problems. Data must be gathered from the community and the researcher periodically for well organized plan.

3) Experiment with plan or project

This is the step for applying plan in the problems solving which may be done by the community to follow the guidelines. During the test, there should be sharing data to assess changing of plan for the highest efficiency.

4) Overall Results Assessment

This is the step for joint-analysis, assess and make conclusion in the operation when the experimentation is over to assess the success, fault, operation, staff, budget, timeframe and satisfaction.

However, participatory action research is similar to participatory research but only different in the guidelines for solving problems from the community study which emphasized on the study and analysis of the problem, including analysis to find

the local resource in solving problems. The outstanding points of Participatory Action Research are as the following (Sithinut Praputnithisarn, 2003: 32-33);

1) Community

Participatory action research placed the importance on data and opinion of the community data collected from conversation, sharing experiences and opinion to study the problems or community needs.

2) Problems solving

Participatory action research which allows people to participate in the solving problems involved with the study of resources locally , leading to problems-solving in the community.

3) Selection with People Participation

Participatory action research opened for people to participate in the selection of project, leading to action. If there are many problems and many problems solving, there must be joint consideration to decide which problem is urgent and which approach should be used.

4) People Participation in all Steps of Problems solving

Participatory action research allows people to participate in problems solving at every step and can continue after the research completed by people searching for core leader to further the operation.

2.6 Related Research

The research on environmental education for sustainable agriculture had involved the following related research;

Wee Rawang (2006: 136-139) conducted the research on factor effecting change in agricultural occupation to wood carving among farmers at Hang Dong District, Chiangmai province. Findings indicated that the informants had identified reasons for changing occupation as the need to earn more income than farming. Furthermore, many informants had high hope in life and desire to maintain wood crafting as one type of handicraft, including the need to participate in community development.

Wee Rawang (1995: 108) conducted research on community-culture based environmental education: a case study for the World Culture Heritage of Ayutthaya Historic City. The research was discovered that informants in wooden carving needed to gain extra incomes from this occupation as well as hoping to achieve stability in production and environment. In another words, farmers needed agricultural occupation that would lead to sufficient incomes for life existence under equilibrium surrounding with healthy stage between bodies, soul, social and natural and cultural environment which coincided with self-sufficient economy philosophy by leading life in the middle ground.

Pannya Mankeb (2002: 141-148) conducted the research on future of sustainable agriculture in Thailand. He had compiled future of sustainable agriculture in 6 areas. They were: learning process in sustainable agriculture, research and development of knowledge in sustainable agriculture, sustainable agriculture promotion, production, marketing and processed products, organizational and institution development as well as developing natural resources that being standard production factor.

National Economic and Social Advisory Council (2003: 105-106) synthesized agricultural problems together with sustainable agriculture in the north, northeast, south, central and nationwide. Findings from the analysis results indicated that each region had similar problems in 9 issues as follows: first from lacking land for living, second from water management for agriculture, third from agricultural price, fourth from farmers debts, five from Cooperative Union, Six from Natural Resources, seven from coastal fishery, and finally from participation of general public in the development process. Problems in this area have become more intense in the southern region and some part of central region. All problems issues are connected together with causes and effects and contributed to the sustainable development.

Nanthiya and Narong Hutanuwat (2004: 22-27) conducted the research on sustainable agriculture, visionary procedure, process and indicator in the pilot study to develop sustainable agriculture of small farmers at Phumnivet, Yasothorn. They had also done result evaluation based on indicator to change visionary procedures by ideal

farmer. Assessment was done on the results of determinant to change viewpoint from the model farmers consisted of research results in 3 areas as follows: First in assessment of changing viewpoint, second in assessment of knowledge and ability to search for knowledge and finally in assessment of Economy Self-sufficiency. Findings indicated that assessment in changing viewpoint could be arranged in 3 levels as fully changed, partial changed and starting the change.

As for assessment of knowledge and ability to search for knowledge, it could be arranged into 3 levels as follows: first having full knowledge and fully developed knowledge for being model farmer, second having partial knowledge and partially developed knowledge for being model farmer and third having knowledge and developed knowledge for being model farmer at beginning level

Assessment of economy self sufficiency consisted of results in first self support in foods. Findings indicated that model farmer had enough foods for household consumption after changing to sustainable agriculture. Second in self-support in products, findings indicated that model farmers mostly had not paid for chemical fertilizer and cost, labor cost because using more family members to work, third in increasing income; finding indicated that most farmers must consider the need of market which required more products to enter the market while fresh produces were sold more than processed foods and finally assessment of debts and assets, findings indicated that model farmers were in the process of changing to sustainable agriculture which made it hard to distinctively identify the reduction of debts and assets. However, model farmers mentioned that the increased debts resulted from more investment in the rice paddies, buying animals, growing trees, including managing water system which was considered savings and assets in term of produces would increase. Somehow, the certain assets increased were gaining knowledge as intellectual savings.

CHAPTER III
METHODOLOGY

The research on environmental education for sustainable agriculture management was conducted as participatory action research: PAR among the researcher, experts and farmers. The general objective of research was to present a model of environmental education which enabled farmers to manage agricultural occupation in order to sustainably promote quality of life and community environment, with 3 specific objectives including 1) studying the environment in community related to farmers, management, agricultural occupation and environment 2) designing a model of environmental education process on farmers' participation for sustainable agriculture management and 3) evaluating a model of environmental education for sustainable agriculture management. The research methodology was showed as the following;

3.1 Population and Sample

3.1.1 Population

The population was the farmers holding mainly agricultural occupation in Banglen District, Nakhonpathom Province. Banglen District is comprised of 15 Sub-districts Administrative Organizations and 180 villages with total populations of 88,855 villagers or 21,587 households. Out of those numbers, 8,743 households had made their livings in agriculture (Record of Nakhonpathom Province, 2004).

3.1.2 Sample

The sample could be devided into 2 groups: farmers and experts as the mentioned following;

1) Farmers

1.1) Samples for studying in community environment, there were 75 samples from 15 Sub District Administrative Organizations by the random of

the geography of Banglen District, Nakhonpathom Province. Because of the area of Banglen District was low land and situation for the agricultural occupation, so did not different of area and most people had been earned a living in agriculture. However, the researcher had given the members of Sub District Administrative Organizations selected the informants who were the heads of farmer households and well aware of all situations in each Sub District Administrative Organizations.

1.2) Samples for the activity of environmental education process, there were 37 samples and selected by the volunteer application among head of the farmers households.

1.3) Samples for actual implementation in the field of farmers, there were 18 samples selected by the volunteer application among head of the farmers' household which half of samples for environmental education activities process.

2) Experts

The experts were 10 local persons in community who knew the existing situation of agricultural occupation and community environment.

3.2 Research Area

This research area was Banglen District, Nakhonpathom Province where was the low land and situation for the agricultural occupation and majority people had earned a living the agriculture as main.

3.3 Research Methods

This research was composed of research process 3 steps: 1) studying community environment related to farmers, management, agricultural occupation and environment 2) designing a model which participatory process of environmental education and 3) evaluating an efficiency of a model as the following;

3.3.1 Community Environment

Community environment is comprised of the study of community data including 6 items related to farmers, management, agricultural occupation, environment, environmental education learning of farmers, and problems and

recommendations by using questionnaire, survey and interview (Patricia A. Lauer, 2006: 34) as the following;

1) Farmers

Community environment related to farmers including 7 items: gender, age, marital status, religion, education, size of household and land use as the following;

1.1) Documentary studied from research reports, journals, articles and relevant documents.

1.2) Community survey was conducted in the research area to survey general conditions of agricultural community.

1.3) Questioning by the questionnaire to support the interview for collecting data that related to farmers.

2) Management

Community environment related to management including 4 items: goal, Process, resources and time frame as the following;

2.1) Documentary studied from research reports, journals, articles and relevant documents.

2.2) Community Survey was conducted in the research area to survey general conditions in the community as related to agricultural occupation.

2.3) Questioning by the questionnaire to support the interview for collecting data that related to management.

3) Agricultural Occupation

Community environment related to agricultural occupation including 5 items: occupation, classification of agriculture, the method of distribution, group member and training as the following;

3.1) Documentary studied from research reports, journals, articles and relevant documents.

3.2) Community Survey was conducted in the research area to survey general conditions in the community as related to agricultural occupation.

3.3) Questioning by the questionnaire to support the interview for collecting data that related to agricultural occupation.

4) Environment

Community environment related to environment including 10 items: soil, water, air, energy, plant, animal, concept culture, organization culture, usage or behavior culture and object culture as the following;

4.1) Documentary studied from research reports, journals, articles and relevant documents.

4.2) Community Survey was conducted in the research area to survey general conditions in community environment.

4.3) Questioning by the questionnaire to support the interview for collecting data that related to environment.

5) Environmental Education Learning of Farmers

Community environment related to environmental education learning of farmers including 6 items: awareness, knowledge, attitude, skill, participation and ability on evaluation which collected data by the questionnaire.

6) Problems and Recommendations

Community environment related to problems and recommendations including the data of farmers, management, agricultural occupation, environment that affected to the enough income for living and supported the quality environment; arranged in 3 priorities as the following;

6.1) Documentary studied from research reports, journals, articles and relevant documents.

6.2) Community Survey was conducted in the research area to survey general conditions in community environment.

6.3) Questioning by the questionnaire to support the interview for collecting data that related to problems and recommendations.

3.3.2 Designing a Model of Environmental Education Process on Farmers' Participation for Sustainable Agriculture Management

The researcher studied the community environment related to farmers, management, agricultural occupation, environment, environmental education learning of farmers, and problems and recommendations. Then, constructed a model of environmental education for sustainable agriculture management which was composed

of 5 steps: 1) the data of community environment analysing, 2) the data of community environment synthesizing, 3) drafting model report of environmental education for sustainable agriculture management, 4) presenting environmental education model to the expert and 5) completing model report of environmental education for sustainable agriculture managements the following;

1) Data of Community Environment Analysing

The researcher got the data of community environment to analyse that related to the agricultural occupation problems. Then, the data will be taken to synthesize in the other steps.

2) Data of Community Environment Synthesizing

The researcher got the data of the agricultural occupation problems to synthesize for the general information which will be taken to design a model of environmental education for sustainable agriculture management in the other steps.

3) Drafting Model Report of Environmental Education for Sustainable Agriculture Management

The researcher got the general information from the synthesizing to compile the outline and contents of a draft model of environmental education for sustainable agriculture management. Then, will be taken a draft model present to the experts in the other steps.

4) Presenting Environmental Education Model to the Expert

The researcher got a draft model for presenting to the 10 experts by group process meeting. Then, a draft model was taken to approve and invent a completed model in the other steps.

5) Completing Model Report of Environmental Education for Sustainable Agriculture Management

The researcher got a draft model which approved and passed the experts group process. Then, a draft model had taken to a completed model of environmental education for sustainable agriculture management. Moreover, a completed model will be taken to evaluate efficiency in the other steps.

3.3.3 Efficiency Evaluation

Data from the community environment were taken to analyse and design for a model of environmental education for sustainable agriculture management. Then, will be taken to evaluate efficiency as the following;

1) Volunteer Farmer Application

The volunteer farmer application was the application for the heads of farmer households with accepting minimum 30 samples which interested in environmental education activities process.

2) Environmental Education Activities Process

Environmental education process was the activities which follow to a model environmental education for sustainable agriculture management for treating to the farmers. The contents were 3 items including: 1) existing situation of environment in community 2) environmental education and 3) project management. Then, will be taken to evaluate the achievements of environmental education learning.

3) Evaluation of Environmental Education Achievements

The evaluation of environmental education achievements was the compare of mean of environmental education learning with pretest and posttest design. There were 6 items of environmental education including; awareness, knowledge, attitude, skill, participation and evaluation on ability. Then, to be evaluated the achievements of management skill.

4) Evaluation of Management Achievements

The evaluation of management achievements was the agricultural occupation plan writing which followed to the environmental education concept and management principle. The agricultural occupation planning composed of 4 main items: goal, process, resources, and time frame, then to be implemented in the farmers' fields.

5) Actual Implementation

Actual implementation was the practice which followed to the agricultural occupation planning. There were 2 months for implementing in the fields, and then to be evaluated the intention to act on occupation management of farmers.

6) Intention to Act for Farmers' Management on Agricultural Occupation

Intention to act for farmers' occupation management was the evaluation which followed to the agricultural occupation planning. The researcher had evaluated the level of intention to act on the occupation management of farmers. In according to, the farmers had been doing to follow the environmental education concept and project management principle that can make them had the more income and quality community environment. However, there were 4 items to evaluate: goal, process, resources and time frame.

3.4 Research Instruments

The instruments of this research were consisted of questionnaires and efficiency evaluation form.

3.4.1 Questionnaire

It was used for asking farmers on general data of farmers, management, agricultural occupation and environment.

3.4.2 Efficiency Evaluation Form

This form was taken to evaluate the efficiency of environmental education learning and intention to act as the following;

1) Environmental Education Learning of Farmers
2) Intention to Act for Farmers' Occupation Management

3.5 Data Analysis and Interpretation

Data analysis had been done with quantitative and qualitative integrated research. It was comprised of the study of community general data and efficiency evaluation in environmental education for sustainable agriculture. Qualitative analysis was comprised of 2 steps in designing a model of environmental education process on farmers' participation for sustainable agriculture management and evaluating a model of environmental education for sustainable agriculture management.

3.5.1 Qualitative Research

Qualitative research was involved with 2 steps which consisted of designing a model of environmental education process on farmers' participation for sustainable agriculture management and evaluating a model of environmental education for sustainable agriculture management through analysis to extract essential data for conclusion and arrange data system for reasonable presentation (Manee Chaitheeranuwatsiri, 1996: 51).

3.5.2 Quantitative Research

Quantitative research was included in 2 steps: 1) studying in community environment and 2) evaluating a model of environmental education for sustainable agriculture management as the following;

1) Content Analysis

The study of general data of community was involved with 6 aspects which comprised of farmers, management, agricultural occupation environment, environmental education learning of farmers, and problems and recommendations through analysis on data, content and relevant documents (Manee Chaiteeranuwatsiri, 1996: 43). It had been done to compile results and narrate standard data from studying documents, questionnaire, and observation through Descriptive Statistic to explain data with frequency, percentage and mean (Manus Suvan, 2001: 98; Marguerite G., 2006: 12).

2) Efficiency Comparison

The comparison of the efficiency was taken to the evaluation of a model of environmental education for sustainable agriculture management by the statistic of T-Test which had been tested of in average comparison of one Group Sampling (Boonthum Kitpreedaborisut, 2003: 118; Gopal K. Kanji, 1993: 27; Sherri L. Jackson, 2006: 197; Puangrut Taweerut, 1997: 160). However, the data will be taken to analyse for SPSS/PC^{+} program.

CHAPTER IV
RESULTS

The research on environmental education for sustainable agriculture management was conducted as a the participatory action research: (PAR) among the researcher, experts and farmers. The general objective of this research was to present a model of environmental education process to allow the farmers being able to manage their agriculture occupations that promote sustainable life quality and environment in the community, with 3 specific objectives including 1) studying the environment in community related to farmers, management, agriculture occupation and environment, 2) designing a model of environmental education process emphasizing on farmers' participation for the sustainable agriculture management, and 3) evaluating the efficiency of a model of environmental education for sustainable agriculture management. The research findings were seperatedly presented 3 aspects as the followings;

4.1 Community Environment

4.2 A Model of Environmental Education for Sustainable Agriculture Management

4.3 An Efficiency Evaluation of a Model of Environmental Education for Sustainable Agriculture Management

4.1 Community Environment

Community environment is defined as the studying general information of community regarding farmers, management, agricultural occupation environment, environmental education learning and recommendations. The research findings as the following;

4.1.1 Farmers

Farmers are defined as the persons holding agricultural occupation related to plantation and/ or animal raising. The information's farmers including gender, age, marital status, religion, education, size of household and land use as the research findings mentioned in table 1.

Table 1. Number and Percentage of Informants Classified to Gender, Age, Marital Status, Religion and Education

Individual Information	Number (person)	Percentage
1. Gender		
1.1 Male	50	66.67
1.2 Female	25	33.33
2. Age		
2.1 41-50 years	29	38.67
2.2 31-40 years	19	25.33
2.3 51-60 years	13	17.33
2.4 less than or equal 30 years	10	13.33
2.5 more than 60 years	4	5.33
3. Marital Status		
3.1 Married	59	78.67
3.2 Single	16	21.33
4. Religion		
4.1 Buddhism	75	100.00
4.2 Islamic	0	0.00
4.3 Christian	0	0.00
5. Education		
5.1 Primary level	38	50.67
5.2 Secondary level	21	28.00
5.3 Bachelor degree	11	14.86
5.4 Junior/Senior secondary	4	5.41
5.5 Master degree	0	0.00

As the research findings in table 1 presented that over a half of the information being males (66.67%) and the rest being female (33.33%) with 43 years old in average. Almost of informants were Buddhism and got married (78.67%) single (21.33%). The majority finished primary level (50.67%), secondary level (28.00%) and bachelor degree (14.86%). Moreover, a farmer family was composed of 5 members in average and including father mother and children.

However, some families included relatives. As for land use, most farmers occupied land use average 30 rais by separating 28 rais for agriculture. Mostly farmers (52.19%) own average 18 rais of land and leased from others (47.81%) average 22 rais. Data survey from documents and survey of community leaders and farmers regarding land use of agricultural occupation revealed that majorities of farmers occupied their own lands use in 3 ways: private land owner, partial land owner and leaser, lease whole land from other. There were more land leasers than private land owners.

4.1.2 Management

Management is defined as a decision making process for efficiency of agricultural occupations related to goals, processes, resources and time frame as the following;

1) Goal

Goal is defined as as the sufficient amount of yearly income with effective caring to community environment mentioned in the table 2.

Table 2. Number and Percentage of Informants Classified to Decision Making on Plantation and/or Animal Raising

Decision Making on Plantation and/or Animal Raising	Number (person)	Percentage
1. Plantation and/ or animal raising based on own skills	41	54.67
2. Plantation and/ or animal raising based on had done before	19	25.33
3. Plantation and/ or animal raising based on market demand	8	10.67
4. Plantation and/ or animal raising based on soil, water conditions and other production factors	6	8.00
5. Plantation and/ or animal raising mostly followed neighbors	1	1.33
6. Plantation and/ or animal raising based on government	0	0.00

As the research findings in table 2 presented that over a half of informants decided do plantation and/ or animal raising by their own skills (54.67%), by what they had done before (25.33%) and decided to the market demands (10.67%). However, the majority did not specify the yearly income (62.67%) and specified (37.33%). The specifying of yearly income was showed in figure 2.

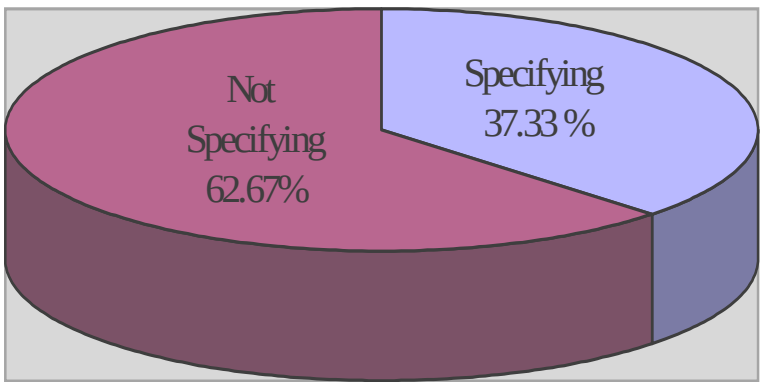

Figure 2 Percentage of Farmers Specifying the Yearly Income

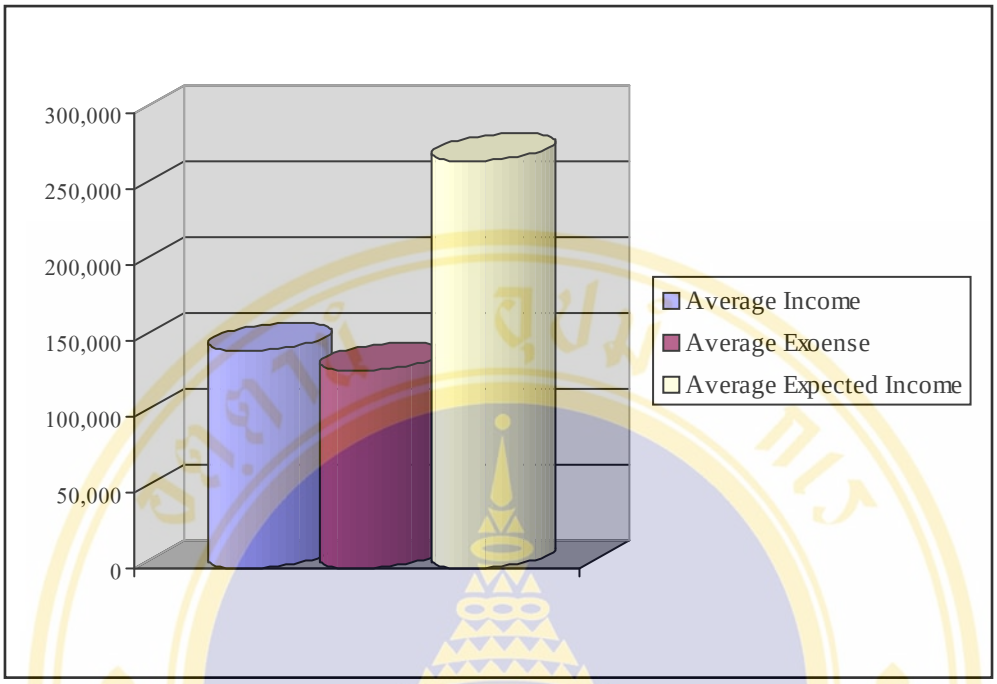

Figure 3 Income, Expense and Expected Income from the Agricultural Occupation

As the research findings in figure 3 presented that many farmers earned income from agricultural occupation 143, 760 baht per year. Majorities of farmers (40.00%) earned between 50,001 to 100,000 baht per year, then at 100,000 to 150,000 baht (20.00%) and over 250,000 baht (18.67%). As for expenses, most farmers spent yearly average of 130,066 baht while listed yearly expenses between 50,001 to 100,000 baht per year (38.67%), then spent under or equal to 50,000 baht (26.67%), and between 100,001 to 150,000 baht (14.66%). Moreover, most farmers expected only adequate income for self-support and maintain family living in the yearly average of 268,200 baht. The most farmers (38.67%) need to get the expected income over 250,000 baht, between 50,001-100,000 baht (22.66%) and 150,001-200,000 baht (18.67%). From the interview the community leaders and farmers showed that the agricultural occupation composed of the income and expense, the main income was from the agricultural occupation, the expense was from 2 parts: 1) the expense for agricultural occupation and 2) family, the income and expense were closed. Therefore, the farmers needed to have the expected income 2 plus of normal income. It will be enough for living without debt.

2) Process

Process is defined as the production methods and planning to achieve the project objectives as the research findings mentioned in table 3.

Table 3. Number and Percentage of Informants Classified to Production Planning

Production Planning	Number (person)	Percentage
1 Choosing production method in agricultural occupation		
1.1 Own skills	30	40.00
1.2 Availability of production resources	26	34.67
1.3 Ancestor teaching	8	10.67
1.4 Objective	8	10.67
1.5 Follow the neighbor mostly	3	4.00
2 Planning production in agricultural occupation		
2.1 With plan	69	92.00
2.2 Without plan	6	8.00

As the research findings in table 3 presented that most farmers (40.00%) decided to produce based on own skills, based on production factor (34.67%) and based on ancestor's agricultural occupation (8.00%). The most farmers (92.00%) had production planning, and without plan (8.00%). Interviewing community leaders and farmers suggested agricultural planning with purposes, production factors, marketing and investment, including plan savings for self sufficient living and further investment for agriculture. Moreover, majorities planned the outside of agricultural occupation such as household expenses.

Table 4. Number and Percentage of Informants Classified to Production Plan

Production Plan	Number (person)	Percentage
1 Significant factors in production planning		
1.1 Production factors such as workers, equipments and capitals	48	64.00
1.2 Production objectives	13	17.33
1.3 Production time frame	9	12.00
1.4 Production method	5	6.67
2. Production plan in agricultural occupation		
2.1 Based on market demand	50	66.67
2.2 Based on own needs	21	28.00
2.3 Follow neighbor mostly	2	2.67
2.4 Aimlessly production	2	2.67
2.5 Based on order	0	0.00

As the research findings in table 4 presented that many farmers (64.00%) agreed that production factors such as workers, materials and investment were the most important elements of production plan, production objective (17.33%), production time frame (12.00 %) and production method (6.67%). Currently, the most farmers planned the production in agricultural occupation based on market demand (66.67%), based on own needs (28.00%), followed by the neighbors and without any objectives (2.67%). Interviewing community leaders and farmers suggested that the most farmers considered production factor was the priority factors such as plants, animals and money. And produced the production for supporting the market demand. Most farmers produced based on market demand to make certain that the products were supported by the market. Moreover, some farmers produced the products based on merchants' suggestions because they were the one who knew the demand of market and able to find certain market for the farmers.

3) Resources

Resources are defined as employment by hiring and purchasing materials, equipments and raw materials as well as locating capital for agricultural occupation. Findings from the study of production data indicated that the most farmers used average labor of 3-4 persons in agricultural occupation by using household labor, relatives and hiring labor, which came from Banglen District (92.00%). Interviewing community leaders and farmers suggested that the most farmers relied on both household labors and hiring labor. Some farmers used only household labors, as for the hiring, majorities of farmers hired within the communities: sub district or nearby villages. The labors were used in all production steps such as wring in the rice paddy from the beginning to the ending of the process. But some farmers used them in few steps of the production. Many farmers bought materials, equipments and raw materials as production such as machinery, tools, organic and chemical fertilizer as mentioned in figure 4.

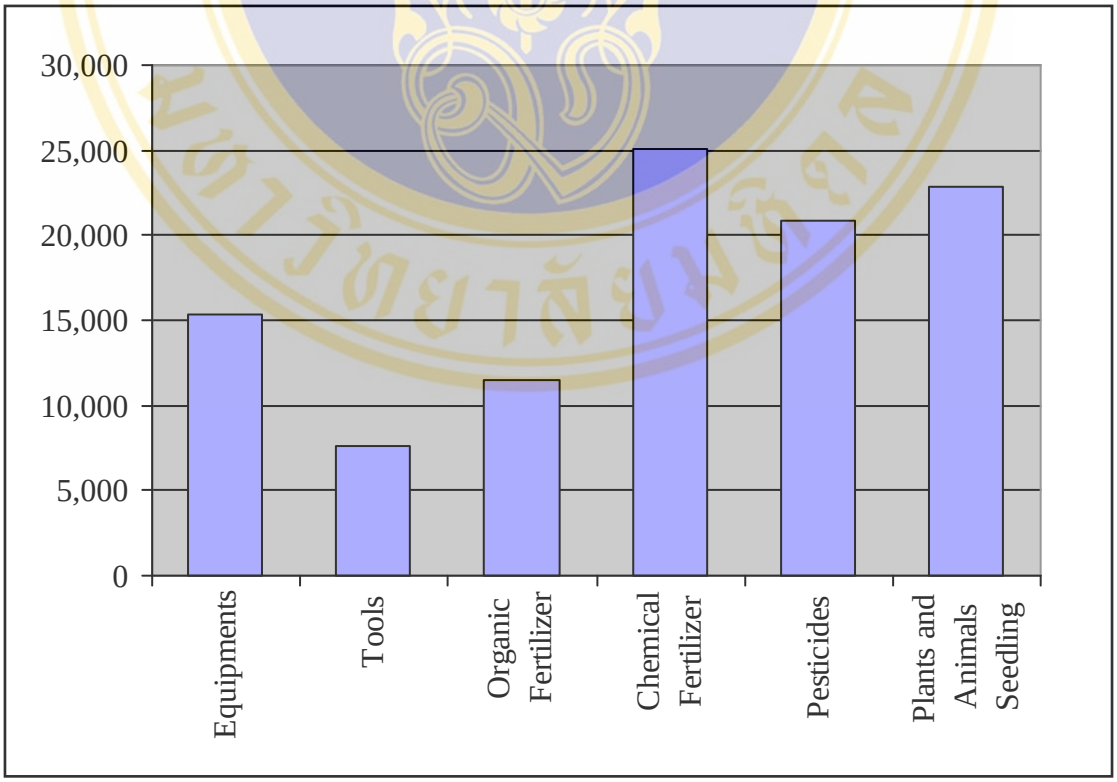

Figure 4 Yearly Expense of Materials from the Agricultural Occupation

As the research findings in figure 4 presented that the most farmers had the yearly expenses for the materials, tools and raw materials in agricultural occupation. There were average expenses on machinery 15,000 baht, regular tools 7,500 baht, organic fertilizer 11,500 baht, chemical fertilizer 25,000 baht, pesticides 20,000 baht and plants and animals seedlings 22,000 baht. In addition, the other expenses such as animals foods and fuel which some farmers paid average of 75,600 baht yearly. Furthermore, some farmers were able to produce own materials, tools and raw materials while some leased machineries and tools. Majorities of farmers (77.33%) paid cash for materials, tools and raw materials, following by installment (3.33%), while paid in cash and installment or loan (9.33%). Interviewing community leaders and farmers suggested that many farmers spent large sum of money in modern agricultural equipments and technology both in purchasing and hiring. Purchasing was done in materials such as plants seedlings, animals, seedlings, pesticides, and chemical fertilizer. As for hiring, it used of machinery needed such as for field plough or rice harvesting and sources of money presented in table 5.

Table 5. Number and Percentage of Informants Classified to Sources of Money

Sources of Money	Number (person)	Percentage
1 Source of funds		
1.1 Self-funding	34	45.33
1.2 Bank loan	26	34.67
1.3 Borrow from community capitalist	9	12.00
1.4 Borrow from relatives	5	6.67
1.5 Borrow from neighbors	1	1.33
2. Addition funds		
2.1 Bank loan	25	33.33
2.2 Own savings	24	32.00
2.3 Borrow from community capitalist	13	17.33
2.4 Borrow from relatives	13	17.33
2.5 Borrow from neighbors	0	0.00

As the research findings in table 5 presented that many farmers (45.33%) spent their own funds on agriculture, borrowed from the bank (33.67%), and from community capitalist (12.00 %). As for additional funds, took out additional loan from the bank (33.33 %), borrowed from relatives (17.33%). Interviewing community leaders and farmers suggested that many farmers spent their own savings to make their livings in agricultural occupation and when the savings were inadequate, they would take out more loan from the bank or cooperative or village fund.

4) Time Frame

Time frame is defined as the period of plantation and/ or animal raising which specific of the main plants or animals in a year. The research findings indicated that within a year period, many farmers grew the main plants average twice yearly and raised the animal average once a year. Interviewing community leaders and farmers suggested that many areas in Banglen District were suitable for growing rice and vegetables. Many farmers grew the plants two to three times a year on average. Moreover, plantation and/ or animal raising based on plants or animals life cycle such as harvesting rice on 120 days or breeding fishes for approximately 8 months.

4.1.3 Agricultural Occupation

Agricultural occupation is defined as growing plantation and/ or animals raising which consisted of agricultural activities, distribution methods, group members and training. These are key data in environmental education on agricultural occupation. The research findings are being presented as the following;

1) Occupation

Occupation is defined as major and minor occupations, duration in making living from agricultural occupation and reasons in occupied agricultural occupation as the research findings mentioned in table 6.

Table 6. Number and Percentage of Informants Classified to Occupation

Occupation	Number (person)	Percentage
1 Agricultural occupation		
1.1 Major	68	90.67
1.2 Minor	7	9.33
2. Classification of supplementary occupation		
2.1 Work for wages	43	57.33
2.2 Vendors	22	27.33
2.3 Other occupations such as being the member of Sub District Administration	3	4.00
3. Reasons for being in agricultural occupation		
3.1 Ancestor occupation	35	46.67
3.2 Inherit land from parents	27	36.00
3.3 Enjoy being in agricultural occupation	13	17.33

As the research findings in table 6 presented that many farmers (90.67%) made their livings mainly from agricultural occupation, and the rest being the minor occupation (9.33 %). While agriculture was main occupation for most farmers, the farmers worked for wages as the minor occupation (57.33%), following by as vendors (27.33%). Furthermore, the farmers (4.00%) picked their minor occupations by being members of Sub District Administrative Organization. Majorities of farmers (46.67%) had been living in this agricultural occupation in average of 21 years and just to follow ancestors' tradition (46.67%), inherited the land from ancestors (36.00%), and enjoy doing it (17.33%).

2) Classification of Agricultural

Classification of agricultural is defined as agricultural pattern which consisted of either growing single plantation, animals raising only or growing single plantation and animals raising together.

The research findings from the classification of agriculture in community was to presented that the most farmers (48.00%) grew only plantation, grew plantation and animal raising together (41.33%), and only animal raising (10.67%). Data survey from agricultural documents suggested that Banglen District occupied areas of 259,843 rais by dividing into paddy fields for 218,595 rais, field crops 1, 218 rais, fruits trees 13,163 rais, vegetables 4, 549 rais, flowers 1,242 rais and other agricultural areas for 21,076 rais. Therefore, it seemed that most farmers preferred to grow only plantation as well as animals raising such as pigs, chickens, ducks, cows, fishes and shrimps. The classification of agriculture in the community was showed in figure 5.

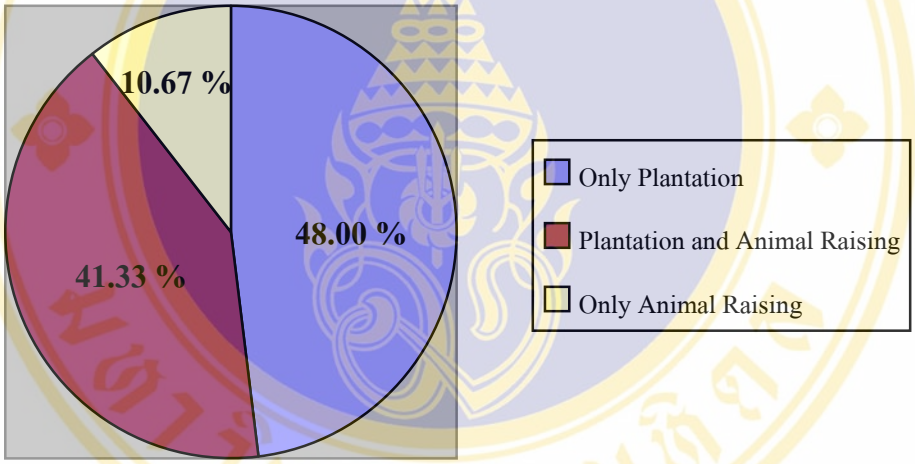

Figure 5 Percentage of Classification of Agriculture in Community

3) Method of Distribution

Method of distribution is defined as selling agricultural commodities which consisted of marketing and market places. From the study of distribution method in agricultural occupation, findings indicated that many farmers (72.00%) distributed agricultural products by selling directly to the traders at home, selling to wholesale market (26.67%). Majorities of farmers (96.00%) sold to domestic markets. Interviewing community leaders and farmers suggested that many farmers sold directly to the traders at home which made small differences in prices but rather saved times and expenses in transporting products to the market. Furthermore, certain

commodity such as rice in excess supply can be sold to the government in higher price than selling to the rice trader.

4) Group Member

Group member is defined as participating in group membership while maintaining agricultural occupation which consisted of being part of the group and number attending group meeting. Findings from the study of group member activities in agricultural occupation suggested that during that time, many farmers (70.67%) were group members, while were not (29.33%). As for members, many farmers attended the meeting in average 1-2 times yearly. Interviewing community leaders and farmers suggested that many farmers were members of agricultural cooperatives or members of the bank for agriculture and agricultural cooperatives. Findings from the study of documents revealed that Banglen District is consisted of many occupational groups such as hyacinth handicraft, women occupational promotion, sewing clothes as well as having economic group such as savings for production.

5) Training

Training is defined as participation in receiving knowledge in agricultural occupation from different divisions while doing agricultural occupation which consisted of training experiences on training subjects and numbers of training, studying training data on agricultural occupation. Research results indicated that many farmers (72.00%) received training in agricultural occupation and never received any training (28.00%). Majorities of them received training in bio and organic fertilizer as well as the application of fertilizers and pesticides. In the past 3 years, farmers received training in agricultural occupation in the average of 2 times a year.

4.1.4 Community Environment

Community environment is defined as soils, water, air, energy, plants and animals, concept culture, organization culture, behavior culture, and object culture. The research results suggested as the following;

1) Soil

Soil is defined as the classification of soil, usage and soil problems in the community as the research findings mentioned in table 7.

Table 7. Number and Percentage of Informants Classified to Information Related to Soil

Soil Condition	Number (person)	Percentage
1.Classification of soil		
1.1 Clay	59	78.67
1.2 Loose soil	14	18.67
1.3 Sandy soil	2	2.67
2. Land use		
2.1 Agriculture	72	96.00
2.2 Industry	3	4.00
3. Soil problems		
3.1 Highly acid	29	38.67
3.2 Acid soil	28	37.33
3.3 Alkaline soil	13	17.33
3.4 No problem	5	6.67

As the research findings in table 7 presented that soils in community (78.67%) are consisted of clay, loose soil (18.67%) and sandy soil (2.67%). Soils are being used mostly for agriculture (96.00%) and industry (4.00%). As for soil problems, faced with highly acid (38.67%), acid soil (37.33%) and alkaline soil (17.33%). Interviewing community leaders and farmers suggested that clay was mainly used for agriculture in the community. Besides, community mostly encountered soil conditions with alkaline, harden and decreased quality from remaining pesticide.

2) Water

Water is defined as the classification of water, usage and problems of water sources in community as the research findings mentioned in table 8.

Table 8. Number and Percentage of Informants Classified to Information Related to Water

Water Condition	Number (person)	Percentage
1 Classification of water source		
1.1 River and canal	67	89.33
1.2 Underground water	5	6.67
1.3 Tab water	3	4.00
2. The usage from water source		
2.1 Agriculture	70	93.33
2.2 Household consumption	5	6.67
3. Problems with water source		
3.1 Inadequate	27	36.00
3.2 Waste water	17	22.67
3.3 Overflow	17	22.67
3.4 Shallow canal with contaminated chemical subatance	3	4.00
3.5 No problems	11	14.67

As the research findings in table 8 presented that many communities (89.33%) used water from the river and canal, following by used underground water (6.67%), and used tab water (4.00%). Many farmers (93.33%) used water for agriculture and for household consumption (6.67%). There was problem in inadequate amount of water (36.00%), with problems in waster water and overflow (22.67%), not having problems in the community (14.67%). Findings from community survey and documents suggested that Ta Chin River flew through Banglen District along these canals, Banglen, Phrapimol, Bangluang, Bangsaipa, Bangpasee, Nokkratung and Narapirom. Furthermore, there were the water sources available for agriculture as well

as having Klong Tasarn as the substitute canal during the dry season. Therefore, many farmers made use of those rivers and canals by using the water in agriculture.

3) Air

Air is defined as air problems conditions, classification and cause of air pollution in the community as the research findings mentioned in table 9.

Table 9. Number and Percentage of Informants Classified to Information Related to Air

Air Condition	Number (person)	Percentage
1 Air problems conditions		
1.1 Having problems	51	68.00
1.2 No problems	24	32.00
2 Classification of air pollution problems		
2.1 Foul odor	27	52.94
2.2 Dusty	17	33.33
2.3 Chemical mixtures	7	13.73
3 Cause of air pollution		
3.1 Factory	27	52.94
3.2 Lump laterite road	17	33.33
3.3 Pesticide	7	13.73

As the research findings in table 9 presented that many communities had encountered problems with air pollution (68.00%) and not having problem (32.00%). The most air pollution problems (52.94%) were foul odor, dust (33.33%) and mixed chemical (13.73%). Many problems caused by industrial factories (52.94%), following by lump laterite road (33.33%), and pesticide (13.73 %). Interviewing community leaders and farmers suggested that Banglen District encountered air pollution problems mostly in foul odor and dust. Foul odor resulted from industrial factories and cattle houses operation. For dust problem, it is caused by having many lump laterite roads in the community.

4) Energy

Energy is defined as amount of money spending for energy in a month and problems related to energy as the research findings mentioned in table 10.

Table 10. Number and Percentage of Informants Classified to Information Related to Energy

Energy	Number (person)	Percentage
1 Amount of money spending for energy in a month		
1.1 Fuel	53	70.67
1.2 Electricity	18	24.00
1.3 Cooking gas	4	5.33
2 Problems related to energy		
2.1 Expensive	74	98.67
2.2 Less amount of energy	1	1.33

As the research findings in table 10 presented that within a month, the most farmers households (70.67%) spent for fuel, electricity (24.00%) and cooking gas (5.33%). The problem of energy encountered problems in high cost of energy (98.67%). Interviewing community leaders and farmers suggested that most farmers spent mostly on fuel in comparison with other expenses on energy within a month. However, many farmers used the same amount of fuel but paid higher fuel price because its price adjusted according to world market's fuel price.

5) Plant

Plant is defined as classification of economic plants and vegetables in family as the research findings mentioned in table 11.

Table 11. Number and Percentage of Informants Classified to Information Related to Plant

Economic Plants in Family	Number (person)	Percentage
1 Classification of economic plants in family		
1.1 Rice	55	73.33
1.2 Vegetables	9	12.00
1.3 Fruits	4	5.33
1.4 Ornamental flowers	1	1.33
1.5 No plantation	6	8.00
2 Vegetable in family		
2.1 Growing	66	88.00
2.2 No plantation	9	12.00
3 Classification of vegetable (arranged in priority)		
3.1 Chili	37	56.06
3.2 Basil	22	33.33
3.3 Lemon grass	30	45.45

As the research findings in table 11 presented that the most farmers (73.33%) grew rice which was the economic plants, vegetables (12.00%) and fruits (5.33) Moreover, they grew vegetable in family (88.00%) and not grow (12.00%). The vegetables were grown including chili (56.06%), basil (33.33%), and lemon grass (45.45%). The findings from the documentary suggested that the most area of Banglen District were farmland, perennial plants, vegetable and ornamental flowers. Therefore, the most farmers grew the rice and distributed it for economy at first. And corresponded to interviewing community leaders and farmers suggested that the farmers grew the rice for the economic plants which were the mainly of income to their family. Besides, they grew the vegetable for the economic plants such as kale, chili, lemon grass and basil. In order that, they grew the vegetable and economic plants together.

6) Animal Raising

Animal is defined as animal raising, classification of animal raising in family as the research findings mentioned in table 12.

Table 12. Number and Percentage of Informants Classified to Information Related to Animal

Economic Animal Raising in Family	Number (person)	Percentage
1 Animal raising in family		
1.1 Yes	48	64.00
1.2 No	27	36.00
2 Classification of animal raising in family (arranged in 3 priorities)		
2.1 Fish	36	75.00
2.2 Chickens	15	31.25
2.3 Ducks	6	12.50

As the research findings in table 12 presented that the most farmers (64.00%) raised the animals in family and not raise (36.00%). The animals were raised at first was fish, then chickens and ducks. The finding from the documentary and community survey suggested that the most farmers raised the animals in family such as fish, chickens and ducks. In order that, they grew together with the mainly plantation.

7) Concept Culture

Concept culture is defined as ideas associated with relationship between man and his environment and decision making in the way of life as the research findings mentioned in table 13.

Table 13. Number and Percentage of Informants Classified to Concept Culture

Concept Culture	Number (person)	Percentage
1 The relationship between human and environment		
1.1 Human being a part of environment	57	76.00
1.2 Human need to construct the technology for controlling the nature	9	12.00
1.3 All things on earth were not last long	9	12.00
2 The decision making in the way of life		
2.1 Based on own decision	33	44.00
2.2 Based on the expert before making decisions	23	30.67
2.3 Based on existing situation	12	16.00
2.4 Based on the consideration of own benefit	3	4.00

As the research findings in table 13 presented that most farmers (76.00 %) agreed that human was a part of the environment, agreed with the idea that human need to construct the technology for controlling the nature and all things on earth were not last long (12.00%). Many farmers (44.00%) preferred to make own decisions, consulted with the expert before making-decision (30.67%), and made decision based on existing situation (16.00%). Many farmers based their concepts culture on Buddhism philosophy that viewed human as part of earth while many of them made their own decision based on experiences from knowing and perceiving, leading to decisions making.

8) Organization Culture

Organization culture is defined as problems solving when there are quarrels within family and community as the research findings mentioned in table 14.

Table 14. Number and Percentage of Informants Classified to Organization Culture

Organization Culture	Number (person)	Percentage
1 The approach to solve the quarrel problem in family		
1.1 Giving up	61	81.33
1.2 Compromising by the reasoning	8	10.67
1.3 Compromising by the parents	5	6.67
1.4 Compromising by the older relative	1	1.33
2 The approach to solve the quarrel problem in community		
2.1 Compromising by the senior in community	25	33.33
2.2 Compromising by the leader in community	24	32.00
2.3 Giving up	23	30.67
2.4 According to law	3	4.00

As the research findings in table 14 presented that many farmers household (81.33%) handled quarrels within the families with giving up, the reasoning (10.67%) and comprised by the parents (6.67%). Many farmers based their concepts on forgiving with consideration and understanding within their families. As for community disputes, many farmers (33.31%) agreed to solve the problems with community senior advice, ask the community leader or committee to make decision (32.00%) and agreed with giving up (30.67%). Majorities of farmers in the community lived together with understanding and harmony.

9) Behavior Culture

Behavior culture is defined as family expenses and savings consisted of household, expenses and savings methods as the research findings mentioned in table 15.

Table 15. Number and Percentage of Informants Classified to Behavior Culture

Behavior Culture	Number (person)	Percentage
1 Family expenses		
1.1 Food	32	42.67
1.2 Education	15	20.00
1.3 Facilities such as mobile phone, computer, the installment of car	15	20.00
1.4 Investment of occupation	9	12.00
1.5 Clothing	1	1.33
2 Saving		
2.1 Bank	52	69.33
2.2 Cooperative	10	13.33
2.3 Bond	2	2.67
2.4 Life insurance	2	2.67
2.5 No saving	9	12.00

As the research findings in table 15 presented that many farmers (42.67%) incurred current expenses on foods, education and the facilities such as mobile phone, car installment (20.00%). Many farmers (69.33%) saved their incomes at the bank, saved at the cooperatives (13.33%) and had no savings (12.00%). Many farmers based their cultural behavior on consumption. Interviewing community leaders and farmers suggested that many farmers spent mostly on foods as compared to other expenses because foods were basic necessities which must be consumed regularly. Besides, many farmers saved their incomes from agricultural occupation at the bank or agricultural cooperatives that they were group members.

10) Object Culture

Object culture is defined as classification and form of residence and household facilities as the research findings mentioned in table 16.

Table 16. Number and Percentage of Informants Classified to Object Culture

Object Culture	Number (person)	Percentage
1 Classification of the residence		
1.1 Detached house	74	98.66
1.2 Business building	1	1.34
2 Form of the ownership of residence		
2.1 Own	68	90.67
2.2 Relative	6	8.00
2.3 Rent	1	1.33
3 Number of household facilities		
3.1 Having 1 car	40	53.33
3.2 Having 1 motorcycle	29	38.67
3.3 Having 1 bicycle	31	41.33
3.4 Having 1 television	39	52.00
3.5 Having 1 stereo	46	61.33
3.6 Having 1 vcd/dvd player	48	64.00
3.7 Having 1 refrigerator	64	85.33
3.8 Having 1 washing machine	45	60.00
3.9 Having 1 microwave oven	8	10.70

As the research findings in table 16 presented that many farmers household (98.66%) lived in a single houses, stayed with relatives (8.00%). The most farmers (90.67%) had home owner rights. Each household owned at least 1 convenience gadget such as 1 car, 1 motorcycle, 1 bicycle, 1 vcd or dvd player, 1 refrigerator, 1 washing machine and 1 microwave oven. Many farmers stressed their consumption on objects with modern technology. From the survey and interview community leaders and farmers suggested that many farmers had adequately had basic gadgets such as television, electric fan, refrigerator, radio, motorcycle and bicycle to maintain living comfortably.

4.1.5 Environmental Education Learning of Farmers

Farmer's learning environmental education is defined as learning results in environmental education of farmers based on objectives of environmental education comprised of awareness, knowledge, attitude, skills, participation and evaluation on ability by comparing farmers' pretest and posttest achievement scores in environmental education. Learning measures are consisted of 5 level scores as the following;

1. Scores 4.21-5.00 represent very high level of learning
2. Scores 3.41-4.20 represent high level of learning
3. Scores 2.61-3.40 represent moderate level of learning
4. Scores 1.81-2.60 represent low level of learning
5. Scores 1.00-1.80 represent very low level of learning

Therefore, environmental education of farmers including awareness, knowledge, attitude, skills, participations and evaluation on ability. Findings from comparison of learning achievement in agricultural education of farmers pre-learning and post-learning as the research findings mentioned in table 17.

Table 17. Overall of Farmers' Environmental Education Learning

Environmental Education	Mean	Level of Learning
1. Awareness	4.07	High
2. Knowledge	3.39	Moderate
3. Attitude	4.26	High
4. Skill	4.00	High
5. Participation	3.84	High
6. Evaluation on Ability	4.42	Very High
Mean	4.00	High

As the research findings in table 17 presented that many farmers had overall learning results in environmental education at high level with the average scores of 4.00 points. As for awareness, average scores showed the medium level at 4.07 points while knowledge had medium scores at average 3.9 points. Attitude scored the highest with average of 4.26 points and high scores in skills with average of 4.00 points. Participation scored high at average 3.84 points and evaluation on ability scored the highest at 4.42. After all, many farmers had educational education and can develop the community environment with quality. The agricultural occupation still likes to use chemicals because it can protect the pest, easy to use and save the time. Therefore, the most of farmers used the chemicals for increasing the products and it caused to some farmers who did not to use the chemicals can not avoid from the using of chemicals, because the farmers who lived around the area used it for process of production and the danger of the chemicals affected to human and environment. Present some farmers considered to the danger of chemicals and interesting in the bio which taken to integrate with the chemicals. Findings also indicated that many farmers had environmental concerned such as pesticide reduction or using bio element together with pesticides. The level of learning environmental education of farmers as classified by objectives of environmental education as the research findings mentioned in table 18.

Table 18. Farmers' Environmental Education Learning Classified to Awareness, Knowledge, Attitude, Skill, Participation and Ability on Evaluation

Environmental Education	Mean	Levels of Learning
1. Awareness		
1.1 Agree that human was a part of environment	4.03	High
1.2 Agree that the quality environment affect to life quality	4.11	High
1.3 Agree that human has not existed if without environment but the environment has existed while without human	4.08	High

Table 18. Farmers' Environmental Education Learning Classified to Awareness, Knowledge, Attitude, Skill, Participation and Ability on Evaluation (cont.)

Environmental Education	Mean	Level of Learning
2. Knowledge		
2.1 Produce expansion can be depended on the chemical fertilizer and pesticides only	3.03	Moderate
2.2 Pesticides spraying was the fair ownership	3.33	Moderate
2.3 Agricultural occupation have to will be taken the highest benefit	3.80	Moderate
3. Attitude		
3.1 Quality environment affect to physical health	4.27	High
3.2 Quality environment affect to mental health	4.27	High
3.3 Quality environment affect to overall of life quality	4.25	High
4. Skill		
4.1 Can be analyzed the affect of the agricultural occupation to community environment	3.83	High
4.2 Can be decided to choose the plantation and / or animal raising that was not destroy the environment in community	4.13	High
4.3 Can had the income in agricultural occupation that was not destroy the environment in community	4.03	High
5. Participation		
5.1 There was the participation for meeting that related to development and conservation in community environment	3.93	High
5.2 There was the participation for planting and / or animal raising that that was not destroy the environment in community	3.81	High
5.3 There was the participation for persuading that related to development and conservation in community environment	3.79	High

Table 18. Farmers' Environmental Education Learning Classified to Awareness, Knowledge, Attitude, Skill, Participation and Ability on Evaluation (cont.)

Environmental Education	Mean	Level of Learning
6. Ability on Evaluation		
6.1 If people in community burns the waste more, in the future will be occurred the global warming more	4.28	Very High
6.2 If human has not stopped to destroy the forest, the world will be occurred disaster	4.51	Very High
6.3 Using of pesticides in agricultural occupation can affect to living of plants, animals, and healthy people	4.48	Very High

As the research findings in table 18 presented that awareness showed high level which aware of human being part of environment and environmental quality effect life quality as well as realizing that without environment human cannot exist. Knowledge remained at moderate level while most of farmers knew that the agricultural occupation can yield maximum profit and increasing products required the use of fertilizers or pesticides or spraying, which was farmer's righteous action to do on own land. Attitude showed high level. Majorities of farmers agreed that environment effected physical and mental health and life quality of self and others. Skills remained at high level where farmers possessed skills in analysis impacts and decision in growing plantation and / or animal raising without disturbing community environment. As for participation, it showed the high level since majorities of farmers had participated and invited the locals to join environmental conservation and development in the community. The evaluation on ability was at the very high level which farmers could forecast life and environmental impacts from environmental destruction.

4.1.6 Problems and Recommendations

Problems and recommendations are defined as important opinion related to farmers, management, agricultural occupation and community environment which could yield sufficient income for farmers to sustain own lives and promote good

quality community environment in 3 items (arranging from the most important to the least important). Research results in the study on problems, threats and recommendations indicated the following results: first involving in low products but higher production cost and low products price. Second lack of the recommendation from the government and related divisions on agriculture and third in decay environment such as soils, water, air and contaminated chemical elements. From interviewing community leaders and farmers, it was found that majorities of farmers wanted to concern the divisions to support higher products price and lower price for production materials such as pesticides, chemical fertilizers. This should help farmers to reduce production cost and sell agricultural product without loss. Furthermore, farmers had not received any supports from the government as it should be or at minimum level as well as majorities of farmers neglected to meet local farmers.

The research findings were presented that the most farmers were 43 years old and finished the graduate at primary level and living the agricultural occupation because it was the ancestor occupations. Most farmers did not specify the yearly income which the income and expense were closed. The farmers needed to get the expected income which was 2 plus of normal income. The farmers had plantation and / or animal raising by their skills and had planning for the production which produced by the market demand. And the production factors were the most important of the plan. Moreover, the farmers had the objectives of environmental education at high level but the community had the problems such as acid soil, the less of water for plantation and air pollution. In order that, the farmers were adults which had the worry and afraid of the changing (Somkid Isarawatana, 2000: 26) and finished at the primary level which caused to live on the agricultural occupation (Somkid Isarawatana, 2000: 38) which contributed to inferior agricultural production (Wee Rawang, 1996: 57).

From the analysis of community surrounding regarding problems in agricultural occupation, main problems for agricultural occupation were identified in 3 items: first the insufficient income, second the management skills and third the community environment problems. Problems discovered during the analysis of the community surrounding had been included in designing the model of sustainable agricultural management so that farmers could have proper environmental education and management skills, leading to higher income and good quality environment.

4.2 A Model of Environmental Education for Sustainable Agriculture Management

The design of a model of environmental education process emphasizing on farmer's participation for the sustainable agriculture management covering of 6 steps: 1) data analysis on community environment, 2) data synthesis on community environment, 3) drafting a model of environmental education for sustainable agriculture management, 4) presenting a model of environmental education to the experts, 5) completing a model of environmental education for sustainable agriculture management and 6) system theory based environmental education as the following;

4.2.1 Data Analysis on Community Environment

Community general surrounding analysis was done by taking the data from the community environment. Then, the data were taken to analyse which related to the problems of agricultural occupation. There were 3 main problems: first the insufficient incomes, second the management skill and third the problems of community environment. Results from the analysis were used in the community data analysis.

4.2.2 Data Synthesis on Community Environment

Community data synthesis is consisted of taking the data from the problem of agricultural occupation in community. Then, synthesized the data in 4 items: first existing situation of environmental in community, second environmental education, third project management and fourth healthy people and healthy environment. Data from the synthesis were used for designing a draft model of environmental education model for sustainable agriculture management.

4.2.3 Drafting a Model of Environmental Education for Sustainable Agriculture Management

Designing a draft model of environmental education for sustainable agricultural management was done by arranging structure and contents from the synthesized data. There were the contents in 6 unites: first introduction, second

existing situation of environmental in community, third environmental education, fourth project management, fifth healthy people and healthy and sixth conclusion. From there, it was taken to the experts for checking the quality of a model.

4.2.4 Presenting a Model of Environmental Education to the Experts

A draft model of environmental education for sustainable agriculture was presented to 10 experts by group process meeting. Moreover, this process was for making into the complete model.

4.2.5 Completing a Model of Environmental Education for Sustainable Agriculture Management

A model of environmental education for sustainable agricultural management was designed on a draft model that completely verified and corrected by the experts. Then, taken to complete a model as the following components;

Unit 1: Introduction

Unit 2: Existing Situation of Environment in Community including preface, environment, community environment, environmental education and conclusion.

Unit 3: Environmental Education including preface, environmental education philosophy, environmental principles, and environmental education, environmental input, environmental process, results evaluation and conclusion.

Unit 4: Project Management including preface, project management principles, project components, project management process, writing project and conclusion.

Unit 5: Healthy People and Healthy Environment including preface, community life quality, community environmental quality and conclusion.

Unit 6 Conclusion

After completely designing a model of environmental education for sustainable agriculture management as shown in figure 6.

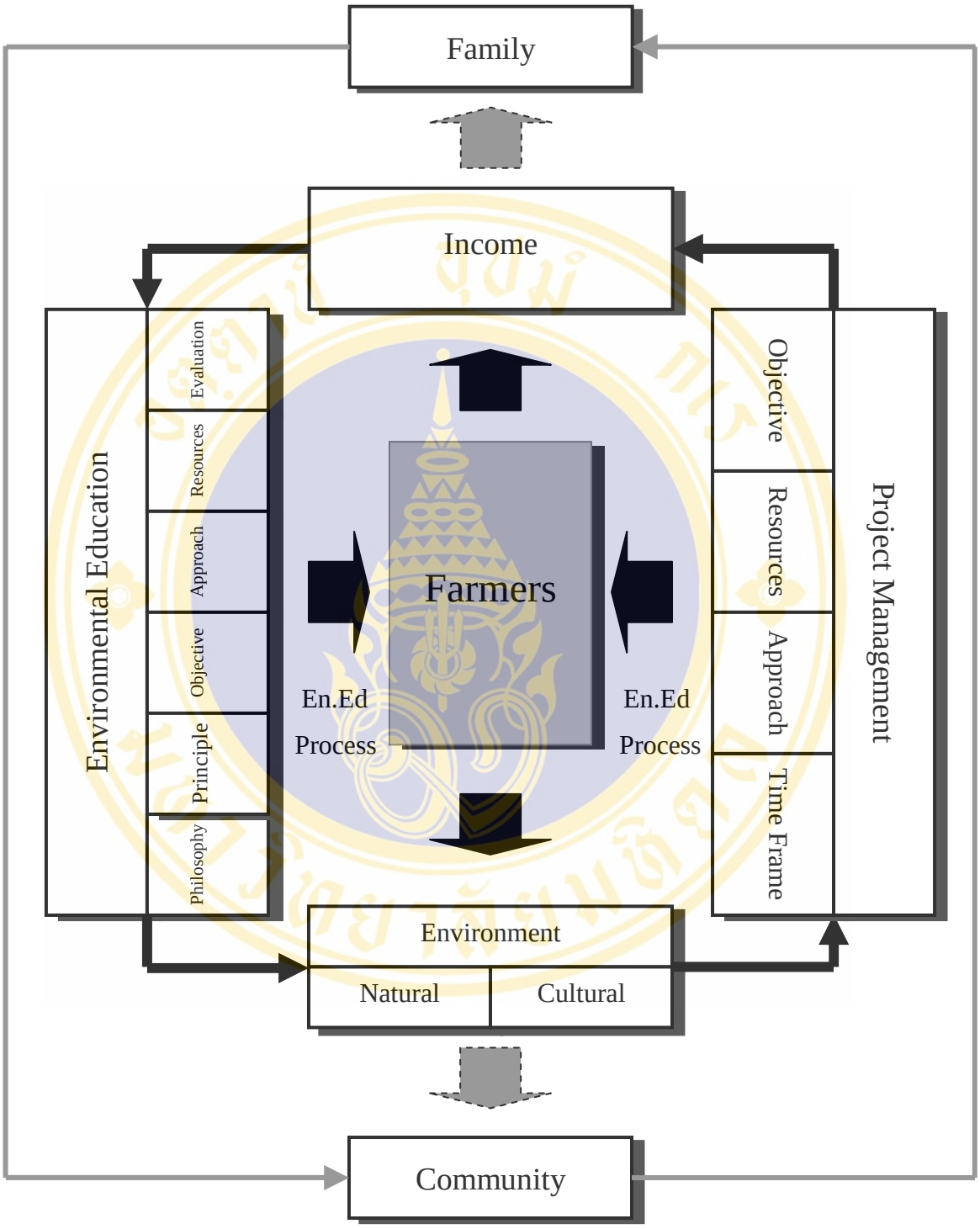

Figure 6 A Model of Environmental Education for Sustainable Agriculture Management

Source: The Research Findings

Figure 6 presented that a model of environmental education for sustainable agriculture management is based on conceptual framework of environmental education and principle of project management by assigning environmental education as the process to develop individual spirit to be environmental friendly. Therefore, environmental education was the way to develop farmer for environmental friendly agriculture. As for project management, it is the tool for managing agricultural occupation to get more incomes together with quality environment. Therefore, the researcher as environmental educator is acting as transmitter of environmental education and project management to the farmers by allowing them to maintain sustainable agricultural occupation under environmental education concepts and principles of project management together passed by environmental education process.

Environmental education covers 6 items of major contents: firstly, philosophy of environmental education, secondly, principle of environmental education, thirdly, objective of environmental education, fourthly, approach of environmental education, fifthly, resources for environmental education and sixthly, evaluation of environmental education. As for project management, it is comprised of contents in 4 items as follows: first objective, second approach, third resources and fourth time frame. When the farmers had environmental education and skills of project management. Then, the farmers could develop their agricultural occupations that get more income and quality of environment which consisted of natural and cultural environment. Increasing income was taken to lead the higher income to their families. Then, taken to warmth and security in family which the members occupied steady jobs with self support and environmental friendly, leading to god quality community from being strong community, getting together as one group, having brainstorm, group participation and self reliance. As a result, sufficient income led to warm and stable family and strong community. Then, became the cycle of sustainable agricultural occupation and had the quality of environment together.

4.2.6 System Theory Based Environmental Education

Environmental education must be done in accordance with the system theory based environmental education. Therefore, environmental education usually contained 7 steps as follows: firstly, environmental study, secondly, the design of environmental education model, thirdly, resources for environmental education, fourthly, environmental education process, fifthly, ealuation of environmental education achievement, sixthly, environmental management and seventhly, healthy people living in healthy environment as the following;

1) Environmental Study

Environmental study covers firstly, community environment and secondly, learning levels of environmental education as the following;

1.1) Community Environment

The study of general information in community is consisted of studying community data in 4 aspects as farmers, management, agricultural occupation and environment through the study of documents, community survey, questioning through questionnaires and interviewing forms.

1.2) Learning Levels of Environmental Education

The study of environmental education learning is consisted environmental education in 6 aspects as awareness, knowledge, attitude, skill, participation and ability to evaluate by using questionnaires.

2) Design of Environmental Education Model

Taking data from environmental education to analyze and synthesize as environmental education model for sustainable agricultural management consisted of the following steps;

2.1) Analysis and synthesis data derived from community environment.

2.2) Constructing draft model environmental education for sustainable agriculture which consisted of contents in 6 units as follows: 1) introduction, 2) existing situation of environment in community, 3) environmental education, 4) project management, 5) healthy people and healthy environment and 6) Conclusion.

2.3) Presenting draft model of environmental education for sustainable agricultural to the experts for verification and improvement.

2.4) Completing environmental education model for agricultural occupation.

3) Resources for Environmental Education (Input)

Resources for environmental education are consisted of 5 factors as the following;

3.1) Learners

Learners are interested farmers who have been occupied agricultural occupation by growing crops and/or raising animals and gathered by environmental educator to participate in the project.

3.2) Curriculum

Curriculum is the environmental education model for sustainable management derived from synthesizing environmental education model consisted of contents in 6 units as previously mentioned.

3.3) Activities

Activities used in transmitting environmental education knowledge to farmers in this research such as training activities for learning the principle and practice in skill.

3.4) Media and Technology

Media and Technology are consisted of printing media, electronic media, natural media and equipments media. Such media must not be too complicated which should make farmers learn and understand better.

3.5) Environmental Educator

Environmental educator is being considered as having important roles in driving environmental education to widely practice among farmers and in the community. Environmental educator must possess the following 4 components in environmental educator qualification, environmental educator roles, methods for handling environmental education and environmental educator ethics.

4) Environmental Education Process (Process)

Environmental education or process in the environmental education was integrated process that incorporated environmental input together in 5 factors by the environmental educator who was in charge of transmitting knowledge to farmers together through 2 environmental education activities in training for the principle and writing management plan and the practice as learning skill from actual field practice as written plan, including the uncomplicated use of proper media and technology suitable for farmers.

5) Evaluation of Environmental Education Achievement (Output)

The achievement of environmental education was the out put of environmental education process which consisted of achievement results evaluation in farmers' environmental education as set in 6 objectives as follows: awareness, knowledge, attitude, skill, participation and evaluation on ability..

6) Environmental Management (Outcome)

Environmental management or outcome was the result of the environmental education process after farmers had formal environmental education as the basis for agricultural occupation under the concept of project management through occupation planning based on identifying objectives and methods for production to achieve set objectives as well as using the production materials worthwhile and operating under the specific time. As a result, farmers had full skill in managing agricultural occupation project.

7) Healthy People Living in Healthy Environment (Impact)

Healthy people living in healthy environment or impact derived from principles of project management in agricultural occupation that involved environmental education which had boosted farmers income, leading to healthy living form being environmental friendly as well as extending the lasting use of community resource and creating economic security such as in occupation and production as well as life security such as in health, environment and finally resources security in healthy living and quality environment which turning into sustainable community.

4.3 An Efficiency Evaluation of a Model of Environmental Education for Sustainable Agriculture Management

Results from the community environment were taken to analysis and designed for a model of environmental education for sustainable agriculture management. Then, taken to the evaluation efficiency of a model passed by environmental education. The results of evaluation in 4 items as the following;

4.3.1 Application of Farmer Volunteer for Actual Implementation

Enlisted farmers did by voluntarily enlisting at least 30 farmers as head of households in arranging the activity of environmental education. There were 37 farmers entering in this program which mostly (72.97 %) were males and females (27.03%) with average age of 49 years old, the most farmers (89.19%) got married, single (10.81%) and were Buddhists. Majorities of farmers (62.16%) finished in primary level of education; secondary level of education (24.32%) and junior / senior secondary (8.11%). Farmers' household mostly had average 5 members per household consisted of father, mother and children. However, some families had relatives and cousins. Furthermore, farmers occupied own lands average 30 rais by being agricultural areas average 28 rais. Farmers occupied own lands, owned and partial leased lands and whole leased land.

As for plantation and / or animal rising, the most farmers grew the main plants average 2 times per year and raised main animal average once a year. Most farmers (97.30%) planned before production, growing plantation and / or animal rising based on own skills (54.06%) and also chose the production method based on own skills (45.95%), then choosing method responding to method (21.62%). The most farmers (59.46%) agreed that production factors were important components in planning, in the production objectives (18.92%), and producing based on the market demand mostly (67.57%). Moreover, farmers (64.86%) specified the yearly income before production and mostly earned average yearly income from agriculture 232, 270 baht, average yearly expense 188, 125 baht and expected average yearly income 423, 513 baht to be self sufficient. However, farmers (62.16%) spent their own savings for investment in agricultural occupation, borrowed from the bank (24.32%) and took the loan from village funds (5.41%). Furthermore, farmers (45.95%) took out additional loan from the bank when investment funds depleted, borrowed additional from the village funds (27.03%).

When deriving person information and numbers of the farmers. Then, taken to the activity of environmental education.

4.3.2 Environmental Education Activities

The activity of environmental education was arranged for farmers based on a model of environmental education environmental for sustainable agriculture management and had 37 farmers for this process. The were 2 activities: 1) training and 2) actual implement, the training activity were composed of 3 main contents: 1) existing situation of environmental in community, 2) environmental education and 3) project management. The existing situation of community environment was consisted of data in 4 items: personal information, management, agricultural occupation and community environment. These information helped farmers to learn about environmental situation and possibility as well as maintaining agricultural occupation in community. The contents of environmental education were 6 parts: 1) philosophy 2) principle 3) objective 4) approach 5) resources and 6) evaluation. Providing farmers with environmental education content created objective of environmental education in 6 items: awareness, knowledge, attitude, skills, and participation and evaluation on ability. The contents of project management were 4 parts: 1) approach 2) objective 3) resources and 4) time frame. As for providing farmers with project management gave the management skills to farmers and can plan the approach to achieve the objective with using the resources efficiently within a crop of plantation and/ or animal raising. And leading to higher income and quality environment. After providing environmental education for farmer. Then, evaluation of achievement on environmental education activities.

The training activity composed of 2 sub activities: 1) lecture and 2) writing of agricultural occupation plan. The lectured by the experts related to existing situation of community environment, environmental education and project management. Then, was the writing of agricultural occupation plan which 2 types: 1) group plan and 2) individual plan. The group plan was from the 5 groups of 37 farmers and classified to 2 plans of farming , 1 plan of jasmine growing and 1 plan of bamboo growing. After the action of group planning, developed to the individual plan by voluntarily enlisting the half of 37 farmers and this process had 18 farmers which wrote the owner plan.

Then, each farmer took the plans for actual implementation on their fields. When finished the activity of environmental education then evaluated the learning of the farmers 3 items: 1) evaluation of environmental education achievement by evaluating on the objective of environmental education 2) evaluation of management achievement by evaluating the skill writing of the agricultural occupation plan and 3) evaluation of intention to act on occupation management from the actual implementation with respectively as the followings;

4.3.3 Environmental Education Achievement Evaluation

Environmental education Achievement evaluation which was comparison scores between pre and post arranged environmental education consisted of results comparison in 6 items as follows: awareness, knowledge, attitude, skills, participation and evaluation on ability. The result of the farmer's environmental education learning as the following;

Table 19. Comparing the Achievement of Farmers' Environmental Education Learning

Environmental Education Activity Treating	Number (person)	Mean	Standard Deviation	Sig.	t
Before Environmental Education Activity	37	4.07	0.66	0.000	2.119
After Environmental Education Activity	37	4.32	0.25	0.000	

t (df = 36, 0.05) = 1.688

As the research findings in table 19 presented that average achievement scores of farmer's environmental education pre and post arranged environmental education activities had statistical significant value at 0.05. Post arranged environmental education scores were higher than scores of pre arranged activities. After comparison of average scores in environmental education classified to awareness, knowledge, attitudes, skills, participation and evaluation on ability, it indicated higher arranged environmental education scores than scores of pre arranged activities.

Table 20. Comparing the Achievement of Farmers' Environmental Education Learning Classified to Awareness

Awareness	Number (person)	Mean	Standard Deviation	Sig.	t
Before Environmental Education Activity	37	4.31	0.83	0.000	4.704
After Environmental Education Activity	37	4.96	0.17	0.000	

t (df = 36, 0.05) = 1.688

As the research findings in table 20 presented that average achievement scores of environmental education related to awareness in post environmental activities were higher than pre environmental activities scores. Farmers had pre environmental activities scores as equaled as 4.31 points and post environmental activities scores indicated farmers' scores increased to 4.96 points.

Table 21. Comparing the Achievement of Farmers' Environmental Education Learning Classified to Knowledge

Knowledge	Number (person)	Mean	Standard Deviation	Sig.	t
Before Environmental Education Activity	37	2.89	1.03	0.000	7.006
After Environmental Education Activity	37	4.32	0.70	0.000	

t (df = 36, 0.05) = 1.688

As the research findings in table 21 presented that average achievement scores of environmental education related to knowledge in post environmental activities were higher than pre environmental activities scores. Farmers had pre environmental activities scores as equaled as 2.89 points and post environmental activities scores indicated farmers' scores increased to 4.32 points.

Table 22. Comparing the Achievement of Farmers' Environmental Education Learning Classified to Attitude

Attitude	Number (person)	Mean	Standard Deviation	Sig.	t
Before Environmental Education Activity	37	4.31	1.02	0.000	3.044
After Environmental Education Activity	37	4.85	0.36	0.000	

t (df = 36, 0.05) = 1.688

As the research findings in table 22 presented that average achievement scores of environmental education related to attitude in post environmental activities were higher than pre environmental activities scores. Farmers had pre environmental activities scores as equaled as 4.31 points and post environmental activities scores indicated farmers' scores increased to 4.85 points.

Table 23. Comparing the Achievement of Farmers' Environmental Education Learning Classified to Skill

Skill	Number (person)	Mean	Standard Deviation	Sig.	t
Before Environmental Education Activity	37	4.02	0.85	0.000	4.413
After Environmental Education Activity	37	4.71	0.44	0.000	

t (df = 36, 0.05) = 1.688

As the research findings in table 23 presented that average achievement scores of environmental education related to the skills in post environmental activities were higher than pre environmental activities scores. Farmers had pre environmental activities scores as equaled as 4.02 points and post environmental activities scores indicated farmers' scores increased to 4.71 points.

Table 24. Comparing the Achievement of Farmers' Environmental Education Learning Classified to Participation

Participation	Number (person)	Mean	Standard Deviation	Sig.	t
Before Environmental Education Activity	37	4.21	0.97	0.000	3.430
After Environmental Education Activity	37	4.79	0.38	0.000	

t (df = 36, 0.05) = 1.688

As the research findings in table 24 presented that average achievement scores of environmental education related to the participation in post environmental activities were higher than pre environmental activities scores. Farmers had pre environmental activities scores as equaled as 4.21 points and post environmental activities scores indicated farmers' scores increased to 4.79 points.

Table 25. Comparing the Achievement of Farmers' Environmental Education Learning Classified to Ability on Evaluation

Ability on Evaluation	Number (person)	Mean	Standard Deviation	Sig.	t
Before Environmental Education Activity	37	4.49	0.79	0.000	3.081
After Environmental Education Activity	37	4.91	0.28	0.000	

t (df = 36, 0.05) = 1.688

As the research findings in table 25 presented that average achievement scores of environmental education related to the evaluation on ability post arranged environmental activities were higher than pre arranged environmental activities scores. Farmers had pre environmental activities scores as equaled as 4.49 points and post arranged environmental activities scores indicated farmers' scores increased to 4.91 points.

Therefore, the results of evaluation on environmental education learning with pre and post arranged by awareness, knowledge, attitude, skills, participation and evaluation on ability increased before treating the acitivity of environmental education as being concluded in environmental education activities. The result was showed in figure 7.

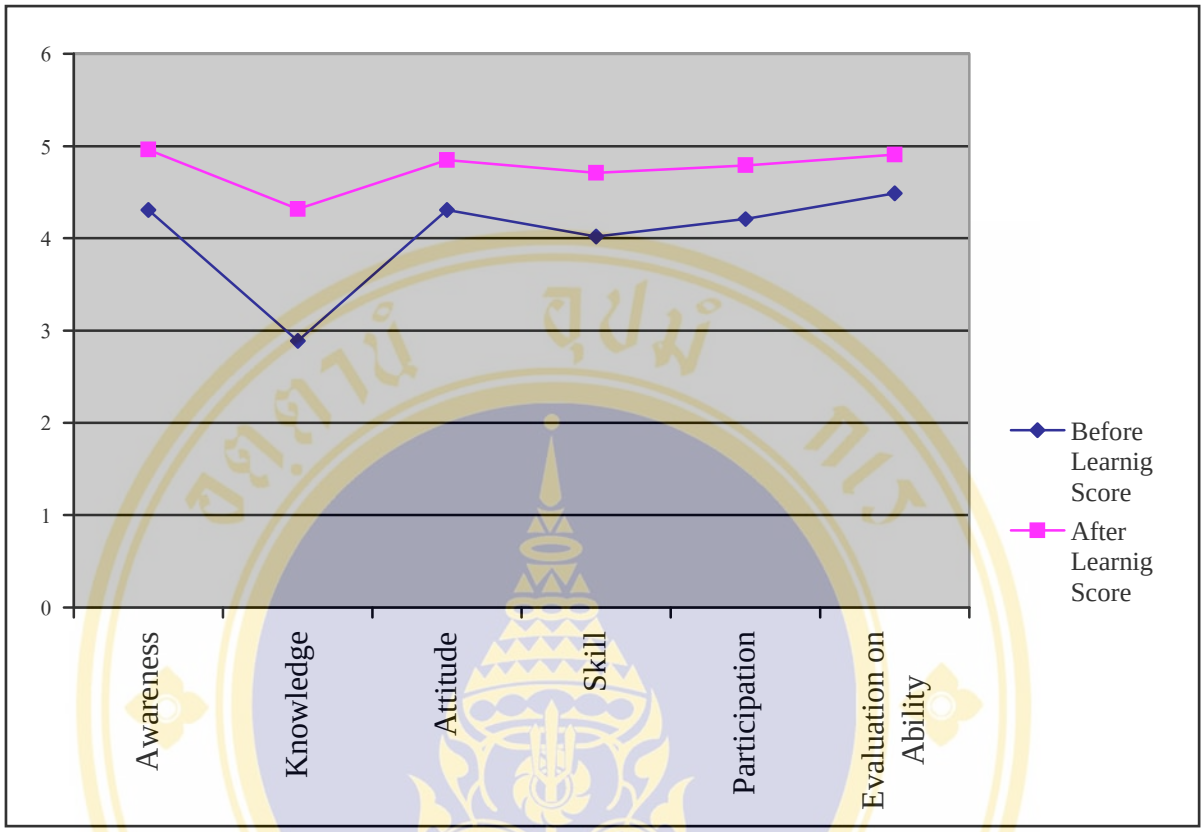

Figure 7 Achievement of Farmers' Environmental Education Learning

4.3.4 Evaluation of Management Achievement

Achievement evaluation in agricultural occupation management was composed of 2 items: 1) writing plan of agricultural occupation and 2) actual implementation. The project management was to define or select the approach to achieve objectives under the limited resource and time frame. Therefore, components of project management were consisted of objectives, approach, resource and time frame which involved farmers as the project managers who normally action an advisory or staff capacity and working with other (Wayne R. Mondy and Robert M. Noe, 2005:11), and proceed with agricultural occupation to yield production as plan with worthy resource utilization in the limited time frame of each crop growing and raising animals to derive at products with quality and quantity. The writing of project management plan was consisted of 4 elements as the follows: 1) objective/ goal, 2) method, 3) resources and f 4) time frame. And followed by the project management process which consisted of 5 steps as the following;

Step 1 Data Collecting

Data collecting was the survey for all available data which related to farmers' agricultural occupation to analyze and make decision.

Step 2 Data Analyzing

Data analysis was the analysis of all data based on factors available. Available data had to separate and consider together with productional factors.

Step 3 Planning

Planning was to design or identify activities at work which contained agricultural occupation method based on 4 components as follows: first in objectives, second in approach, third in resource and fourth in time frame which involved how to plan for reaching maximum benefits with the minimum use of production factors, leading to increasing income before actual implementation.

Step 4 Performance

Performance was to proceed with activities as plan by farmers applied and designed plan in the actual agricultural area and evaluated results afterward.

Step 5 Evaluating

Evaluating was to measure activity level as plan through measurement of results and compare with set measures.

1) Evaluation of Management Achievements Related to Writing the Plan of Occupational Management

Writing the plan of farmers' agricultural occupation based on environmental education concept and principle of project management. The research indicated that farmers could write project or agricultural occupation plan based on the concept of environmental education and project management, leading to higher income and good quality environment. When treated the activity of environmental education, then the farmers able to write their plan of agriculture occupation which to get more income and quality of environment. The written project was consisted of 4 elements as follows: firstly, objective/ goal, secondly, method, thirdly, resources and fourthly, time frame as the following;

1.1) Objective/ Goal

Objective was to identify desired target for achievement as responding to the need of agricultural occupation and environment. Farmers planned agricultural occupation by identifying objectives and goals in 2 levels which responded to environment and agricultural occupation. In another words, farmers had to concern about environment together with income while maintaining the agricultural occupation. In the objective of agricultural occupation plan, the farmers considered to get higher incomes and cared their environmnets. Therefore, they planed the objective by using the bio chemical or bio fertilizer to reduce the cost of agriculture and maintained the environment in community.

1.2) Method

Approach was the bridge or channel which led to set the goals. Farmers identified the operational steps, leading to achievement on objectives in arrange steps. And each step, the farmers considered production costs as main concern. At the same time, farmers had more environmental concern as well such as in the production involved with the pesticides, farmers reduced amount of pesticides used as well as involving the use of bio with chemical elements for safe environment and reducing production cost. In the method of agricultural occupation plan, the farmers planed their production processes by using the bio chemical during the procedures. Consequently, the farmers would consider to the way for reducing the cost and caring the environment sush as they applied the bio chemical to maintain the soils or spreaded to plants for protecting the pests. Therefore, they considered to increase their incomes and protected environment.

1.3) Resources

Resource was referring to the use of all type of resources in order to achieve the set goals which consisted of the following 4 factors: first man, second knowledge and management, third materials and fourth money. Farmers planed with concern in human production cost, knowledge, management, production resources and money. Farmers also concerned about labor, labor sources in the production, consumers, including product buyers. While maintaining agricultural occupation, farmers searched for knowledge and methods for successful agricultural occupation

such the rice growing, the farmers considered to growing the rice suitable for weather condition to get higher production. Therefore, the farmers planed to reduce input or resources for getting higher output or production. And the planed to apply the existed resources first then they would add some resources into the production process.

1.4) Time Frame

Time frame was the time spent on work to achieve the set goals by specifying time from the beginning to the end of the project or specific period of time within one crop of plantation and/ or animals raising. Farmers planed proper time frame for agricultural occupation to grow plantation and/ or animals raising for sufficient products and serve the market demand such as farmers could grow rice average 2-3 times during a year period, including plan to grow some plants which can harvest in long period.

Furthermore, the research results also indicated that project or written agricultural plans were prepared for 2 levels: 1) group plan and 2) individual plan. Group plan derived from separation of farmers into smaller groups to brainstorm and sharing ideas before writing such plan. As for individual plan, it was added value plan from group plan by having individual farmer who expressed his interesting agricultural occupation to write own agricultural occupation plan. Obviously, both group and individual plans were done in accordance to environmental education concept and project management. Then, interested individual farmer practiced testing plan in the actual area.

2) Evaluation of Management Achievements Related to Actual Implementation

Actual implementation did in agricultural area for 2 months as plan. In this step, 18 farmers were selected by farmers who participated in environmental education activities. From there, intention of farmers as related to agricultural occupation was evaluated. Since actual field application had time limitation, the researcher based on intention to act for evaluating on farmers'management of agricultural occupation. The research results indicated that the farmers 18 farmers able to write their agricultural occupation plans for implementing in their fields. This process get 18 plans which classified to plantation and/ or animal raising amount 3 types: 1) 14 plans of farming

2) 1 plan of jasmine growing and 3) 3 plans of farming and animal raising. When the farmers did implementation follow to the plan for 2 months, then evaluated the intention to act on farmers' management of agricultural occupation. And the 18 farmers intended to maintain agricultural occupation in accordance to the set plan to achieve the desire objective based on environmental education and project principle, leading to agricultural occupation with higher income and good quality environment. Evaluation of farmers' intention to act on farmers' management of agricultural occupation was composed of 5 levels and showed in table 26 as the following;

Score 5 means having intention to act on occupation management at very high
Score 4 means having intention to act on occupation management at high
Score 3 means having intention to act on occupation management at moderate
Score 2 means having intention to act on occupation management at low
Score 1 means having intention to act on occupation management at very low

Table 26. Intention to Act for Farmers' Occupation Management

Items	Levels of Intention to Act					Mode
	Very High	High	Moderate	Low	Very Low	
1. Objective						
1.1 Intention to specify the objective or goal before plantation and/ or animal raising	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	
1.2 Intention to specify the types and quantity on plantation and/ or animal raising that corresponded to market demand	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	Very High
1.3 Intention to specify the income before plantation and/ or animal raising with sufficiently to existing and family	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	
1.4 Intention to plantation and/ or animal raising which considered to sustainably of community environment	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	

Table 26. Intention to Act for Farmers' Occupation Management (cont.)

Items	Levels of Intention to Act					Mode
	Very High	High	Moderate	Low	Very Low	
2. Approach						
2.1 Intention to apply the plantation and/ or animal raising that had followed the plan	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	Very High
2.2 Intention to apply the plantation and/ or animal raising that had followed the objective	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	
2.3 Intention to apply the plantation and/ or animal raising with efficiently	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	
3. Resources						
3.1 Intention to apply the labor in family on plantation and / or animal raising with suitably	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	Very High
3.2 Intention to hire the labor on plantation and/ or animal raising with suitably	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	
3.3 Intention to apply the materials on plantation and/ or animal raising with suitably	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	
3.4 Intention to apply the money on plantation and/ or animal raising with suitably	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	

Table 26. Intention to Act for Farmers' Occupation Management (cont.)

Items	Levels of Intention to Act					Mode
	Very High	High	Moderate	Low	Very Low	
4. Time Frame						
4.1 Intention to grow up the plantation and/ or animal raising in a period with suitably	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	Very High
4.2 Intention to grow up the plantation and/ or animal raising in specific time with suitably	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	
4.3 Intention to begin and end of production product on plantation and/ or animal raising at suitable time	18 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	

As the research findings in table 26 presented that all farmers intended to manage agricultural occupation related to objectives, methods, resources and time frame in the very high level as well as intended to remain in this occupation as plan to achieve desire results. Furthermore, it based on environmental education and principle of project management, leading to agricultural occupation with incomes and quality environment. From interviewing farmers, findings suggested that farmers intended to occupy agricultural occupation that could reduce production cost. At the same time, could produce the production followed to goal. However, the farmers had the intention to living on agricultural occupation with higher income for self supporting in family and community environment together. And aimed to safe the environment in community for using with compromise at long time.

CHAPTER V
DISCUSSION

The research on environmental education for sustainable agriculture management was conducted as a participatory action research: PAR among the researcher, experts and farmers. The general objective of this research was to present a model of environmental education process to allow the farmers to manage their agricultural occupations in a way that would promote sustainable life quality and environment in the community, with 3 specific objectives:1) studying the environment in community related to farmers, management, agriculture occupation and environment; 2) designing a model of environmental education process emphasizing farmers' participation for sustainable agriculture management; and 3) evaluating the efficiency of a model of environmental education for sustainable agriculture management. The research area was Banglen District, Nakornpathom Province which was used for collecting data from the sample group, mainly farmers as household leaders who made their livings from occupational agriculture in plantation and animal raising in the following 3 groups: In the first group were 75 farmers for collecting the general data in the community, the second group were 37 farmers for treating the activity of environmental education and the last group were 18 farmers for collecting data in actual implementation.

The research process consisted of 3 steps: 1) studying the environment in the community related to farmers, management, agriculture occupation and environment by using the questionnaire interview and community survey; 2) designing a model of environmental education process emphasizing farmers' participation in sustainable agriculture management by 10 experts; and 3) evaluating the efficiency of this model of environmental education for sustainable agriculture management by arranging environmental education for farmers. This was comprised of a written plan for agricultural occupation and actual implementation. The data were analysed using SPSS/PC^{+} program. The main issues were as follows;

5.1 Community Environment

Results of discussions on the study of community environment were comprised which related to farmers, management, agricultural occupation, environment and farmers' learning environmental education. Results are discussed as the followings;

5.1.1 Farmers

Farmers or informants consisted of local residents of Banglen District, Nakhonpathom province, with an average age of 43 years. The majority of them had completed primary school education. The farmers were adults who were worried and afraid of change and had finished school at the primary level which caused them to live on the agricultural occupation (Somkid Isarawatana, 2000: 26-38). The low level of education is the main cause for farmers being not able to earn a good income from agricultural occupation which coincides with the findings of Wee Rawang (1996: 57). Findings indicated that most farmers had completed Prathom 4 education which contributed to inferior agricultural production and insufficient incomes for daily living. Furthermore, many farmers occupied areas on average of 30 rais with 28 rais reserved for agriculture. Findings indicated that the most and the least self-occupied areas by farmers were 93 rais and 1 rai. From the research results analysis, it was discovered that farmers occupied lands in 3 ways: first self-occupied, second partially self-occupied and partially leased, and totally leased from others which coincided with the base data of Banglen District (1998) that revealed similar information because areas in Banglen District are suitable for growing crops and raising animals. Local people made their living mainly from agricultural occupations. This factor contributed to a few farmers occupying their own land while farmers without own lands leased more from others because of insufficient land for agricultural occupation. This corresponded to the interviews with the community leaders and farmers who said that the farmers who did not have the own land to use had to rent from others, so they did not have savings after selling the products. Because they had to spent money on rent, agricultural necessities and their families, they did not have enough money for saving.

5.1.2 Management

Many farmers made their decisions to do plantation crops and/or animals raising based on their own skills which coincided with the work of Nantiya and Narong Hutanuwat (2004: 92) who stated that farmers chose production patterns in agriculture based on their own skills. They had planned production but were unable to fix income per year since agricultural product prices fluctuated from middle merchant price fixing, and also from higher production cost such as fuels, chemical fertilizers and pesticides. This finding coincided with the research of Vitoon Punyakul (2004: 9) who stated that a production process that relied on external factors for production such as pesticide, chemical fertilizers, plants and animal species, and fuel usually incurred high cost and market dependency which made farmers unable to specify definite incomes. However, research results indicated that farmers had earnings from agricultural occupation at a yearly average of 143,760 baht and yearly expenses of 130,066 baht. The agricultural occupation is composed of income and expenses; the main income was from the agricultural occupation, the expense was from 2 parts: 1) the expense for agricultural occupation such as production factors and; 2) family expenses such as food, education and facilities. The income and expenses were close. However, farmers expected average yearly incomes of 268,200 baht or twice their actual incomes deemed adequate for self-support and family support because farmers needed more income to pay debt and other household expenses such as food, education and facilities.

Many farmers produced agricultural products based on consumers' demand to get high prices or certain incomes which coincided with the research of Nunthiya and Narong Hutanuwat (2004: 212) who stated that farmers usually considered marketing products based on market demand for opportunities to sell more products, leading to increasing income. Besides farmers agreed that production factors were a key component of planning which coincided with the study of Jaral Junlukana and Pakawan Sakulmun (2003: 212) who stated that successful agricultural occupation depended on the readiness of production factors such as labor, agricultural tools, fertilizer, plant and animals species and funds. As for labor in agricultural occupation, findings indicated that farmers who occupied a small area of agricultural land used

household labor. As for farmers who owned large areas of agricultural land, they used both household labor and hired additional laborers when regular laborers were inadequate which coincided with the finding of Wee Rawang (1996: 96) who found that only farmers with small areas of land used household labor while farmers with large areas of land used both household labor and hired help. As for additional production factor such as tools, machinery and regular tools, organic and chemical fertilizers, plants and animals species and pesticides, farmers bought these raw materials. Some farmers produced some of their own materials and bought a certain part. The majority of them paid in cash as well as using their own funds in agricultural occupation and took out bank loans or loan from village funds when their own funds were insufficient because farmers did not want to incur debt. This finding coincided with the research work of Wee Rawang (1996: 97) who found that farmers used their own funds for agricultural occupation based on Buddhism's belief that being in debt was inappropriate behavior.

5.1.3 Agricultural Occupation

Many farmers made their livings mainly from agricultural occupation and being employed in supplementary occupations because Banglen District is located on the low-lying land with Ta Chin River flowing through the area which makes this area suitable for agricultural occupation. The agricultural area is 259,843 of a total 368, 022 rais. Since Banglen economy depends mainly on rice paddy (agricultural base data, Banglen District, 2006), many farmers consider their occupation, mainly growing crops, as an ancestral inheritance. Areas in Banglen District are comprised of rice paddies, field crops and fruits orchards up to as much as 220,205 rais of agricultural land (agricultural base data, Banglen District, 2006). Perhaps, this is due to farmers' need to follow tradition and carry on their ancestor's pride as well as the fact that changing the agriculture system from rice paddy to field crops or fruit orchards requires investment and new planning production. As for production distribution, traders would buy directly from farmers at home due to the need to reduce production costs and time for transporting agricultural products to the distribution place. This coincided with the research work of Wee Rawang (1996: 99) who found that farmers

who sold agricultural products to the traders at home were small farmers who had fewer products and incurred transportation problems when selling products directly.

Most farmers were members of an agriculture group. There were 2 groups: 1) occupational group and 2) economic group. The occupational group consisted of a hyacinth handicraft group and a women's occupational promotion and economic group which engaged in activities such as savings for production as well as participating in agricultural occupation training arranged by concerned divisions. Most training comprised of topics in bio, and organic farming including the use of fertilizers and pesticides because the concerned divisions operated in accordance with the master plan for pest prevention and eradication (2002-2006) using training for the use of pesticide to support organic farming or replace pesticides with bio elements (Office of Environmental Planning and Policies, 2004: 95). The government planned a rally to encourage agricultural producers to be aware of chemical dangers in agriculture which may affect the environment and human beings (Office of Environmental Planning and Policies, 2004: 98). At the same time as farmers took an interest in the surrounding environment at the community and national levels; perhaps they only thought of applying modern agricultural technology and production factor to yield high production without any concerns in environmental effects. The application of pesticides may reduce bio diversity and incur losses in the ecosystem, including health hazards which contribute to inferior community surroundings. Besides, farmers may need other alternatives to reduce cost in production while maintaining environmental quality with the application of bio technology which is environmentally friendly mixed with agricultural occupation to create an environment with quality.

5.1.4 Environment

Many farmers preferred growing rice as an economic crop because farmers made their livings from rice paddy as well as having suitable areas and it being their ancestor's occupation. Besides rice is the country's main staple. Therefore, rice has become the most important economic crop of Banglen District. Moreover, farmers grew garden vegetables along with growing rice; these were chili, holy basil and lemon grass which coincided with base data of Banglen District which suggested that

most of the area could be used for growing garden vegetables together with rice paddies. The areas used for growing chili were 2,266 rais, holy basil 93 rais, and lemon grass 26 rais. The total areas used for vegetable gardening was 8,310 rais and the produce was for sale and household consumption. Furthermore, farmers also raised animals for household consumption such as fish, chickens and ducks, perhaps from the desire for self-support and to reduce household expenses which coincided with the work of Nantiya and Narong Hutanuwat (2004: 196) who stated that self support in food suggested sufficient household food consumption.

Within a month, farmers' households whose spending was mainly on energy had encountered problems in the high cost of energy which agreed with the economic situation of the country that was currently facing fuel price fluctuations. Findings from the research indicated that apart from fuel expenses, farmers had sizable expenses on foods which coincided with the study of Nantiya and Narong Hutanuwat (2004: 196) who stated that most farmers' expenses related to food costs because foods are basic human necessities. As for savings, farmers saved at the bank which indicated cautious planning in financial and spending matters as well as being able to allocate money for agricultural and household spending, considered as self-support economy (Narong Hutanuwat, 2004: 217). Farmers agreed with the relationship between humans and the environment by accepting humans as part of the environment, perhaps from valuing the whole society and social equality or having no hard feelings after a quarrel in the family. Also, as well as community disputes could be intervened in by community seniors which suggested that household members and local community chose to reason in problems-solving without violence as well as to foster understanding and living in harmony among family and community members.

5.1.5 Farmers' Learning on Environmental Education

Farmers' learning in environmental education in awareness, knowledge, attitudes, skills, participations and evaluation on ability was at a high level since most of them accepted the concept of humans as being part of the environment which agrees with the philosophy of integrated preference that emphasized international society (documents accompanying the educational philosophy) as well as being the base

philosophy for the society to recognize the value and understand sharing between humans and the environment, economy, society, and politics as basis for good society ready in all areas and full of happiness. Therefore, such a concept should encourage farmers who have depended on agricultural occupation for living to concern themselves about the environment. The agricultural occupations still use the chemicals for the production process such as chemical fertilizers, pesticides and herbicides. The chemicals can increase production and protect the tests rapidly. Moreover, they are easy to use and save time so most farmers were still using them. And it caused some farmers who had not used the chemicals to take them up, because the farmers who lived around the area used them for processes of production. The danger of the chemicals also affected humans and the environment. At present, some farmers consider the danger of chemicals and are interested in bio farming which they integrate with the chemicals. They do this for the quality of lives and environments.

5.2 Designing a Model of Environmental Education for Sustainable Environmental Management

Findings from the research results indicated that farmers had encountered 3 main problems in agricultural occupation: first, insufficient income, second, management, and finally community environmental problems. After analysis of the problems, findings indicated that farmers had encountered problems in agricultural occupations from lacking management skills which is considered a key instrument, leading to operation achievement and success (Natapan Kaejornnun and Chatraporn Samaoejai, 2005: 18).Without good management in agricultural occupation, farmers would not be able to earn enough income and may cause community environmental problems as well. Therefore, environmental education for sustainable management was based on the conceptual framework of environmental education and principles of project management which involve awareness, knowledge, skills, attitudes, participation and ability on evaluation. Management area consisted of goals/objectives, process, resources and time frame. When farmers were equipped with environmental and skills management, farmers could plan agricultural occupation well, leading to achievement and efficient use of production resources within a

harvesting season. And related to Alan and Sam (2006: 170) that the planning was specified to internaland external resources such as financail, human, equipment, facilities, and materials and supplies. At the same time, farmers should be aware of the environment as well as increasing incomes from agricultural occupation and achieving a quality community.

5.3 An Efficiency Evaluation of a Model of Environmental Education for Sustainable Agriculture Management

Findings from the environmental education achievement evaluation indicated that average scores of farmer's pre-test and post-test suggested statistically significant differences at 0.05 because a model of environmental education for sustainable agricultural management could help farmers to achieve more environmental objectives. This coincided with the research of Wee Rawang (2001: 108) who researched environmental education on community based culture: Case Study: World Heritage, Phra Nakhon Si Ayutthaya. Findings indicated that a community-based culture environmental education model was highly effective in developing knowledge, participation and skills in community art conservation and development with statistically significant differences at 0.01.

Findings on the achievement of management suggested that farmers could write agricultural occupation projects or plans in accordance with the environmental education conceptual framework and administrative measures for projects, leading to higher incomes and an environment with quality. Planning comprised 4 components in objective/goal, methods, resources and timeframe. In each component, farmers had considered objectives of agricultural occupation, leading to higher income and environment with quality.

This resulted from arranging environmental activities based on an environmental education model for sustainable agricultural management which originated from the objectives of environmental education comprising awareness, knowledge, attitudes, skills, participation and evaluation ability as well as having management skills that enabled farmers to plan agricultural occupations, leading to income and environment improvement. This finding coincided with the work of

Salamon et al. al. (1997) (cited Nantiya and Narong Hutanuwat (2004: 159) who pointed out that farmer in the State of Illinois, U.S.A were concerned about the environment together with economics while doing agricultural activities that produced enough food as well as reducing production expenses and increasing savings.

Furthermore, research results suggested 2 types of agricultural occupation in group and single plans. The group plan was based on the group leader's written statement because the majority of farmers had poor written skills, but group members brainstormed and produced such a plan. As for the single plan, farmers who were interested adapted it to agree with own agricultural occupation, including actual practice. Since actual field practice had a limited time frame, evaluation was done on the farmer's desire to commit to the designated plan to achieve objectives in earning income from agricultural occupation and an environment with quality because farmers needed to increase incomes.

This finding coincided with the research of Wee Rawang (1995: 108) who discovered that informants in wooden carving needed to gain extra income from this occupation as well as hoping to achieve stability in production and the environment. In other words, farmers needed agricultural occupations that would lead to sufficient income for life existence under equilibrium surrounded with a healthy stage between bodies, soul, social and natural and cultural environment. This which coincided with the self-sufficient economy philosophy by leading life in the middle ground (Sunai Setboonsang, 2007: 11) as well as coinciding with the measure index for happiness by being healthy in body and soul and having sufficient income for living with a warm family and a good environment (Office of the National Health Reform, 2006: 6).

CHAPTER VI
CONCLUSIONS AND RECOMMENDATIONS

The research on environmental education for sustainable agriculture management was conducted as a participatory action research: PAR among the researcher, experts and farmers. The purpose of this research was to present a model of the environmental education process to allow farmers to manage their agricultural occupations so as to promote sustainable life quality and environment in the community. There were 3 specific objectives: 1) studying the environment in the community in relation to farmers, management, agricultural occupations and environment; 2) designing a model of environmental education process emphasizing farmers' participation for sustainable agriculture management; 3) evaluating the efficiency of the model of environmental education for sustainable agriculture management. The research area was Banglen District, Nakhonpathom province which was used for collecting data from informants who pursued agricultural occupations related to plantation crops and/or animal raising. There were 3 groups: the first group consisted of 75 farmers who were used for collecting general data of the community; the second group of 37 farmers for treating the activity of environmental education; and finally 18 farmers for collecting data on actual implementation.

The research covers 3 steps: 1) studying the environment in the community related to farmers, management, agriculture occupation and environment by using the questionnaire interview and community survey; 2) designing a model of environmental education process emphasizing farmers' participation for sustainable agriculture management by 10 experts; 3) evaluating the efficiency of a model of environmental education for sustainable agriculture management by arranging environmental education for the farmers which was comprised of a written plan for agricultural occupation and actual implementation of the plan. This stage included measurement of achievement in environmental education by comparing average scores of a pretest and posttest of environmental education. Moreover, management

achievement was measured by writing a plan of agricultural occupation and evaluating farmers' intention to act in the management of their agricultural occupation. The conclusions and recommendations are as the following;

6.1 Conclusions

Demographic data showed that most of the farmers (66.77%) were males, and a minority females (33.33%), the average age was 43 years, and most were Buddhists, and married (78.67%). Most farmers (51.35%) had only a primary level of education (Prathom 1-6). There were average of 5 household members with 2 males and 3 females. The majority of farmers occupied on average 30 rais of which 28 rais were reserved for agriculture. Just over half of the farmers (52.19%) had their own land; the rest leased land from others (47.8%). Farmers (54.67%) decided to grow plants and/or animal raising based on their own skills. Most of the farmers (62.67%) had not specified a yearly income before production. The farmers earned their incomes from agricultural occupations at an average of 143,760 baht yearly and incurred average expenses of 130,066 baht per year. However, the farmers said they needed on average an income of 268,200 baht yearly to sufficiently sustain their own living and support their families.

A large number of farmers (40.00%) chose a production method based on their own skills and most planned production (92.00%). Most (64.00%) had already chosen production factors such as workers, materials and funds as the most important components of production planning. Most farmers (66.67%) planned production based on market demand. On average, farmers employed 3-4 laborers in agricultural occupations by using on average 2 immediate family members and 3 relatives as well as hiring 3 laborers. Many laborers were from Banglen District (92.00%), and farmers bought materials, equipment and raw materials such as machinery, tools, organic fertilizer, chemical fertilizer, pesticide and plants and seedlings, and animals. Farmers' yearly expenses averaged 15,000 baht for machinery, 7,500 baht for tools, 11,500 baht for chemical fertilizer, 20,000 baht for pesticides and 22,000 baht for plants, seedlings, and animals. Just under half (45.33%) were paid in cash and used their own savings for agricultural occupation (45.33%); about a third (33.33%) and borrowed from the bank if they needed more money.

Within a year, the most farmers (57.33%) grew the main plants twice a year and raised animals on average 1 time (26.67%). The majority of farmers (90.67%) made their living mainly in agriculture, hiring work (57.33%), and just under half had followed agricultural occupation for 21 years and it was their ancestors' occupation (46.67%). Just under half (48.00%) grew only plantation crops, a similar figure grew plantation crops and raised animals together(41.33%), and a minority were only involved in animal raising (10.67%). The farmers (72.00%) would sell directly to traders from their homes, and sell domestically (96.00%). Over two-thirds of the farmers (70.67%) were members of agricultural groups, and attended meetings 1-2 times a year. Most farmers (72.00%) had previously received training in bio and organic fertilizer, and in the use of other fertilizers and pesticides. In the previous 3 years, farmers had received training on average twice yearly.

The soils in community (78.67%) are clay and used in agriculture (96.00%) and are acid soils (38.67%). Most farmers (89.33%) used water from canals and rivers, used water for agriculture (93.33%) and about a third of the farmers (36.00%) encountered problems with an inadequate amount of water. Furthermore, the community (68.00%) encountered problems on air pollution and problems from foul odors (52.94%). Most farmers (70.67%) spent money on fuel and had problems related to the high cost of energy (98.67%). As for growing economic plants, farmers (73.33%) grew rice and grew vegetables (88.00%) such as chili, holy basil and lemon grass. Most (64.00%) raised animals such as fishes, chickens and ducks for home consumption. In conceptual culture, the most farmers (76.00%) agreed with the idea of humans as part of the environment. After family quarrel, family members (81.33%) solved the problems with no hard feelings and asked community seniors to intervene in the community disputes (33.331%).

A large number (42.67%) spent money on food and deposited their money at the bank (69.33%). As for place of residence, nearly all lived in a single home (97.33%), and most owned land (90.67%). Farmer in each household possessed at least 1 convenience such as a car, motorcycle, bicycle, television, stereo,vcd/dvd player or microwave oven. Most had a high level of awareness of environmental education together with moderate knowledge and a high level of attitude. As for skills and participation, they were at high levels while evaluation on ability remained at the

very high level. Problems, threats and recommendations which contributed to sufficient income for self support and community environmental quality promotion in 3 areas are arranged from the most to the least significance: 1) problems in low production, high production cost and low product price; 2) Problems caused by lacking advice from concerned government and related divisions; and 3) problems of a degraded environment in the community.

Conclusions were made on the design of model for educational environment that emphasized farmers' participation for sustainable agricultural management based on a conceptual framework of environmental education and principle of project management which consisted of contents in 6 units: unit 1: Introduction. Unit 2: Existing Situation of Environmental in Community which consisted of preface, environment, community environmental learning and conclusion. Unit 3: Environmental Education consisting of preface, environmental education philosophy and principle, environmental education, environmental education input, environmental education process, results evaluation, conclusion. Unit 4: Project Management consisting of preface, principle of administrative project, components of administrative project, process of administrative project, writing project and conclusion. Unit 5: Health People and Healthy Environment consisting of preface, community life quality, community environmental quality and conclusion. Unit 6: conclusion.

Conclusions from the evaluation of the model of environmental education for sustainable agricultural management were suggested by pre-test and post-test average achievement scores in environmental education of farmers with statistical significant differences at 0.05. Post-test average achievement scores were higher than average pre-test scores. As for evaluation in achievement results of agricultural occupation, farmers were able to write a plan of agricultural occupation based on a conceptual framework of environmental education and principles of project management, leading to more income and an environment with quality. The plan of agricultural occupation was comprised of 4 components: first objectives / goals, second method, third resources and fourth time frame. Furthermore, evaluation on farmers' intention to manage agriculture indicated that farmers scored very high on intention to manage agricultural occupations related to objectives, methods, resources and time frame.

6.2 Recommendations

6.2.1 Practical Recommendations

1) Work coordination with farmers should be done through community leaders or farmers' core leader since they both have earned the farmer's respect and are well-prepared to cooperate.

2) Operations related to sustainable agricultural occupation in the community should be coordinated and involve participation between farmers and other divisions in the community development arena.

3) Contents for farmers' environmental education should be as concise as possible because farmers have limited ability and time for learning.

4) Agricultural promotional officers and agricultural academic officers should give advice and follow-up on agricultural occupations to know and understand the need of farmers in the targeted area.

6.2.2 Recommendations for Further Research

1) This research was designed specifically for studying an environmental education model for sustainable agricultural occupation. Therefore, further research should involve study of the effect on life quality and environment of friendly-environmental agricultural occupation.

2) Given the time limit in this research, further research should be done for an extended period over the whole harvesting season.

3) There should be study on management level of household leaders which could lead to increases in income and good quality environment from agricultural occupation.

4) Environmental education should be arranged for farmers to promote their learning for continuous managing of their own and community agricultural occupations.

5) There should be study on policies at the provincial and national levels regarding the government's management in the promotion, support and development of community agricultural development.

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APPENDIX

APPENDIX A.

A Model of Environmental Education for Sustainable Agriculture Management

Environmental Education

for Sustainable Agriculture Management

A Model Submitted in Partial Fulfillment of The Thesis

for The Degree of Doctor of Education (Environmental Education)

Faculty of Social Sciences and Humanities

Mahidol University

2008

๏… Presently, even our mother land has various channels to get income,
the major one is still being the agriculture.
So, it is necessary to develop continuously
all branches of agriculture and all levels of farmer
for higher quality of production
with caring to the effective resources …๏

(The Royal Speech of the King, Maejo Institute of Agricultural Technology, 1985)

PREFACE

The general objective of the research was to present a model of environmental education process to allow the farmers being able to manage agricultural occupation that promote sustainable life quality and environment in the community Morever, which can made the farmers manage their agricultural occupation to get more income, quality of lives and community environment A model including of 6 units: Unit 1: Introduction, Unit 2: Existing Situation of Environmental in Community, Unit 3 Environmental Education, Unit 4: Project Management, Unit 5: Healthy People and Healthy Environment and Unit 6: Conclusion.

The researcher hope very much that Environmental Education for Sustainable Agriculture Management will be taken to direct the farmers for planning their agricultural occupations with effectiveness. And to get the quality of lives and environment in community.

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CONTENTS

CONTENTS (cont.)

LISTS OF FIGURE

Figure

LISTS OF PICTURE

Picture

LISTS OF PICTURE (cont.)

Picture

LISTS OF PICTURE (cont.)

Picture

UNIT 1
INTRODUCTION

Environmental education for sustainable agriculture management was done with the objectives to present a model for farmers to manage agricultural occupation that promote sustainable life quality and environment in the community with 3 specific objectives as follows: firstly, studying the environment in the community related to farmers, management, agriculture and environment, secondly, designing a model of an environmental education process emphasizing farmers' participation for sustainable agriculture management and finally, evaluating the efficiency of a model of environmental education for sustainable agriculture management. Furthermore, other concepts theories, including related researches had been incorporated in to this research as well. This research was done as participatory action research: PAR among the researcher, experts and farmers. The researcher was the one who conducted the research base on the process of environmental education. The exprts then checked the model of environmental education for sustainable agriculture. Farmers who participated in this environmental education activities were representing samples of the study. In this research, samples were head of the households who did plantation and/ or animal raising in Banglen District, Nakonpathom Province. General data were collected in the community from the samples for the research in the sustainable agricultural management. Research approach was comprised of 4 steps as follows: firstly, environmental study, secondly, participatory process of environmental education., thirdly, model actual implementation and fourthly, model efficiency evaluation. These steps led to sustainable agriculture management which contributed to get more income and balancing environment and in turn contributed to family stability and community strength as being shown in figure 1.

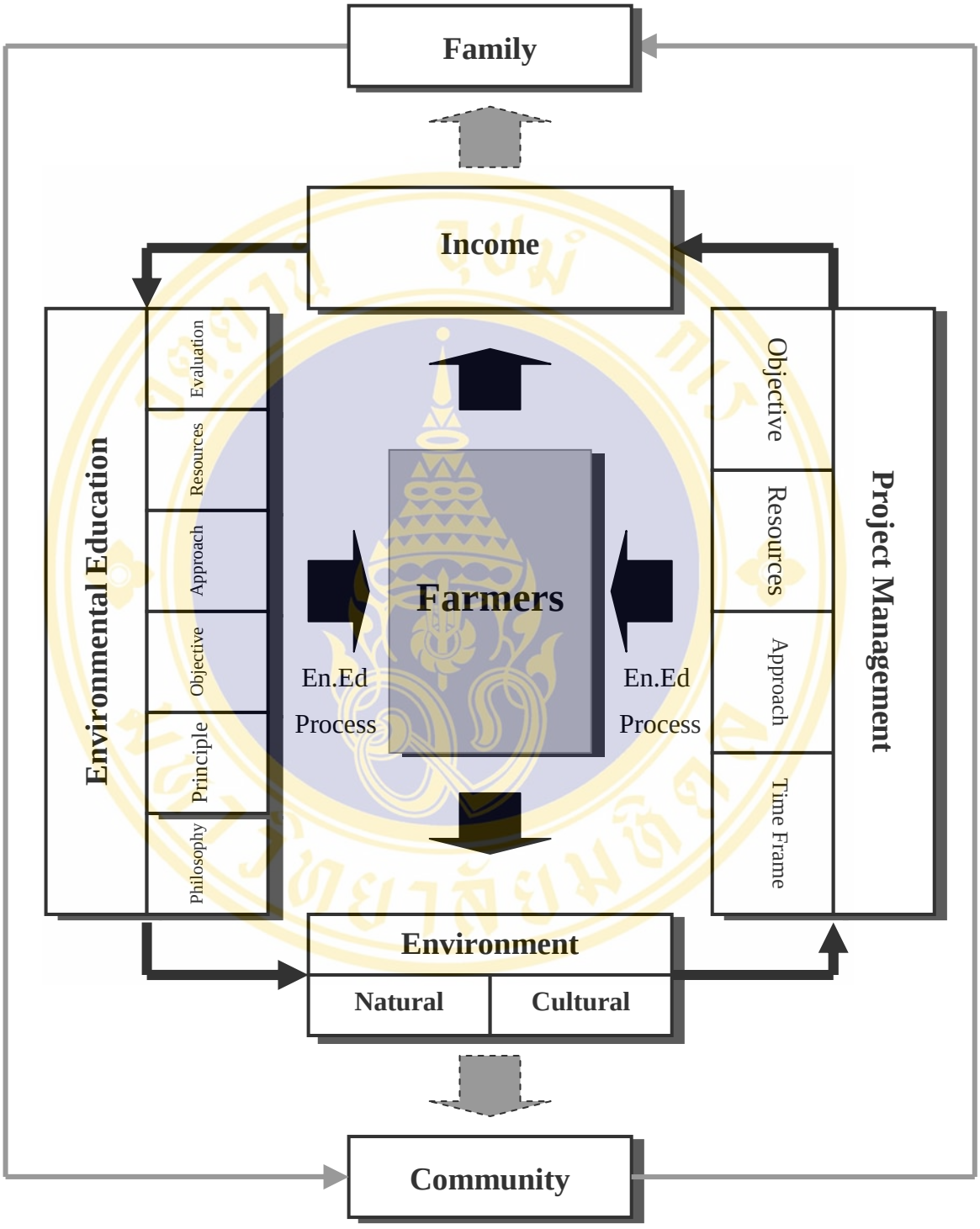


Figure 1 A Model of Environmental Education for Sustainable Agriculture Management

Source: The Research Findings

The figure of a model of environmental education for sustainable agriculture management is based on conceptual framework of environmental education and principle of project management by having environmental education as the process to direct at the spiritual development for being friendly environment. Therefore, environmental education is involved in developing farmers for agricultural occupation without environmental impacts. As for project management, it is the management tools to help farmers earning more income from this occupation as well as being in the good environment. Therefore, the researcher as environmental educator who had transmitted knowledge of environmental education and project management for farmers by helping them to farm under the sustainable agriculture as part of environmental education and project management which combined into environmental education process. The environmental process is consisted of 6 topics as follows: firstly, philosophy of environmental education, secondly, principle of environmental education, thirdly, objective of environmental education, fourthly, approach of environmental education, fifthly, resources of environmental, sixthly, evaluation of environmental education. As for main contents of project management, it is consisted of 4 topics, first in objective, second in approach, third in resources and fourth in time frame. When farmers gained more knowledge in environmental education and skill in project management, they would earn more income from farming and being in good environment which consisted of natural and cultural environment and in turn contributed to increasing family income and stable family from family members working and having stable occupation that enables them to support themselves. At the same time, stable income and good environment can lead good community environment from having strong community, group gathering, brainstorming, cooperation and self support. Then, good income under good environment should lead to firm family ties and strong community and eventually turned into sustainable agricultural management cycle with higher earnings and good environment together as being shown in a model of environmental education for sustainable agricultue management.

UNIT 2
EXISTING SITUATION OF COMMUNITY ENVIRONMENT

2.1 Preface

Environmental study was the method for survey the data necessary for building environmental education model for sustainable agricultural management in order to derive at data in environment. Community in Banglen District, Nakornpathom province was selected to study the community data: firstly, farmers, secondly, management, thirdly, agricultural occupation and fourthly, community environment. As for the study of knowledge level in environmental education of the local community, it is consisted of data in 6 areas: firstly, awareness, secondly, knowledge, thirdly, attitude, fourthly, skill, fifthly, participation and sixth, the evaluation on ability. Furthermore, there were more data in problems, threat and suggestions in agricultural occupation.

Picture 1 Agriculture as a Major Occupation for People in Banglen District

2.2 Environment

Environment is whatever surrounding human as living and non-living organisms in concrete forms (touching and seeing) and abstract forms (culture, tradition and beliefs) which had influenced each others as the supporting factors. Effects from one factor would create or destroy other parts inevitably because environment runs as a cycle which is connected to the whole system. Environment could be classified to natural environment and cultural environment both resource and pollution as being shown in figure 2.

<table>
<tr><td colspan="5">Resource</td></tr>
<tr><td colspan="2">Natural Resource</td><td colspan="3">Cultural Resource</td></tr>
<tr><td rowspan="4">Non-Physical Environment</td><td>1. Soil</td><td colspan="2">Internal Resource</td><td>External Resource</td></tr>
<tr><td>2. Water</td><td rowspan="4">1. Concept Culture</td><td rowspan="4">2. Organization / culture or Affection</td><td rowspan="4">3. Usage or Behavior Culture</td></tr>
<tr><td>3. Air</td></tr>
<tr><td>4. Energy</td></tr>
<tr><td rowspan="2">Physical Environment</td><td>1. Plant</td></tr>
<tr><td>2. Animal</td><td colspan="2">Internal Pollution</td><td>External Pollution</td></tr>
<tr><td colspan="2">Natural Pollution</td><td colspan="3">Cultural Pollution</td></tr>
<tr><td colspan="5">Pollution</td></tr>
</table>

Figure 2 Classification of Environment

Source: Wee Rawang, Mahidol University, 2001

2.3 Environmental Study in Community

Environmental education in community is consisted of main data as follows: personal information, management, agricultural occupation, community environment. Besides, there are more data in environmental education, problems and recommendations.

2.3.1 Personal Information

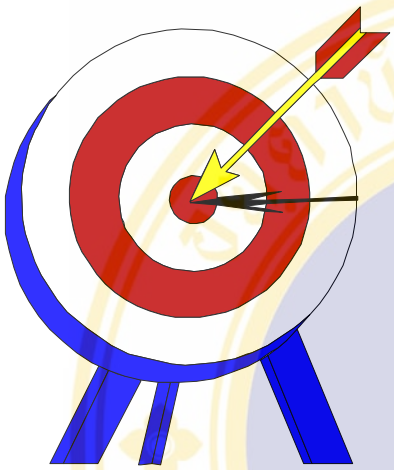
In the study of farmers' personal data, there were 7 areas consisted of gender, age, status, religious, education, size of household and land for living as the following;

Farmers were mainly males than females with average age of 43 years, mostly Buddhists and married and completed primary education level (Pratom 1-6), then, secondary education level (Matayom 1-6), following by bachelor degree and lower and higher certificate. There was average of 5 members per each household which comprised of two males and three females. Furthermore, many farmers occupied their own land, then, leased from the others and the occupied areas for 30 rais and the average agricultural areas for 28 rais.

Picture 2 Farmers Family Consisted of Average Member of 5 Persons

2.3.2 Project Management

The project management for farmers covers 4 parts: goals/objectives, method, resources and time frameas the followings;



1) Goals/ objectives

In making decision to plantation and/ or animal raising, farmers decided to grow crop based on their skills, had done before, then based on market demand and condition of soils, water or other factor. During agricultural occupation, only small number of farmers specified annual earnings, majorities failed to do so. At present, farmers earn income and expenses from agricultural occupation the same average of 130,000 baht per year. Furthermore, majorities of them expected average income of 140,000 baht per year to be sufficient income for living and support the family.

2) Method

Farmers decided to produce based on their own skills most, then choose the production factor. Majorities of farmers planned production plan, only few had not planned. Farmers agreed that production factors such as labor, materials and money were the 3 most important components of the plan, then, the production objectives, production time and method. At present, farmers plan production based on the market demand and own demand.

Picture 3 Labors as the Resources in Agriculture

Picture 4 Organic Fertilizer as Production Material

Picture 5 Water Pump as the Production Tools

Picture 6 Monies as the Production Budgets

3) Resources

Currently, farmers use labors in agricultural occupation average 3 persons by using average 2 immediate family members and 3 relatives and hiring outside laborers average 3 persons. Laborer hired mostly lived within Banglen District. As for equipments such as, materials, equipments, and raw materials for agricultural occupation such as machinery, general equipments, organic and chemical fertilizer, seeds, animals' breeders, most of them were bought by cash. Only few farmers decided to pay in installment.

Farmers paid for materials and raw materials to be used in agricultural occupation such as machinery in the average of 15,000 baht per year, for general equipment average 7,500 baht per year, plant and animals' species average 11,500 baht per year, chemical fertilizer average 25,000 baht per year. Currently, farmers have spent their own funds most for doing agriculture, then, borrowing from the bank. When farmers needed additional funds, majorities of them borrowed more from the bank and spent their own monies.

4) Time Frame

Within a year, farmers grow main crop in average of 2 times per year and raise main animals in average once a year.

2.2.3 Agricultural Occupation Information

In the study of farmers' agricultural occupation data, there are 5 areas consisted of agricultural type, distribution methods, group members and training. Results of the study are explained in the following details;

1) Occupation

Majority of farmer made their livings from agricultural occupation with average 21 years. Their reasons for remaining in agricultural occupation were to carry on ancestors' tradition, then, inherit the land from parents and enjoy doing agriculture.

Picture 7 Modern Machine Being Always Available for Agriculture

Picture 8 Basket Weaving as a Supplementary Occupation

2) Classification of Agriculture

Farmers preferred to grow plantation only, then, grow plantation and animal raising and animal raising only, respectively.

3) Distribution Methods

Farmers sold their products mostly to the buyers at home, then, sold at the wholesale market. Agricultural products are mainly sold in the domestic market.

4) Group Members

While doing agriculture, farmers belonged to the agricultural group but few had not been the members. As for the members, they have participated in the meeting average once a year.

5) Training

Many farmers received previous training in agricultural occupation in bio and organic fertilizers, how to apply fertilizer and pesticide, repairing machinery for agriculture, being volunteer instructor (household account list). In the past 3 years, farmers received training on agricultural occupation average 2 times per year. The Sub District Community Center would transmit technological knowledge to the farmers.

2.3.4 Community Environment

Data on community environment derived from 2 methods of the study as follows: firstly, studying from the documents and secondly, studying environmental education in the community as the following;

1) Location and Boundary

Banglen District is located in the area of Ta Chin River which is the central plain with estimated area 588,836 square kilometers or approximately 368,022.5 rais with the distance from Nakhonpathom Province estimated 40 kilometers and distance from Bangkok estimated 67 kilometers. Banglen has its boundary connected to the district and nearby provinces as the following;

North is adjacent to Songpeenong District, Suphanburi Province and Ladbualuang Distrct, Phranakhon Si Ayutthaya Province.

South is adjacent to Phuttamonthon District, Nakhonchaisri District and Dontum District, Nakhonpathom Province.

East is adjacent to Sainoi District, Nonthaburi Province and Ladbualuang District, Phranakhon Si Ayutthaya Province.

West is adjacent to Dontum District and Kumpangsaen District, Nakhonpathom Province.

Picture 9 Traffic Sign Directing the Neighbors of Banglen District

2) Geographical Condition

Areas in Banglen District are just plain areas without forests and mountains with Ta Chin River flown through from the north to the south which divided areas into 2 sections. Besides, there are many canals separated from Ta Chin River such as Banglen canal, Phrapimon canal, Bangluang canal, Bangsaipa canal, Bangpasi canal, Nokkratung canal and Narapirom canal which made the area suitable for agricultural occupation. Moreover, Ta Sarn canal is one of the important canal that has flown from Srinakarin Dam to Ta Chin River by pushing against salt water and preventing it from damaging agricultural products as well as being the replacement canal during the drought.

Picture 10 Canals are Flown through Community Favorable Agriculture

3) Weather Condition

Banglen District has similar weather as the other districts and provinces in the central region. The North East Monsoon, South West Monsoon and East or South East Monsoon from the South China Sea have blown through regularly, thus creating 3 seasons such as rainy season between May to October, winter season between November to February and summer between February to April.

4) Administration

Banglen District is consisted of 15 sub districts with 179 villages and 2 local administrations in 2 types comprised of 15 Sub District Administrative Organizations and 4 Sub District Municipalities as the following;

Sub District Administrative Organization

4.1) Banglen Sub District
4.2) Bangpasee Sub District
4.3) Bangluang Sub District
4.4) Lumpaya Sub District
4.5) Bangpla Sub District
4.6) Dontum Sub District
4.7) Bangrakam Sub District
4.8) Klongnokkratung Sub District
4.9) Narapirom Sub District
4.10) Bangsaipa Sub District
4.11) Sai-ngam Sub District
4.12) Nilpetch Sub District
4.13) Hinmool Sub District
4.14) Buapaktha Sub District
4.15) Paihuchang Sub District

Picture 11 Bangrakam Sub District as a Strength Community

Picture 12 Lumpaya Sub District has Wat Lumpaya Floating Market as a Tourism Attractive

Sub district Municipalities

4.16) Banglen Sub District Municipality
4.17) Rangkrathum Sub District Municipality
4.18) Bangluang Sub District Municipality
4.19) Lumpaya Sub District Municipality

Picture 13 Bangpla as a Center of Thai Song Dum Culture

5) Natural Resource

Banglen District has Ta Chin River which is the main river separated from Chao Phraya River at Ban Klong Ma Kham Taw, Wat Sing Sub district, Chainat Province flown through for estimated 30 kilometers and passed Suphanburi, Nakhonpathom and Samutsakhon until reaching Thai estuary.

Pictgure 14 Ta Chin River as the Main River for Community Living

6) Economic Condition

Area at Banglen District is suitable for agriculture. Therefore, majorities of people occupied agricultural occupation mainly such as growing rice, fruits trees, field crops, vegetables, raising animals such as ducks, chickens, pigs, cows and buffaloes and geese including marine animals such as fishes, shrimps. Furthermore, some make living from industry work, being hired hand and peddlers.

Picture 15 Agricultural Products for Saling Inside and Outside Community Market

7) Transportation and Basic Infrastructure

Banglen District has convenience transportation with easy access both land and water as well as having complete basic utilities such as roads, electricity, waterworks and water source for agriculture.

Picture 16 Banglen Hospital as a Basic Infrastructure

Picture 17 Public Telephone as a Basic Utilities Available to Service People

8) Culture, Tradition and Tourism

Banglen District has important culture and tour sites such as culture and tradition of Thai Song Dum at Bangpla Sub District, Wat Sookwattanaram of Banrakham with Wang Matcha. Banglen also has important Buddha image “Phra Phut Teepangkorn” which is the young Somdej Phra Summa Sumphraputtachao. At Wat Kao Rad of Bangpla Sub District, the important Buddha image is Phra Phuta Shinnapanchrachanamarn. Wat Bangpla of Bangpla district has the square structure with spire dated back to Si Ayutthaya. Lumpaya Sub District has Lumpaya floating with sightseeing and rafting activities along Ta Chin River, Furthermore, there are more activities in community such as traditional message and local handicrafts for sale.

Picture 18 Praputtathchinapuncharachanamarn at Wat Kao Rad as the Community Spirit Center

Picture 19 Lumpaya Floating Market

Picture 20 Thai Song Dum Culture

9) **Soil**

Community soil is mostly clay. Soil uses in agriculture most of times only few uses in the industries. Community soil is heavily acid soil and alkaline soil.

10) Water

Community uses water from the river and canals the most in agriculture. Insufficient amount of water available in the community water source is the main community problem and then, problem having waste water and too much water.

11) Air

Pollution has become main problem in many communities by having the most problem in foul odor, dust and contaminated chemical, respectively, and some has none.

12) Energy

Within a month, many farmers households spent heavily on energy, then, electricity. Majorities of them encountered problem in high fuel cost.

Picture 21 Fuel as a Production Resouece and High Price at Present

13) Plant

Many farmers households grow rice most as the economic crop, then, vegetables and few grow fruits. Moreover, many of them grow garden vegetables. The most grown vegetables are chili, holy basil and lemongrass, respectively.

14) Animals

Many farmers households raise animals mainly for their consumptions, only few had not raised any animals. Animals breed and raised most for household consumption are fishes, chickens and ducks, respectively.

Picture 22 Rice as the Major Economic Plant

Picture 23 Vegetables as the Minor Economic Plants

Picture 24 Animals Raising for Consumption and Sale

15) Cultural Concept

Many farmers agreed with the concept of human as a part of environment, then, realized that man must build technology to control nature and all things in earth are mortal, respectively. Furthermore, farmers choose their own life style mostly, then, consulting with the expert before making the decision and making decisions based on the situation, respectively.

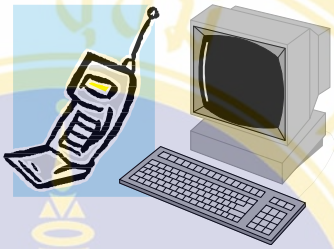
Picture 25 Local Community Lives with Compromising and Forgiving

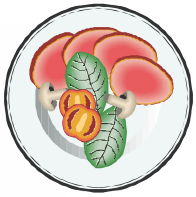
16) Organization Culture

In family quarrel, farmers decided to solve the problem with no hard feelings, then, with reasonable conversation and having parents intervene. As for community quarrel, farmers asked the community senior to intervene, next asking the leader or community committee to decide and had no hard feelings, respectively.

17) Behavior Culture

At present, many farmers spend most on foods, then, education and convenience gadgets such as mobile, car installment and investment in occupation. Farmers save their monies with the bank mostly, then, with the cooperative and some has no savings.





18) Object Culture

Many farmers own individual home. Furthermore, they have owned convenience household gadgets such as automobile, motorcycle, bicycle, television, stereo, vcd/ dvd, refrigerator and microwave oven average 1 machine per household.

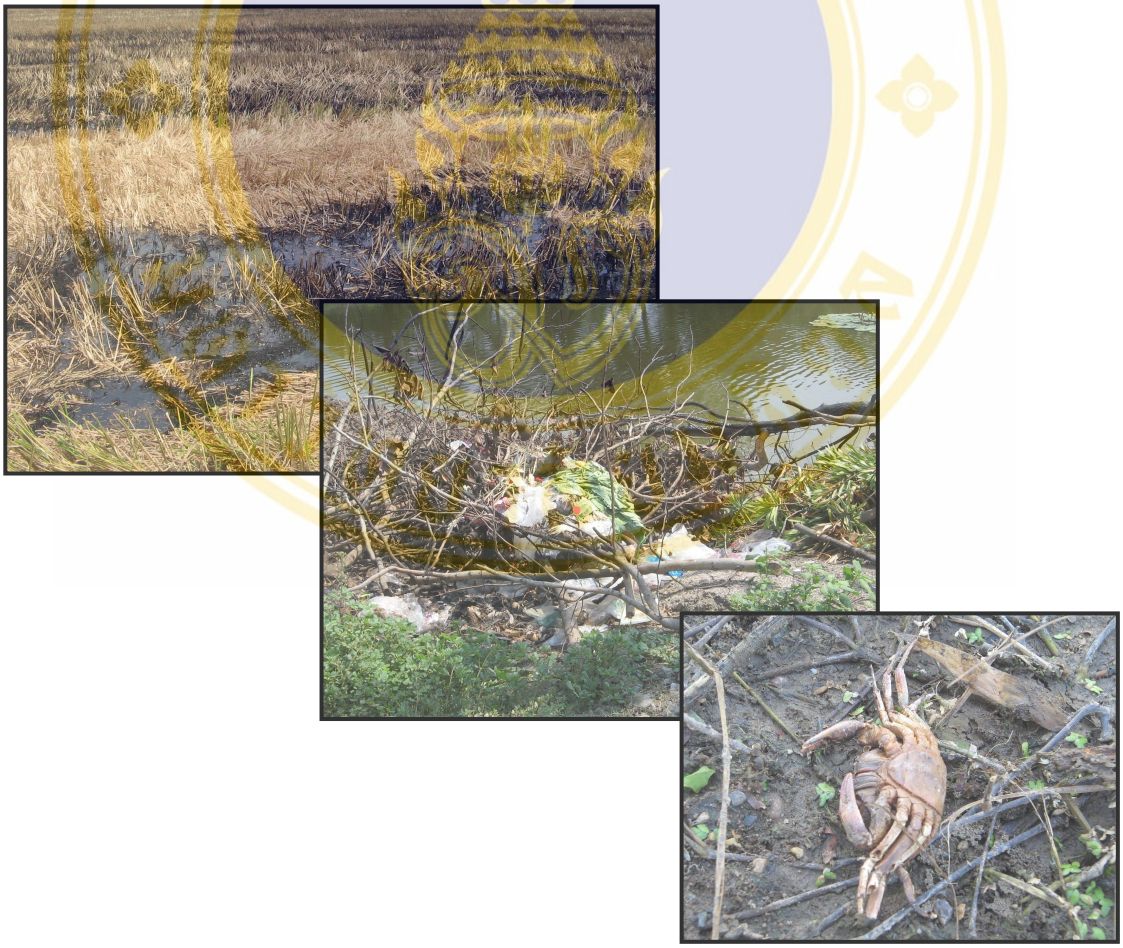
Picture 26 Living Quarter is Individual Home with Convenience Gadgets Ready for Life

2.3.5 Environmental Learning of farmers

Farmers mostly had good learning results from educational education in 6 areas: firstly, awareness, secondly, knowledge, thirdly, attitude, fourthly, skill, fifthly, participation and sixthly, evaluation on ability which indicated that farmers were friendly environment.

2.3.6 Problems, Threats and Recommendations

Farmers agreed that problems needed correction: firstly, low production, high production cost, and low production price, secondly, lacking promotion and advice in agriculture from relevant divisions and thirdly, community environmental decay such as soils, water, air including the contamination of pesticide in the air, soils and water.

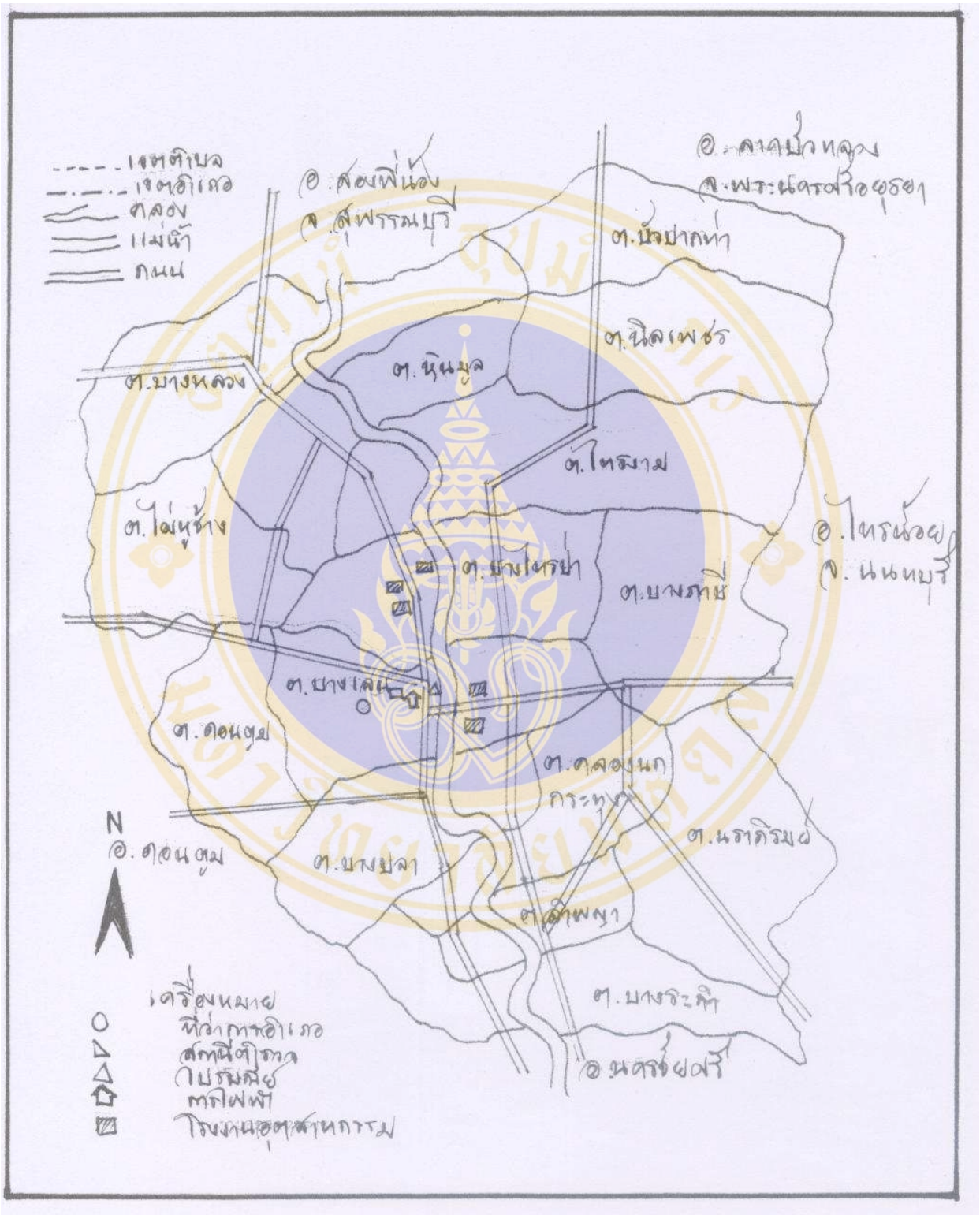


Picture 27 Most of Problems in Community are Low Production, Lack of Promotion to Agriculture and Environment

2.4 Conclusion

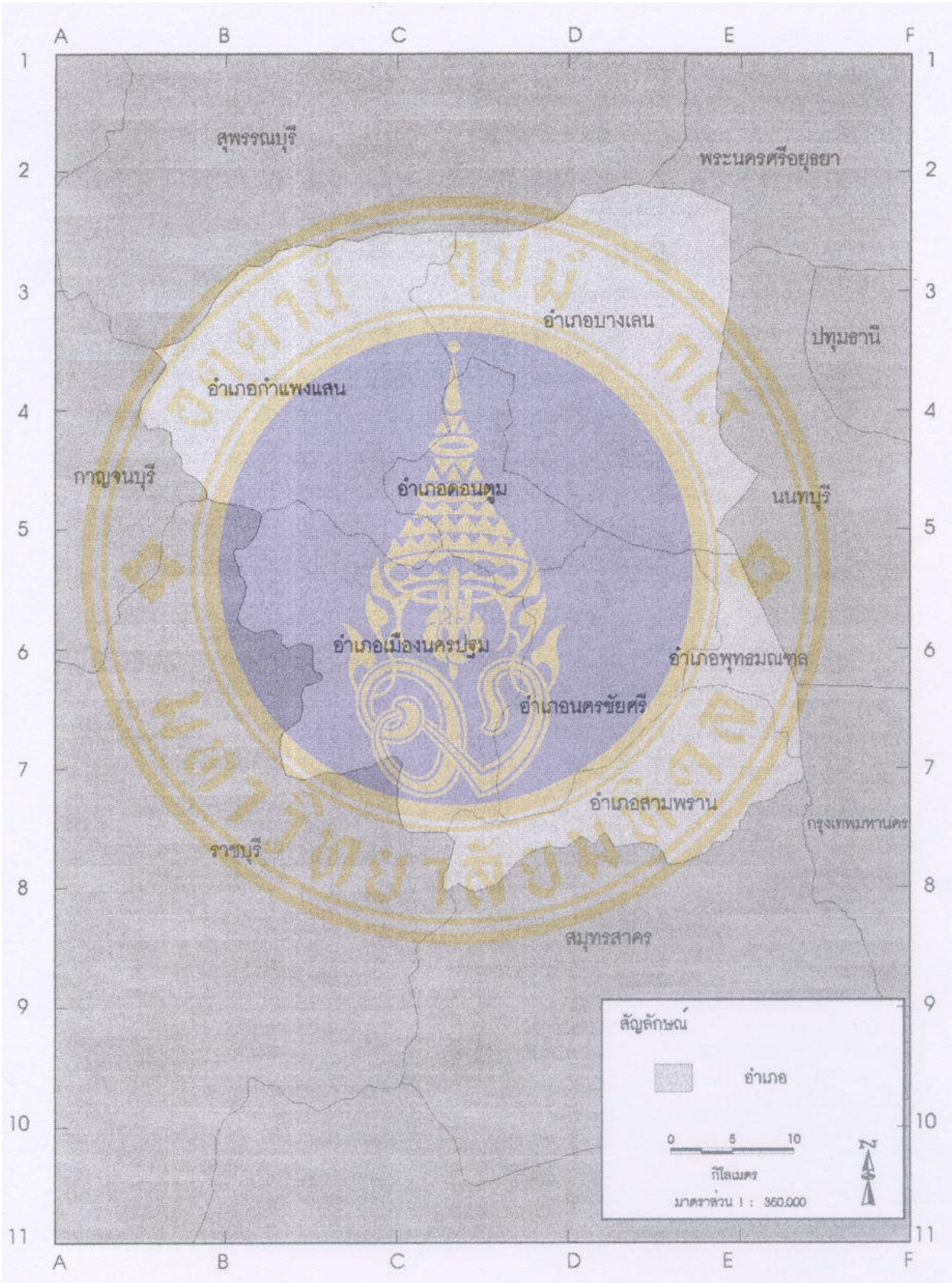
Environmental study is the data in the community consisted of educational results in 3 aspects as follows: firstly, environmental education in the community, secondly, learning in environmental education and thirdly, problems and recommendations. Environment in community as the following 4 areas: firstly, individual data, secondly, data on management, thirdly, data on agricultural occupation and fourthly, data on community environment. As for results of agricultural occupation in 6 areas: firstly, awareness, secondly, knowledge, thirdly, attitude, fourthly, skill, fifthly, participation and sixthly, evaluation on ability. Regarding results in problems and recommendations which is the problems of agricultural occupation and environment.

Figure 28 Natural Environment in Banglen District



Picture 29 Map of Banglen District, Nakhonpathom Province in Brief

Source: Department of Local Administration



Picture 30 Map of Nakhonpathom Province in Brief

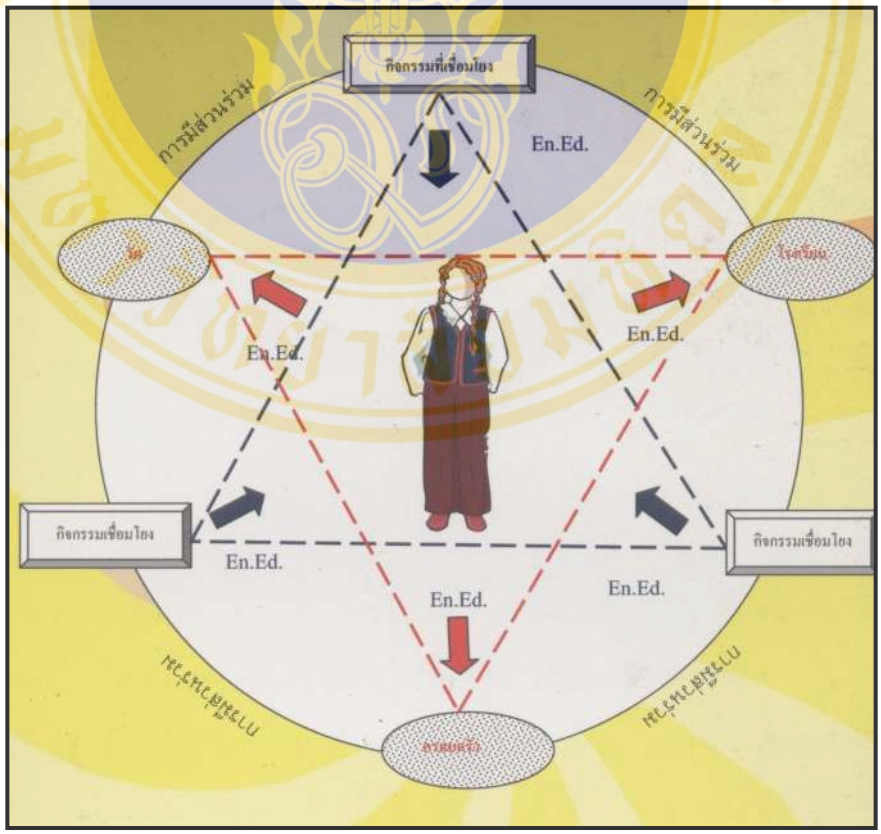
Source: Department of Local Administration

UNIT 3

ENVIRONMENTAL EDUCATION

3.1 Preface

Environmental education is the development process for human awareness, leading to behavioral change as friendly environment and favorable coexistence with environment from individual creating own 6 objectives: awareness, knowledge, attitude, skills, participation and evaluation on ability which should lead to sustainable agricultural occupation. Therefore, environmental education is important guideline to solve all environmental problems including problems from agriculture.



Picture 31 A Model of Environmental Education for Rural Development

Source: Manee Chaiteeranuwatsiri, Mahidol University, 2005

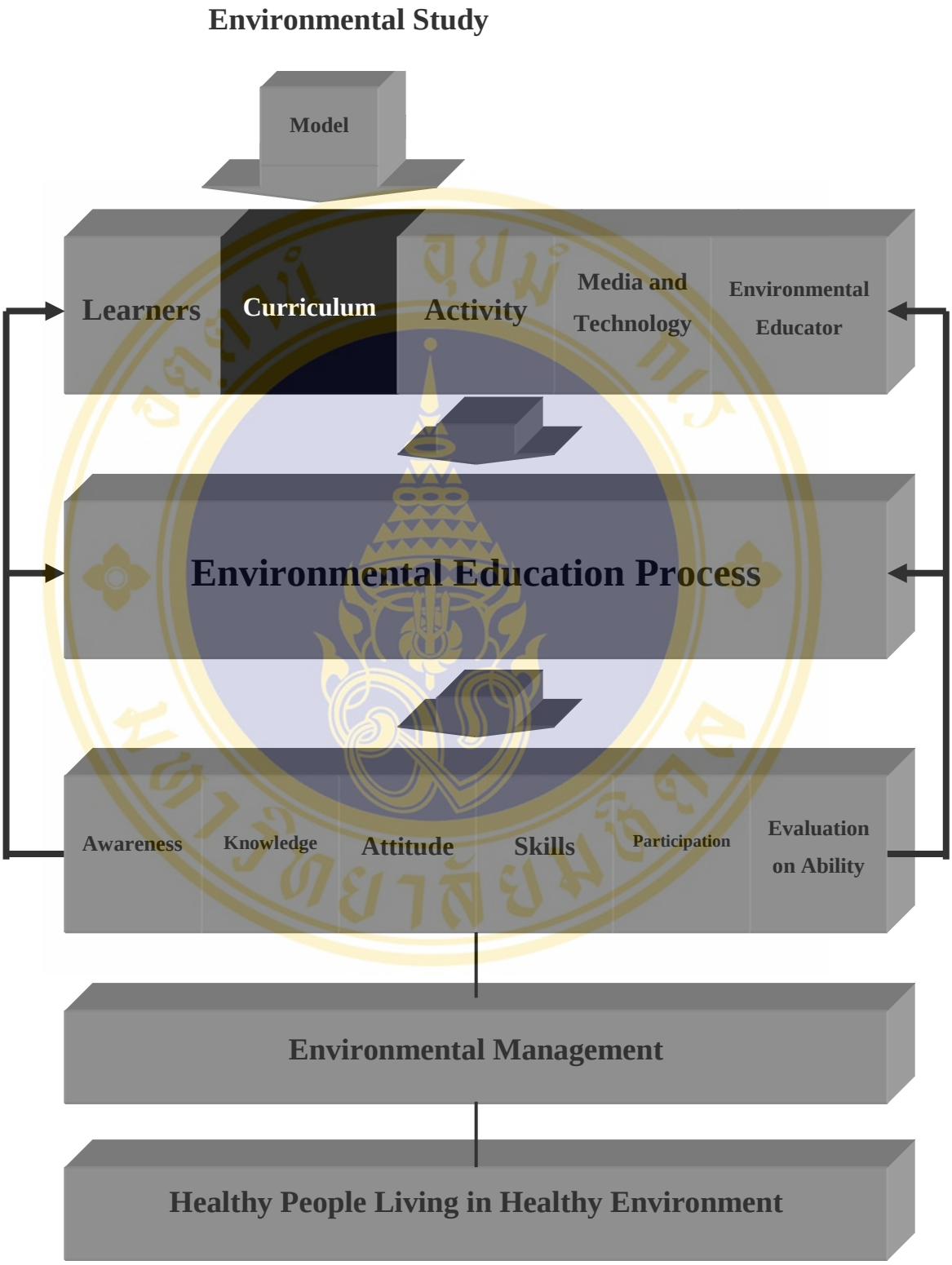


Figure 3 System Theory Based Environmental Education

Source: Wee Rawang, Mahidol University, 2001

3.2 Philosophy of Environmental Education

The philosophy of environmental education is to apply an educational process training people to get wisdom for friendly living in the nature world of environment.

3.3 Principles of Environmental Education

Since environmental education is to develop human intelligence. Therefore, environmental education is to build internal knowledge for displaying external knowledge from snowball until creating environmental education.

Principles of environmental education as stated in the guiding principles of environmental education in the Belgrade Charter from environmental education meeting in Belgrade at Ugoslavia, 1975 as being defined in the principle of environmental education as the following;

Environmental education have to considered as holistic view in both nature and man-made infrastructures worldwide and regional level which stressed existing environment as well as promoting value and necessity and participation in the current protection and problems solving at local, country and world levels by making environmental education as long life process in both formal and informal educational system involving in interdisciplinary approach that mixed between knowledge and various disciplines.

3.4 Objectives of Environmental Education

Environmental education is defined as development process for people awareness and changing behavior without causing any environmental destruction and coexist with environment in harmony with 6 objectives as the following;

3.4.1 Awareness environmental education allows individual to perceive problems, create awareness, motivation and response to environment and environmental problems.

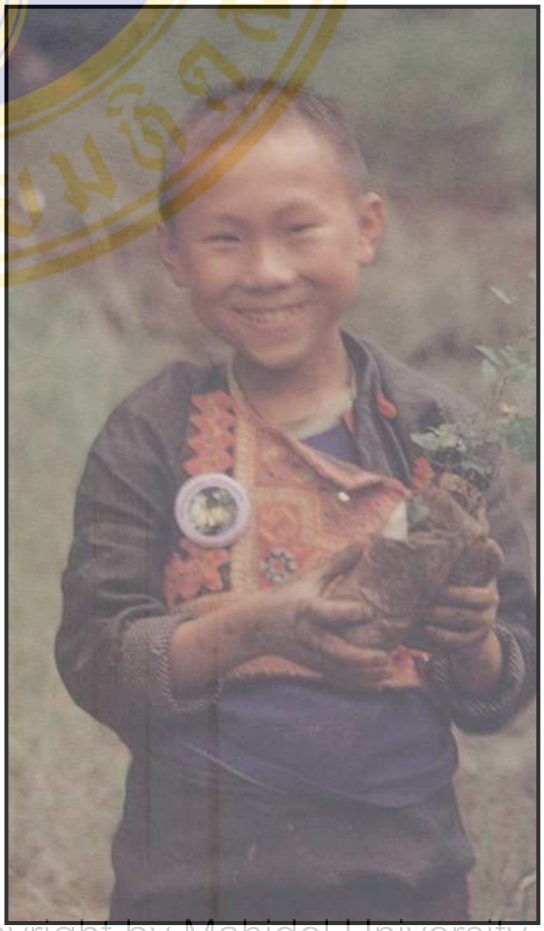
3.4.2 Knowledge environmental education provide basic knowledge to individual to make them understand knowledge and environmental problems including understanding how nature works, association between man and his environment as well as understanding environmental problems and guidelines for solving problems.

3.4.3 Attitude environmental education give individual value and create environmental concern as well as motivating individual to practice prevention and solving environmental problems.

3.4.4 Skill environmental education helps individual to access skill and practice necessary for correcting, improving and protecting environment as well as solving environmental problems.

3.4.5 Participation environmental education allows individual participation in correcting, improving, developing and protecting environment in all levels.

3.4.6 Evaluation on Ability environmental education allows individual to forecast situation as well as make decision to properly handle environment.



Picture 32 Environmental Education Leading toward Favorable Living

Source: Environmental Quality Promotion, 1999.

3.5 Resources for Environmental Education

Resources for environmental education are consisted of learners, curriculum, activities, media and technology and environmental education as being explained in details as the following;

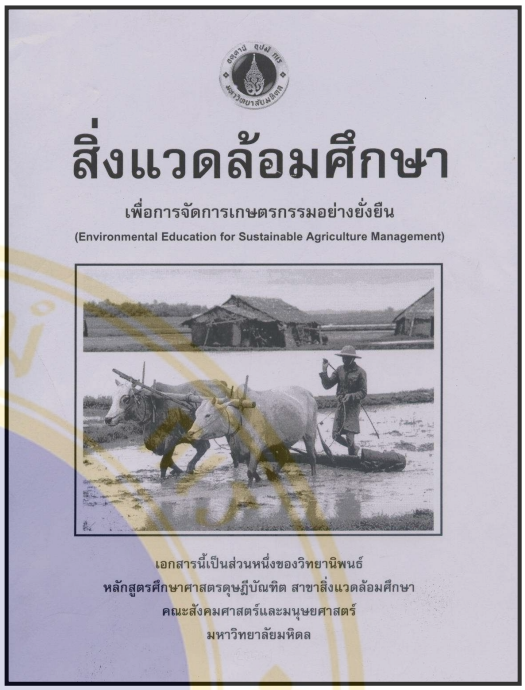
3.5.1 Learners

Learners are farmers, findings from the study of community environmental revealed that the average age of farmers mostly were 43 years old who exhibited adult maturity and life experiences as well as having self confident and eager to learn because they have seen it as necessity for life which rather be specific learning than learning in general.

Picture 33 Farmers Joining the Environmental Education Activity

3.5.2 Curriculum

Since learners are farmers, developed environmental education is non formal environmental education quite similar to local curriculum because developed data and synthesis curriculum collected from the community which included contents in 6 units as follows: Unit 1 Introduction, Unit 2Existing Situation of Environment in Community, Unit 3 Environmental Education, Unit 4 Project Management, Unit 5 Healthy People and Healthy Environment and Unit 6 Conclusion



Picture34 Environmental Education Curriculum for Sustainable Agriculture Management

3.5.3 Activities

Since the targeted groups are farmers and the curriculum are consisted of contents in 6 units as mentioned before. Therefore, activities for transmitting knowledge to farmers must be the activities that farmers can applied in the actual operation such as, field trips, job observation, trainings, demonstration and practicing. As for this research, there are two activities involved in training and practicing which training mostly provides learning in principles by making farmers changing behavior systematically, creating knowledge and understanding, attitude and experience in the subject. As for practicing, actual practice in farmers' own agricultural areas would make

Picture 35 Environmental Education Activity

3.5.4 Media and Technology

Activities in this learning are training and practice. Therefore, media and technology suitable for farmers must be easy to understand and not too complicated by applying 4 types of media and technology as the following;

1) Printing media such as academic documents, pictures and photos.
2) Electronic media such as media as sound and pictures such as Computer voice recorder and slide accompanied CD Rom
3) Natural media such as media naturally available such as agricultural plot, demonstrated plot, soils and water.
4) Equipments media such as agricultural tools as hoe, spade, fertilizer, and seeds.

3.5.5 Environmental Educator

Environmental educator is as same as community developer by building healthy community and healthy environment. Environmental educator must possess 4 characteristics as follows: firstly, environmental educator qualification, secondly, environmental educator duties, thirdly, environmental education management and fourthly, environmental education ethic as stated in the following details;

Picture 36 Environmental Educator at Work with Farmers

1) Qualifications of Environmental Educator

1.1) Understanding environmental education by being able to separate environment from environmental education.

1.2) Possessing ability to build curriculum, activities and apply media and technology.

1.3) Possessing ability on project management

1.4) Possessing ability to communicate

1.5) Possessing ability to evaluate

1.6) Possessing ability to integrate

1.7) Possessing thirst for being environmental educator

2) Functions of Environmental Educator

2.1) Environmental educator must gather farmers for training with Strategic Management which involved in publicity and words to mouth as the strategy to gather interested farmers for training.

2.2) Environmental educator have to transmit environmental knowledge to farmers to achieve objectives in both areas: first in environmental education objectives and second in farmers' ability to mange by writing own administration project.

2.3) Environmental educator have to evaluate and conclude environmental equation results if it had accomplished the desire objectives.

3) Method of Environmental Education

3.1) Lecture

Lecture is for learner to receive knowledge in contents and principles

3.2) Group Discussion

Group discussion is to create consciousness among learners to change skill and attitude to blend and deeply understand the subject.

3.3) Field Trips

Field trips are to observe actual practice in different areas so that learners can be self-learning.

3.4) Demonstration

Demonstration is the emphasis on skill by teaching and explaining for better understanding.

3.5) Brainstorming

Brainstorming is the learning method that each person displayed independently with analysis for the answer and conclusion to the meeting.

3.6) Small Group Segregation

Small group segregation is to allow each learner the participation in expressing idea and sharing knowledge.

3.7) Seminar

Seminar is to assign each learner to study interested subject and presented in the meeting. From then, the discussion would be arranged for the learner to deeply understand.

3.8) Interviewing

Interviewing is to invite speaker to give knowledge which is the better tool for providing knowledge.

Picture 37 Environmental Ethics is Important for Environmental Educator

4) Ethics of Environmental Educator

4.1) Loyalty and righteous by having self loyalty and others

4.2) Job awareness by seriously devote time for work

4.3) Possessing sufficient knowledge in the research for quality work

4.4) Being responsible for work towards living creatures and non creatures in all levels of society

4.5) Giving respect to other research samples' right as human beings

4.6) Being independent thinking without bias in every step of work

4.7) Implementing research results for good benefit

4.8) Giving respect to other people's academic opinion

3.6 Process of Environmental Education

Environmental education could be done in accordance with system theory based environmental education. Therefore, environmental education usually contained 7 steps as follows: firstly, environmental study, secondly, the design of environmental education model, thirdly, resources for environmental education, fourthly, environmental education process, fifthly, environmental education, sixthly, environmental management and seventhly, healthy people living in healthy environment as the following;

3.6.1 Environmental Study

Environmental study involved in the study of 2 areas in community data and community environmental knowledge as the following;

1) The Study of General Information in Community

The study of general information in community is consisted of studying community data in 4 aspects as farmers, management, agricultural occupation and environment through the study of documents, community survey, questioning through questionnaires and interviewing forms.

2) The Study of Environmental Education Learning

The study of environmental education learning is consisted environmental education in 6 aspects: awareness, knowledge, attitude, skill, participation and ability to evaluate by applying questionnaires.

Picture 38 Interviewing for Learning the Existing Situation in Community

3.6.2 Design of Environmental Education Model

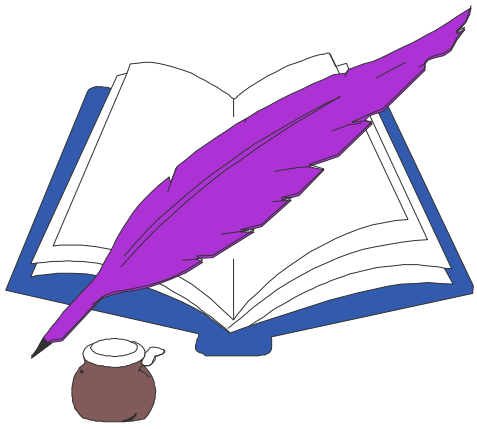
Taking data from environmental education to analyze and synthesize as environmental education model for sustainable agricultural management consisted of the following steps;

1) Analysis and synthesis data derived from studying the environment.

2) Constructing a draft model of environmental education for sustainable agriculture management which consisted of contents in 6 units as follows: Introduction, Existing Situation of Environment in Community, Environmental Education, Project Management, Healthy People and Healthy Environment and Conclusion.

3) Presenting a draft model of environmental education for sustainable agriculture management to the expert for verification and improvement.

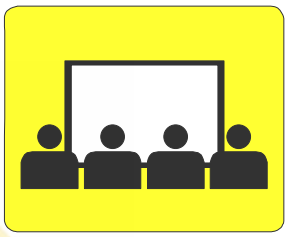
4) Completing a model of environmental education for sustainable agriculture management.



3.6.3 Resources for Environmental Education

Resources for environmental education are consisted of 5 factors as the following;

1) Learners



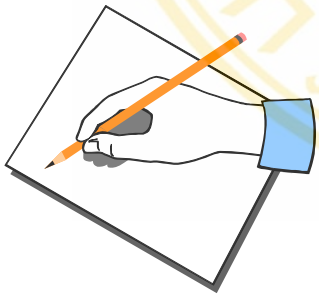
Learners are interested farmers who have been occupied agricultural occupation by growing crops and/or raising animals and gathered by environmental educator to participate in the project.

2) Curriculum

Curriculum is the environmental education model for sustainable management derived from synthesizing environmental education model consisted of contents in 6 units as previously mentioned.

3) Activities

Activities used in transmitting environmental education knowledge to farmers in this research such as training activities for learning the principle and practice in skill.



4) Media and Technology

Media and Technology are consisted of printing media, electronic media, natural media and equipments media. Such media must not be too complicated which should make farmers learn and understand better.

5) Environmental Educator

Environmental educator is being considered as having important roles in driving environmental education to widely practice among farmers and in the community. Environmental educator must possess the following 4 components in environmental educator qualification, environmental educator roles, methods for handling environmental education and environmental educator ethics.

3.6.4 Process of Environmental Education

Environmental education or process in the environmental education is integrated process that incorporated environmental input together in 5 factors by the environmental educator who is in charge of transmitting knowledge to farmers together through 2 environmental education activities in training for the principle and writing administrative plan and the practice as learning skill from actual field practice as written plan, including the uncomplicated use of proper media and technology suitable for farmers.

3.6.5 Objectives of Environmental Education

The achievement of environmental education is the out put of environmental education process which consisted of achievement results evaluation in farmers' environmental education as set in 6 objectives as follows: awareness, knowledge, attitude, skill, participation and evaluation on ability.

Picture 39 Environmental Education Leading to Problems-Solving and Sustainable Development

Source: Environmental Quality Promotion, 1999

3.6.6 Environmental Management (Outcome)

Environmental management or outcome is the result of the environmental education process after farmers has formal environmental education as the basis for agricultural occupation under the administration concept of Project Management through occupation planning based on identifying objectives and methods for production to achieve set objectives as well as using the production materials worthwhile and operating under the specific time. As a result, farmers have full skill in managing agricultural occupation project.

Picture 40 Management Leading to Get Income, Quality of Life and Environment

3.6.7 Healthy People Living in Healthy Environment (Impact)

Healthy people living in healthy environment or Impact derived from principles of project administration in agricultural occupation that involved Environmental Education which had boosted farmers income, leading to healthy living form being environmental-friendly as well as extending the lasting use of community resource and creating economic security such as in occupation and production as well as life security such as in health, environment and finally resources security in healthy living and quality environment which turning into sustainable community.

3.7 Evaluation

Evaluation is done at 3 levels: first in output, second in outcome and third in impact as in the following detail explanations;

3.7.1 Output

Output is consisted of environmental education in achievement evaluation 6 aspects as awareness, knowledge, attitude, participation and ability to evaluate results.

3.7.2 Outcome

Outcome is consisted of management achievement evaluation in the ability to write administrative project plan.

3.7.3 Impact

Impact is consisted of evaluation of results in actual practice in accordance with administrative project plan in the farmers' won agricultural are leading to sustainable healthy people living in the healthy environment.

3.8 Conclusion

Environmental education is the learning process directly aim at the development of human spirit for internal knowledge to display environmental friendly external knowledge which has been transmitted from one person to another and keep on spreading involving with system theory based environmental education with the application of 7 steps of environmental educational process to promote environmental education objectives in 6 aspects as well as increasing income from successful operation, healthy living and sustainable community environment from occupational agriculture with friendly environmental attitude.

Picture 41 Environmental Education Leading to Healthy Living, Quality Environment and Sustainable Community

UNIT 4
PROJECT MANAGEMENT

4.1 Preface

Project management is the tool to manage sustainable agriculture that should help to generate more income for farmers and create healthy environment from agricultural occupation by operating project under the limited timeframe with the use of available resource for maximum benefit. This is how we can achieve our objectives under the strict time and resources as similar to time limitation in agricultural occupation when growing each crop or raising each type of animal. Therefore, it is necessary for farmers to administer project under the specified time in one harvest season.

Picture 42 Project Management as Planning to Get Income and Quality of Environment

4.2 Principle of Project Management

Project management is to define or select the approach to achieve objectives under the limited resource and time frame Therefore, components of project management are consisted of objectives, approach, resource and time frame which involved farmers as the project managers to plan and proceed with agricultural occupation to yield production as plan with worthy resource utilization in the limited time frame of each crop growing and raising animals to derive at products with quality and quantity desire as being shown in the figure 4 below;

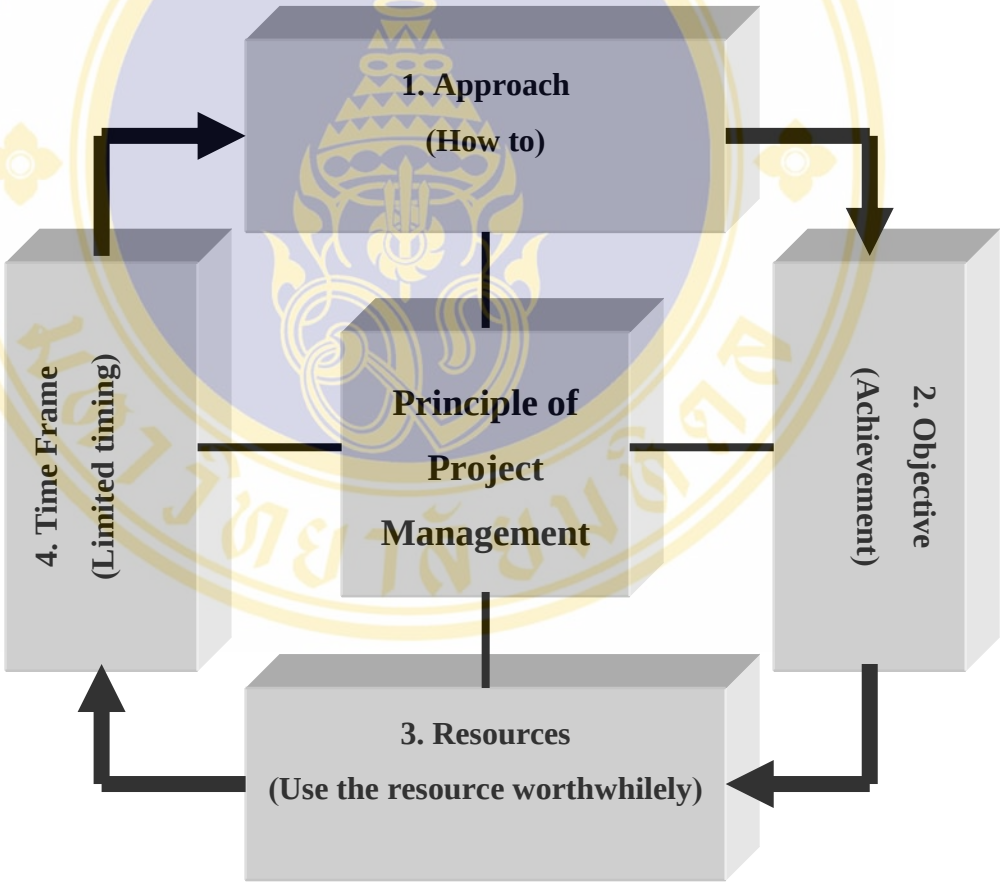


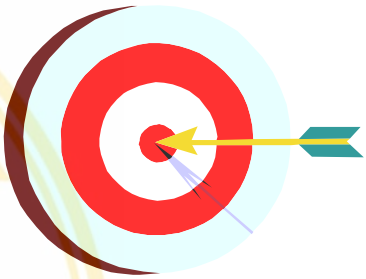
Figure 4 Principle of Project Management

Source: Wee Rawang, Mahidol University

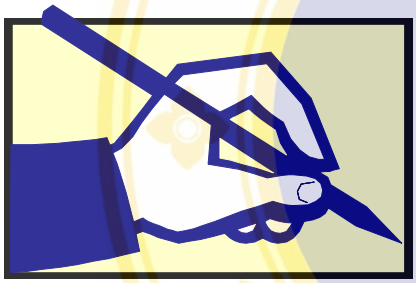
4.3 Components of Project Management

Project management could be done to achieve the set objectives with available resources under the limited time. Then, project administration is consisted of 4 components as follows: firstly, objectives, secondly, approach, thirdly, resource and fourthly, time frame.

4.3.1 Objective



Objective is to identify desired target for achievement as responding to the need of agricultural occupation and environment such as growing rice with intention to produce 100 bins of rice and also maintain healthy environment.



4.3.2 Approach

Approach is the bridge or channel which led to the set goals. For example, growing 100 bind of rice and also maintaining healthy environment require rice species that yield high amount of rice per ear and applying bio instead

of science fertilizer to maintain healthy environment.

4.3.3 Resource

Resource is referring to the use of all type of resources in order to achieve the set goals which consisted of the following 4 factors: first man such as labor, producer, and consumer, second knowledge and management such as, in order to grow rice, one must have knowledge regarding rice and method of increasing production as desired, third materials such as plant and animals' species, agricultural equipments or machinery and fourth money such as other expenses in gasoline, vehicle, waterworks and electricity.

4.3.4 Time Frame

Time frame is the time spent on work to achieve the set goals by specifying time from the beginning to the end of the project or specific period of time within one crop growing season or raising animals such as 3 months or 6 months.

4.4 Project Management Process

Project management process can be compared as planning to achieve goal which is a part of project management process which consisted of 5 steps: 1) data collecting, 2) data analyzing, 3) planning, 4) performance and 5) evaluating as being shown in figure 5 and project management is covers 5 steps as the following;

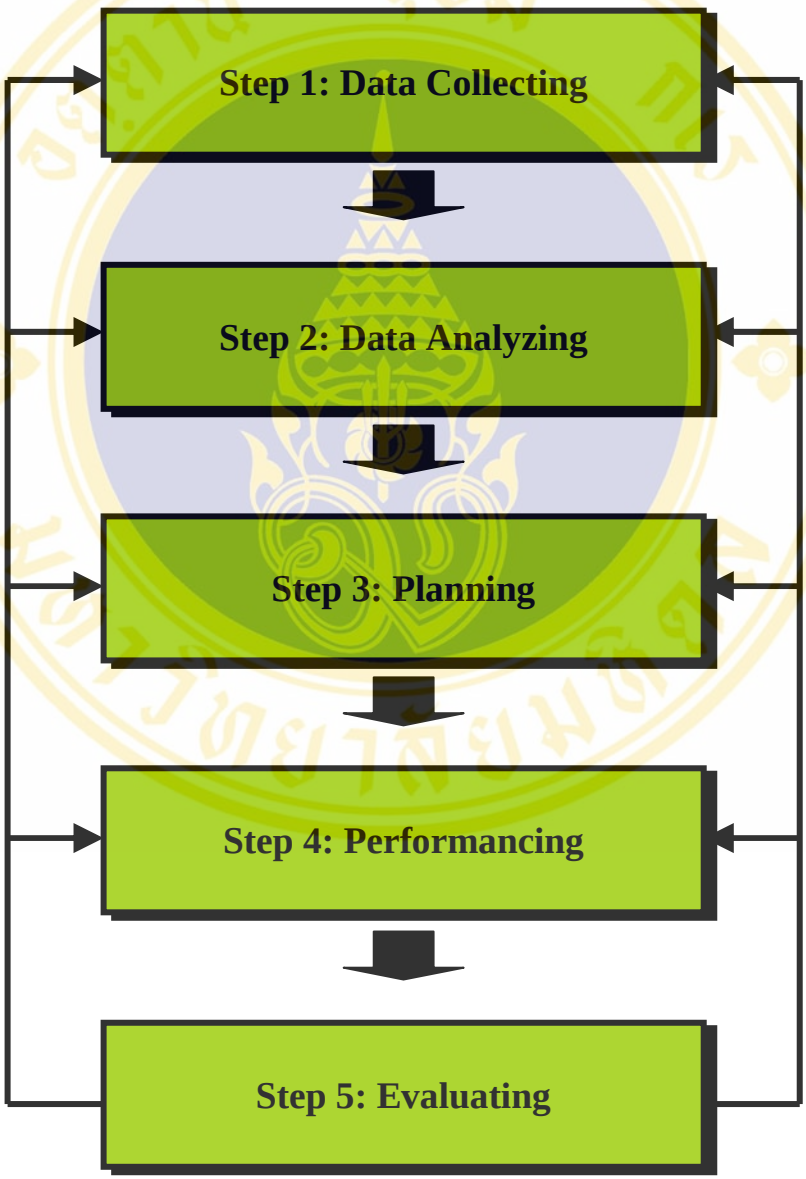


Figure 5 Project Management Process

Source: Wee Rawang, Mahidol University

4.4.1 Data Collecting

Data collecting is the survey for all available data which related to farmers' agricultural occupation to analyze and make decision.

4.4.2 Data Analyzing

Data analysis is the analysis of all data based on factors available. Available data must be separated and considered together with production factor such as when a person needs to raise beautiful fishes for sale with limiting source of funds. He has to decide which type of fishes to yield the most profit with available funds before proceeding with plan

4.4.3 Planning

Planning is to design or identify activities at work which contained agricultural occupation method based on 4 components as follows: firstly, objectives, secondly, approach, thirdly, resource and fourthly, time frame which involved how to plan for reaching maximum benefits with the minimum use of production factors, leading to increasing income before actual implementation.

Picture 43 Planning Bring to Solve the Problem with Effectiveness

4.4.4 Performancing

Performance is to proceed with activities as plan by farmers applied designed plan in the actual agricultural area and evaluated results afterward.

Picture 44 Planning for Achievement in and Concrete Results

4.4.5 Evaluating

Evaluating is to measure activity level as plan through measurement of results and compare with set measures which employed evaluation in 5 levels as the following;

1) Not practicing = 0 point
2) Practice = 1 point
3) Practice as plan = 2 points
4) Practice as plan and achieve desire objectives = 3 points
5) Practice as plan and achieve desire objectives effectively = 4 points

4.5 Project Writing

Since project management involved planning, farmers must write project as planning for agricultural occupation , responding to the highest achievement as desire with the least used in production materials, leading to more income and in the same time making living from environmental friendly-agricultural occupation, leading to quality environment together with higher income. Project writing includes 10 components as follows: first in project title, second in responsible person, third in principle and reason, fourth in objectives, fifth in goals, sixth in operational steps, seventh in resource, eight in time frame, ninth in evaluation and tenth in contribution. Details are shown as the following;

4.5.1 Project Title

Project title is the display of work nature as what kind of work a person plans, perhaps in encountering problems or problems needed to be solved. Moreover, project name tells about the objectives, time frame or location such as chemical-free vegetables project and breeding beautiful fishes for exporting.

4.5.2 Responsible Person

Responsible person is the responsible person for planning and operating project. In order to identify the responsible party for the project, the name which may be the farmer must be stated clearly.

4.5.3 Principle and reason

Principle and reason are background of the project, the origin, the purpose of doing this project and the value of the project to the agricultural occupation by having the actual and reliable data to support writing the project.

4.5.4 Objectives

Objectives are the concrete guidelines for operating project by specifically identifying the quantity to know the purpose measurable quantity for evaluation. In order to identify objectives, one must list 2 concerned issues in the set objectives must be accomplished for both agricultural occupation and environment such as to breed beautiful fishes for 5000 fishes and breeding fishes without water turning bad.

Picture 45 Project Writing for Friendly Environment Being Able to Achieve both Objectives in Agricultural Occupation and Environment

4.5.5 Goal

Goal is the display of desire in abstract without indicating amount or number which has been different from setting objectives such as breeding beautiful fishes project with the goal to increase production of beautiful fishes based on market demand.

4.5.6 Operational Steps

Operational steps is to list steps for work to accomplish the set objectives by stating what to do, how to do, how many and when to do. It must be listed in steps that require farmers to think, compare advantages and disadvantages in all aspects such as resources and expenses to derive at the method most suitable, most economical and yield the most results.

4.5.7 Resource

Resource is all resources used in the project such as man, management, materials and money which required the survey and find the availability and how much more needed. Available resources should be used first and adapted for further use, only buy what is necessary.

1) Man is defined as individual related to project or agricultural occupation such as, producer, consumer, farmer and family member, trader or laborer. These people involved must be listed in names and identified their relationships with the project.

2) Management and knowledge on the occupation and approach to achieve the set objectives such as breeding beautiful fishes, project with the goal to increase production of beautiful fishes based on market demand.

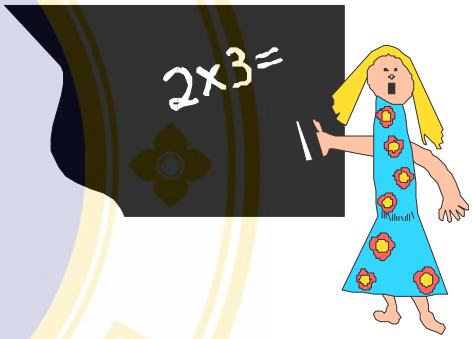
3) Materials is defined as all materials related to the project or applied in agricultural occupation such as plants and animals seeds, fertilizers, chemicals, agricultural equipments and machineries.

4) Money is defined budget for investing in the project or agricultural occupation such as materials, equipments, gasoline and vehicle, utilities, waterworks and telephone.

4.5.8 Time Frame

Time frame is defined as the project schedule, lists of day, month and year from the beginning to the end of the project such as 7 months duration from January1, 2007 to 31 July, 2007. Furthermore, each operation time span may be listed such as nursing beautiful fishes takes 30 days from January 1, 2007-January 30, 2007.

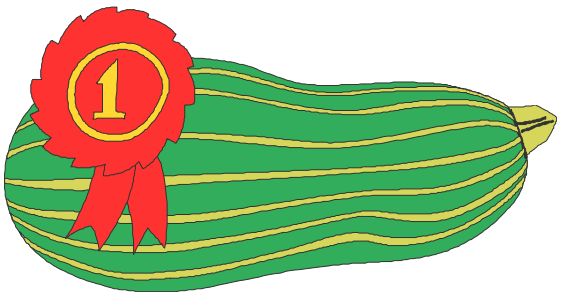
4.5.9 Evaluation



Evaluation is monitoring and measuring project results to see if it has been accomplished as set objectives and by how much as well identifying evaluation methods. Measuring results must be done in accordance to the set objectives in 2 topics as follows: first being able to breed 5,000 fishes as plan by counting number of fishes and second compatible with environmental objectives such as breeding beautiful fishes without water turning waste from not having foul order and checking by smelling water.

4.5.10 Contribution

Contribution is the fringed benefit or unexpected compensation outside the set objectives directly and indirectly which must be identified whether those results derived from the project or agricultural project such as increasing income from selling 5,000 beautiful fishes in the beautiful fishes project or better living or not damaging the water source.



FORM OF PROJECT MANAGEMENT

1. Project Title:……..…..

2. Responsible Person:……....

3. Principle and Reason:

……

……

……

……

4. Objectives:

4.1……

4.2……

4.3……

5. Goals:

5.1……

5.2……

5.3……

6. Operational Steps:

6.1……

6.2……

6.3……

6.4……

6.5……

7. Resource:

7.1 Man

……

……

……

……

……

FORM OF PROJECT MANAGEMENT (cont.)

7.2 Management and Knowledge

.....

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.....

7.3 Materials

.....

.....

.....

7.4 Money

.....

.....

.....

8. Time Frame:

.....

9. Evaluation:

.....

.....

.....

10 Contributions:

10.1).....

10.2).....

10.3).....

4.6 Conclusion

Project management makes the plan for resources allocation balancing perfectly without environmental problems, leading toward healthy living and healthy environment. Project Administration is consisted of 4 components as follows: objectives, approach, resource and time frame. This is involved how to approach the work to make it achieved the set objectives with available resources under the limited timeframe by further writing the project and proceeding with project administration plan in the following 5 steps : data collecting, data analyzing, planning and performancing and evaluating.

Picture 46 Agricultural Occupation for Friendly Environment, Leading to Healthy People and Healthy Environment

UNIT 5
HEALTHY PEOPLE AND HEALTHY ENVIRONMENT

5.1 Preface

Healthy people for healthy environment is being compared to green and happiness to life equilibrium between physical, mental, social and environment under the righteous management based on sufficiency economy as the guidelines to develop and manage agricultural occupation, directing at balancing of human, society, economic and environment and in turn, leading toward sustainable development and green happiness within self, family and community. Environmental education is the process to build sustainable which defined as having healthy living and healthy environment by acting as the mechanism to solve existing problems from agricultural occupation in the community as if being managed the project to lead to sustainable agriculture management that can make farmers healthy people and healthy environment such as more income and equilibrium environment as being shown in figure 6.

Picture 47 Green and Happiness for Healthy People in Healthy Environment

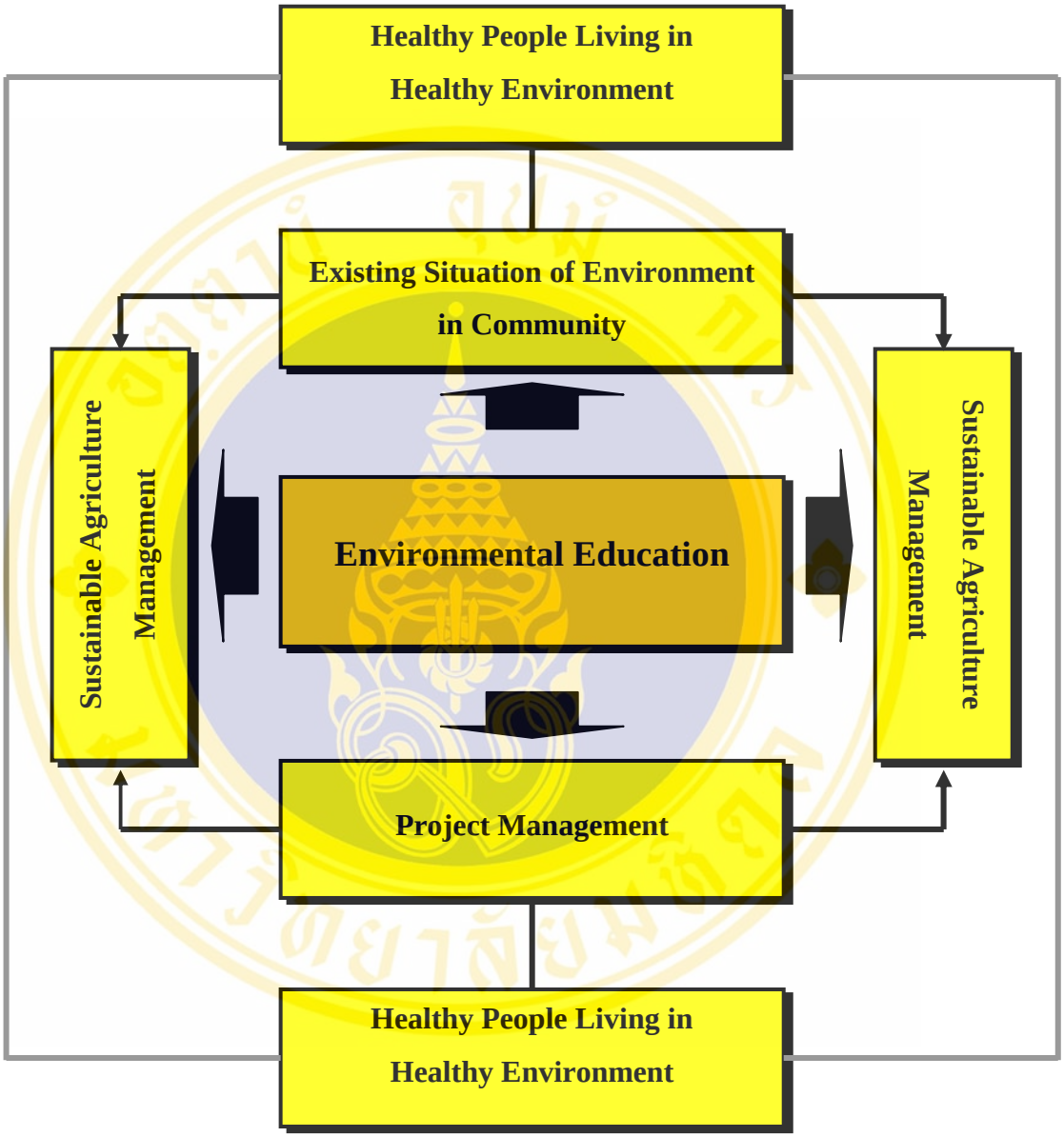

Figure 6 Environmental Education for Development of Healthy People and Healthy Environment in Community

Source: The Research Findings

5.2 Healthy People in Community

Agricultural occupation based on concept environmental education and principle of project management led to sustainable agriculture effecting more farmers' income and better living, leading to healthy people by having good health under the following 3 equilibriums: physical, mental and society.

5.2.1 Physical

Physical is having healthy body without sickness and having longevity and existing in the society happily.

5.2.2 Mental

Mental is having good spirit, being kind, doing the righteous thing as well as having opened mind and managed emotional perfectly, including unselfishness and doing good deeds for the whole society.

5.2.3 Society

Society is having warm and stable family with family members working for living with regular income and occupation leading to strong community with immunity and self-support. This is the society caring for each other, respecting the equality and others differences, willing to coexist peaceful and in harmony as well as having good culture that connect community people and society together.

Picture 48 Physical, Mental, Social and Environment are for Green and Happiness

5.3 Healthy Environment in Community

Agricultural occupation under the sustainable agricultural management besides leading to healthy environment, it can create environmental equilibrium in 2 parts as follows: firstly, natural environment and secondly, cultural environment.

5.3.1 Natural Environment

Having environmental equilibrium involved with 6 components as follows: firstly, soil, secondly, water, thirdly, air, fourthly, energy and minerals, fifthly, plants, sixthly, animals through the use, management , protecting, conservation and developing limited available resources for abundance and support life for maximum benefit with the concern for the next generation.

5.3.2 Cultural Environment

Having cultural environment equilibrium involved with 4 components as follows: firstly, concept culture such as concept, knowledge, secondly, organization culture such as group gathering, family, institute, thirdly, usage culture such as holistic culture, tradition, life styles and practice and fourthly, objects culture such as infrastructures, starting from human knowledge led to righteous environmental concern. Then, one person's idea extended to family, community until becoming culture and environmental friendly, life styles and eventually leading to stable structure and security in living, life and assets.

Picture 49 Local Fishery Leading to Income and Natural Balance

5.4 Conclusion

Sustainable agricultural occupation based on environmental education concepts and principle of project management, leading to healthy people for healthy environment by increasing farmers' income sufficient for existence to stay in better environment under the equilibrium between physical, mental, social and environment. Having income from sustainable agriculture can lead to better status, good health, and warm and stable family, strong community, equilibrium environment, and self support with green and happiness until achieving sustainable eventually.

Picture 50 Agricultural Occupation for Friendly Environment Leading to Green and Happiness in the Community

UNIT 6
CONCLUSION

Environmental education for sustainable agriculture management is intended for farmers to manage agricultural occupation for sustainable healthy people and healthy environment in the community which consisted of 6 units as follows: firstly, introduction is about the background of environmental education for sustainable agriculture management, Secondly, the existing situation of environmental in community, thirdly, environmental education is the process intended to develop farmers' minds for friendly environment and displayed in agricultural occupation without environmental destruction, having the environmental educational philosophy in human mind development to achieve environmental education objectives, leading to environmental management, fourthly, project management as the occupational tools for sustainable management by farmers' ability to plan agricultural to achieve the set objectives under the limited factors and time frame in one harvest season with written project. Project management is consisted of 4 components in objectives, approach, resource and time frame by proceeding under the process of project management leading to sustainable healthy people and healthy environment, fifthly, healthy people and healthy environment resulted from sustainable agricultural occupation based on environmental education framework and principle of project management, leading to better income, warm family, strong community, peaceful society and equilibrium environment and sixthly, conclusion in environmental education for sustainable agricultural occupation as the guideline for solving problems in agricultural occupation in the community as the results from agricultural occupation in accordance with environmental education framework and principle of project management that should provide farmers with healthy living and healthy environment.

APPENDIX B.

Questionnaire of Environmental Education for Sustainable Agriculture Management

No......

Questionaire

on

Environmental Education for Sustainable Agriculture Management

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Directions

This questionaire was available for collecting data in the research title of environmental education for sustainable agriculture management. The questionaire composed of 6 parts as the following;

Part 1 Personal Information
Part 2 Questions Related to Management
Part 3 Questions Related to Agricultural Occupation
Part 4 Questions Related to Community Environment
Part 5 Questions Related to Learning on Environmental Education
Part 6 Problems and Recommendations

This data collected will be taken to analyse for completion of doctoral dissertation in Environmental Education Program, Department of Education, Faculty of Socialsciences and Humanities, Mahidol University.

Thank you

Chutautip Thawornratana
Doctoral Student in Environmental Education
Mahidol University

Directions: Part 1-3, please mark ✓ into ☐ before the sentence or fill in the blank.

Part 1 Personal Information

1.1 **Geder** ☐ Male ☐ Female

1.2 **Age**.....years old (If over 6 monyhs, counting to be 1 year).

1.3 **Marital Status** ☐ 1. Single ☐ 2. Married ☐ 3. Others (Specify……)

1.4 **Religion** ☐ 1. Buddhism ☐ 2. Islamic
☐ 3. Christian ☐ 4. Others (Specify……)

1.5 **Education** ☐ 1. Primary (1- 6) ☐ 4. Bachelor Degree
☐ 2. Secondary (1- 6) ☐ 5. Master Degree
☐ 3. Junior/Senior ☐ 6. Others (Specify……)

1.6 **Size of Household**

1) The number of member in household.....persons (male.....persons, female……persons).

2) The member in household

☐ 1. Husban ☐ 3. Children ☐ 5. Mother ☐ 7. Others (Specify……)
☐ 2. Wife ☐ 4. Father ☐ 6. Relative

1.7 **Land Use**

1) Amount of land use holding.....rai.

2) Amount of agriculture land use.....rai.

3) Forms of land use occupied

☐ 1. Own.....rai.

☐ 2. Rent.....rai.

Part 2 Questions Related to Management

2.1 **Goal / Objective**

1) The decission making of plantation and/or animal raising

☐ 1. Based on previously own

☐ 2. Based on own skill

☐ 3. Based on follow mostly neighbors

☐ 4. Based on government

☐ 5. Based on production resources

☐ 6. Based on market demand

☐ 7. Others (Specify……)

2) The specify of yearly incom on agricultural occupation.

☐ 1. Yes ☐ 2. No

3) Yearly incom in average.....baht.

4) Yearly expense in average .....baht.

5) Yearly expected income in average.....baht.

2.2 **Approach**

1) The decission making of production planning

☐ 1. Based on ancestor teaching

☐ 2. Based on own skill

☐ 3. Based on objective

☐ 4. Based on production resources

☐ 5. Based on follow mostly neighbors

☐ 6. Others (Specify……)

2) Planning production in agricultural occupation.

☐ 1. Yes ☐ 2. No ☐ 3. Others (Specify……)

3) Significant Factors in Production Planning

☐ 1. Production objectives

☐ 2. Production method

☐ 3. Production resources such as workers, equipments and capitals

☐ 4. Production time frame

☐ 5. Others (Specify……)

4) Production Plan in agricultural occupation

☐ 1. Based on own demand

☐ 2. Based on market demand

☐ 3. Based on follow mostly neighbors

☐ 4. Base on order

☐ 5. Aimlessly production

☐ 6. Others (Specify……)

2.3 **Production Resources**

1) The resource of workers in agricultural occupation

☐ 1. Household ☐ 3. Hiring

☐ 2. Relatives ☐ 4. Others (Specify……)

2) The number of workers in agricultural occupation.....persons.

3) The classicfication of workers in agricultural occupation

☐ 1. General ☐ 2. Special expert (Specify……)

☐ 3. Others (Specify……)

4) The resource of hiring workers in agricultural occupation

☐ 1. Within District ☐ 3. Other Province

☐ 2. Within Province ☐ 4. Others (Specify……)

5) The approach of finding to materials in agricultural occupation

5.1 Machinery ☐ 1. Able to produced ☐ 2. Buy ☐ 3. Others (Specify…)

5.2 Tools ☐ 1. Able to produced ☐ 2. Buy ☐ 3. Others (Specify…)

5.3 Organic fertilizer ☐ 1. Able to produced ☐ 2. Buy
☐ 3. Others (Specify……...)

5.4 Chemical fertilizer ☐ 1. Able to produced ☐ 2. Buy
☐ 3. Others (Specify……..)

5.5 Seedling/Animals ☐ 1. Able to produced ☐ 2. Buy
☐ 3. Others (Specify……..)

5.6 Pestices ☐ 1. Able to produced ☐ 2. Buy
☐ 3. Others (Specify……..…)

6) The approach of spending for materials in agricultural occupation

☐ 1. Cash ☐ 2. Instalment ☐ 3. Others (Specify……..…)

7) Yearly expense of materials in agricultural occupation

7.1 Machinery.....baht.

7.2 Tools…….....baht.

7.3 Organic fertilizer.....baht.

7.4 Chemical fertilizer.....baht.

7.5 Seedling/Animals.....baht.

7.6 Pestices.....baht.

7.7 Others (Specify……..…)

8) Sources of money in agricultural occupation

☐ 1. Self-funding ☐ 4. Borrow from community capitalist

☐ 2. Borrow from relatives ☐ 5. Bank Loan

☐ 3. Borrow from neighbors ☐ 6. Others (Specify……..…)

9) Addition funds.

☐ 1. Self-funding ☐ 4. Borrow from community capitalist

☐ 2. Borrow from relatives ☐ 5. Bank Loan

☐ 3. Borrow from neighbors ☐ 6. Others (Specify……..…)

2.4 **Time Frame**

1) The number of plantation and/or animal raising within a year.

1.1 Plantation.....times.

1.2 Animal raising.....times.

Part 3 Questions Related to Agricultural Occupation

3.1 **Occupation**

1) Agricultural Occupation

☐ 1. Major ☐ 2 Minor

2) Type of supplementary occupation

☐ 1. Vendors ☐ 2. Work for wages ☐ 3. Others (Specify……..…)

3) Agricultural occupation in average ……years.

4) Reasons for being in agricultural occupation

☐ 1. Ancestor Occupation ☐ 3. Inherit land from parents

☐ 2. Enjoy being in agricultural occupation ☐ 4. Others (Specify……)

3.2 **Classification of agriculture**

1) Form of agricultural occupation

☐ 1. Plantation only

☐ 2. Animal raising only

☐ 3. Plantation and Animal raising

3.3 **Method of Distribution**

1) Method of distribution in agricultural occupation

☐ 1. The seller direct to the traders at home ☐ 3. Selling to retail market

☐ 2. Selling to wholesale market ☐4. Others (Specify…….)

2) Source of the market for distributing in agricultural occupation

☐ 1. Domestic market ☐ 2. Foreign market

3.4 **Income**

1) Yearly income of agricultural occupation in average……..…..baht.

3.5 **Expense**

1) Yearly expense of agricultural occupation in average……...baht.

3.6 **Group Member**

1) Group member of agriculture

☐ 1. Yes ☐ 2. No (Specify the reason……)

2) As for members, number of meeting in average..... times.

3.7 **Training**

1) Receiving the training in agricultural occupation.

☐ 1. Yes ☐ 2. No (Specify the reason……)

2) As for members, number of receiving training in average..... times.

Part 4 Questions Related to Community Environment

4.1 **Soil**

1) Classificationof soil in community

☐ 1 Clay ☐ 3. Loose soil

☐ 2. Sandy soil ☐ 4. Others (Specify……..…)

2) Using of soil in community

☐ 1. Agriculture ☐ 3. Industry

☐ 2. Resicence ☐ 4. Others (Specify……..…)

3) Problem of soil in community

☐ 1. Alkaline soil ☐ 3. Acid soil

☐ 2. Highly acid soil ☐ 4. Others (Specify……..…)

4.2 **Water**

1) Classification of water source in community

☐ 1. River and Canal ☐ 3. Underground water

☐ 2. Tab water ☐ 4. Others (Specify……..…)

2) Using of water in community

☐ 1. Agriculture ☐ 3. Industry

☐ 2. Resicence ☐ 4. Others (Specify……..…)

3) Problem of wate in community

☐ 1. Inadequate ☐ 3. Overflow

☐ 2. Waste water ☐ 4. Others (Specify……..…)

4.3 **Air**

1) Air pollution problems in community

☐ 1. Having problems ☐ 2. Not having problems

2) Classification of Air pollution problems in community

☐ 1. Foul Odor ☐ 3. Dusty

☐ 2. Chemical mixtures ☐ 4. Others (Specify……..…)

3) Cause of air pollution in community

☐ 1. Factory ☐ 3. Lump laterite road

☐ 2. Pesticides ☐ 4. Others (Specify……..…)

4.4 **Energy**

1) Amount of money spending for energy in a month

☐ 1. Fuel ☐ 3. Cooking gas

☐ 2. Electricity ☐ 4. Others (Specify……..…)

2) Problems related to energy

☐ 1. Expensive ☐ 3. Less Amount of Energy

☐ 2. Difficult to finding ☐ 4. Others (Specify……..…)

4.5 **Plant**

1) Classification of economic plants in family

☐ 1. Rice ☐ 3. Fruits

☐ 2 . Vegetables ☐ 4. Others (Specify……..…)

2) Vegetable in family.

☐ 1. Growing ☐ 2. No Plantation

3) Classification of vegetable garden (arranged in 3 priorities)

☐ 1. Chilli ☐ 6. Onoin ☐ 11. Ginger

☐ 2. Kaile ☐ 7. Galangal ☐ 12. Lettuce

☐ 3. Coccinia grandis ☐ 8. Basil ☐ 13. Lemongrass

☐ 4. Leucaena leucocephala ☐ 9. Kaffer ☐ 14. Others (Specify…)

☐ 5. Gourd ☐ 10. Cucumber

4.6 **Animal**

1) Animal raising in family

☐ 1. Yes ☐ 2 .No

2) Classification of animal raising in family (arranged in 3 priorities)

☐ 1. Pig ☐ 3. Cow ☐ 5. Fish

☐ 2. Chicken ☐ 4. Duck ☐ 6. Others (Specify……)

4.7 **Concept Culture**

1) The relationship between human and environment

☐ 1. Human was a partial of environment

☐ 2. Human have to construct the thecnology for concrolling the environment

☐ 3. Everything in the world was not last long

☐ 4. The only God was a world king

☐ 5. Others (Specify……..…)

2) The decission making in the way of life

☐ 1. Based on yourself

☐ 2. Based on the expert consulting before decide

☐ 3. Based on the mosly member in family

☐ 4. Based on the consideration of own benefit

☐ 5. Based on exsiting situation

☐ 6. Not interesting to decide

4.8 **Organization Culture**

1) The approach to solve the quarrel problem in family

☐ 1. To give up

☐ 2. Reconciled by parents

☐ 3. Reconciled by older relative

☐ 4. According to law

☐ 5. Others (Specify……..…)

2) The approach to solve the quarrel problem in community

☐ 1. To give up

☐ 2. Reconciled by the older in community

☐ 3. Reconciled by the leader in community

☐ 4. According to law ☐ 5. Others (Specify……..…)

4.9 **Usage or Behavior Culture**

1) Family Expense

☐ 1. Residence sush as renting, the installment of house

☐ 2. Food

☐ 3. garments

☐4. Education

☐ 5. The facilities sush as mobile phone, computer, the installment of car

☐ 6. Others (Specify……..…)

2) Saving

☐ 1. Bank ☐ 3. Bond

☐ 2. Cooperative ☐ 4. Others (Specify……..…)

4.10 **Object Culture**

1) Classification of the residence

☐ 1. Detached house ☐ 3. Townhouse

☐ 2. Bussiness building ☐ 4. Others (Specify……..…)

2) Form of the ownership of residence.

☐ 1. Own ☐ 4. Rent

☐ 2. Welfare ☐ 5. Others (Specify……..…)

☐ 3. Relative

3) Number of the facilities in household

☐ 1. Car…….…..item. ☐ 6. VCD/DVD player…….item.

☐ 2. Motercycle……..….item. ☐ 7. Refrigerator……...item.

☐ 3. Bycicle……..…item. ☐ 8. Washing machine……...……...item.

☐ 4. Television……item. ☐ 9. Microwave oven……item.

☐ 5. Stereo……..…..item. ☐ 10. Others (Specify……..…).

Direction: Part 4-5, please mark ✓ into the blank of learning level.

Part 5 Questions Related to Learning on Environmental Education.

Please mark ✓ into the blank of learning level as the follow;

5 mean very high 2 mean low

4 mean high 1 mean very low

3 mean moderate

Question	Levels of Learning				
	5	4	3	2	1
1. Awareness 1.1 Agree that human was a patial of environment. 1.2 Agree that the quality environment affect to life quality. 1.3 Agree that human has not existed if wihtout environment but the environment has existed while without human.					
2. Knowledge 2.1 The produce expansion can be depended on the chemical fertilizer and pesticides only. 2.2 The pesticdes spraying was the fair ownership. 2.3 The agricultural occupation have to will be taken the highest benefit.					
3. Attitude 3.1 The quality environment affect to physical health. 3.2 The quality environment affect to mental health. 3.3 The quality environment affect to overall of life quality.					
4. Skill 4.1 Can be analised the affect of the agricultural occupation to community environment. 4.2 Can be decided to choose the plantaion and / or animal raising that was not destroy the environment in community. 4.3 Can had the income in agricultural occupation that was not destroy the environment in community.					

Question	Levels of Learning				
	5	4	3	2	1
5. Participation 5.1 There was the participation for meeting that related to development and conservation in community environment. 5.2 There was the participation for planting and / or animal raising that that was not destroy the environment in community. 5.3 There was the participation for persuading that related to development and conservation in community environment.					
6. Ability on Evaluation 6.1 If people in community burns the weste more, in the future will be occurred the global warming more. 6.2 If human has not stopped to detroy the forest, the world will be occurred disaster. 6.3 The using of pesticeds in agricultural occupation can affect to living of plants, animals, and healthy people.					

Part 6 Problems and Recommendations

Please specify of problems or recommendations related to farmers, management, agricultural occupation and community environment that affected to the enough income for living and supportted the quality environment; arranged in 3 priorities.

6.1……

6.2……

6.3……

APPENDIX C.

The Interview Form of Intention to Act for Farmers' Occupation Management

Interview Form

Intention to Act for Farmers' Occupation Management

Direction The question for interviewing the farmer that related to intention to act on occupation management.

Items	Levels of Intention to Act				
	Very High	**High**	**Moderate**	**Low**	**Very Low**
1. Objective 1.1 Intention to specify the objective or goal before plantation and / or animal raising. 1.2 Intention to specify the types and quantity on plantation and / or animal raising that corresponded to market demand. 1.3 Intention to specify the income before plantation and / or animal raising with sufficienctly to existing and family. 1.4 Intention to plantating and / or animal raising which considered to sustainably of community environment.					
2. Approach 2.1 Intention to apply the plantation and / or animal raising that had followed the plan. 2.2 Intention to apply the plantation and / or animal raising that had followed the objective. 2.3 Intention to apply the plantation and / or animal raising with efficiently					

Intention to Act for Farmers' Occupation Management (Cont.)

Items	Levels of Intention to Act				
	Very High	**High**	**Moderate**	**Low**	**Very Low**
3. Resources 3.1 Intention to apply the labor in family on plantation and / or animal raising with suitably. 3.2 Intention to hire the labor on plantation and / or animal raising with suitably. 3.3 Intention to apply the materails on plantation and / or animal raising with suitably. 3.4 Intention to apply the money on plantation and / or animal raising with suitably.					
4. Time Frame 4.1 Intention to grow up the plantation and / or animal raising in a period with suitably. 4.2 Intention to grow up the plantation and / or animal raising in specific time with suitably. 4.3 Intention to begin and end of production product on plantation and / or animal raising at suitable time.					

BIOGRAPHY

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